Speakers from the Meetings of the Working Group on Environment in U.S.-China Relations
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An Overview of Chinese Water Issues

10 September 1997

Chinese Oceanic Issues

China's ocean challenges and priorities are not much different than those in the United States: the Chinese are attempting to balance economic growth and resource use with protection of their marine environment. China exhibits a recognition of the importance of scientific research and a commitment to pursuing an understanding of not just the marine environment but also of the interaction between land and sea, and of the ocean and the atmosphere.

Over 400 million Chinese live along the 32,000 kilometers of coastline in China. China also encompasses 6,500 islands and an estimated 3 million square kilometers of exclusive economic zone area. Coastal areas in China account for 60 percent of the country's total industrial and agricultural output, with the marine industry including: marine fisheries, marine communication and transportation, sea-salt resources, seawater agriculture, offshore oil and gas, and marine medicine and foodstuffs.

China's reliance on the marine environment as a food source is even more remarkable. In 1994, marine fisheries accounted for nearly 9 million metric tons (MMT) of fisheries catch, marine aquaculture for nearly 3.5 MMT, freshwater fisheries for 1.2 MMT, and freshwater aquaculture for nearly 8 MMT.

China's increasing reliance on marine resources has caused a series of environmental and social problems. Increased exploitation of offshore fishery resources, for example, has damaged marine biological diversity, and the constant increase of marine pollutants has aggravated environmental pollution in certain sea areas.

Chinese Environmental Priorities

A priority of China's environmental program has always been the protection of its marine resources. The Law of Marine Environmental Protection, promulgated in 1983, was the first comprehensive legal provision to protect marine resources in China. Six other environmental laws regarding the protection of marine resources have since been passed. China is also a member of a number of relevant international conventions, including the International Convention on Civil Liability for Oil Pollution Damage, the International Convention for the Prevention of Pollution from Ships, and the Convention on the Prevention of Marine Pollution by Dumping of Wastes and Other Matter.

In order to implement the Law of Marine Environmental Protection, China created relevant marine environmental protection organizations and institutions within the National Environmental Protection Agency (NEPA), the State Oceanic Administration (SOA), and the State Fishery and Fishing Ports Administration (SFPA). Marine issues were also included in China's Agenda 21 plan and in a ten-year national marine environmental protection program.

According to China's Agenda 21, the objectives of marine protection through the year 2000 are to: (1) mitigate offshore pollution and ecological damage; (2) improve marine conditions in the coastal areas of large cities; and (3) continue to protect marine water quality in relatively unharmed areas.

In order to meet these goals, China plans to:

- Reinforce protection of key coastal areas including the Bohai Sea, Jiaozhou Bay, estuary of the Yangtze River, offshore areas of Zhoushan, and the Zhujiang River estuary. An emphasis will be placed on pollution control of organic salts, organic matter, and petroleum-related pollution;
- Undertake water quality management in order to better control pollutants entering marine ecosystems;
- Strengthen comprehensive environmental management in coastal cities; and
- Reinforce marine environmental pollution monitoring capabilities.

It should be noted, however, that the priorities of different Chinese agencies often vary: the priorities listed in Agenda 21 may not be the same as those expressed by SOA or SFPA.

There is strong cooperation between the National Oceanic and Atmospheric Administration (NOAA) of the U.S. Department of Commerce and the Chinese government, spanning a variety of issues. There are a number of agreements between NOAA and agencies in China under the U.S.-PRC Science and Technology Agreement, which range from cooperation on aquaculture research to coastal zone management. NOAA will also co-host a workshop on natural disasters with China in Beijing in November 1997.

Chinese Water Scarcity

In descending order, China's water priorities can be classified as the following: flood control; water scarcity; water transmission efficiency and losses; expansion and improvement of water use for agriculture; soil and water conservation; and water resource development.

Floods and Flood Control

Flood control is the most important water issue in China. Over 350 million Chinese are subject to severe floods each year, with over 75 million subject to annual floods on the lower reaches of the Yangtze River alone. Another 75 million are subject to yearly flooding on the Huai River. In 1991, for example, a flood on the Huai River inundated 66 million hectares and displaced 30 million people. Annual economic damages related to flooding fluctuate, with $10 billion lost in 1996 and $20 billion lost in 1990. The Chinese are consequently very concerned about floods and flood control, making these issues the top Chinese water priority.

Water Scarcity

China is currently facing a number of very serious water quantity problems, exemplified by the following:

• In 1995, 400 of 595 Chinese cities had water shortages. Over 100 of these were in the North China Plain.
• According to some statistics, water shortages in China have led to nearly $12 billion in annual losses.
• Groundwater subsidence in the North China Plain, which has the most serious water shortage problem in China, has been measured at over three meters per year for the past few years.
• Many coastal areas have experienced saltwater intrusion due to groundwater mining.
• More than 70 percent of the flow of the Yellow River is lost each year to utilization of water resources.

Options for Addressing Water Scarcity Problems

• Water is severely underpriced. Higher water prices would increase conservation of water.
• In the long term, there must be major water industry restructuring and privatization. In England, for example, the government restructured over 150 water agencies into 10 comprehensive agencies based on watershed management planning principles. The Chinese should use this system as a model for governmental restructuring of their water bureaucracy. Such restructuring would take authority from the provinces and put it in the hands of river basin managers.
• In the short term, large diversion projects may be appropriate. In Shanxi, for example, there was a water deficit of 382 cubic meters in 1993 with a projected deficit of 1,325 cubic meters by 2020. A $1.3 billion World Bank loan for both water transfer and bureaucratic restructuring has helped alleviate this province's water problems.

Chinese Wastewater Issues

China's Water Pollution Control Law

China's Water Pollution Control Law was amended in 1996 and addresses severe pollution of non-marine water resources. It is consistent with the new pollution control strategies in the Ninth Five-Year Plan and the Transcentury Green Plan, and includes the following key articles:

• Article 2 specifies that the law covers all non-marine waters;
• Article 5 allows citizens to file formal legal complaints;
• Article 10 calls for a river basin planning approach;
• Article 16 describes the total pollutant control (TPL) strategy;
• Article 19 states that "urban sewage shall be centrally treated," allowing for a sewage treatment fee to be paid in lieu of a normal pollutant discharge fee in urban areas greater than 500,000 people;
• Article 22 calls for cleaner production; and
• Article 23 outlines the "blacklisting" of highly polluting production technology.

Municipal Sewage Projects

China has a need for both permit and pretreatment municipal sewage programs, for which multilateral, bilateral, and build-own-transfer (BOT) funding is available. There are a variety of options open to treat wastewater, including aquaculture and treatment wetlands.

An example of how a municipal sewage project in China develops can be seen through the experience of a proposed project in Anhui province. The Asian Development Bank provided a $150 million loan for two municipal sewage plants and four industrial plants with clean technology upgrades. In order to meet its Class V water quality objective, Anhui needed a 75 percent chemical oxygen demand (COD) reduction of its wastewater. However, this COD approach did not address the eutrophication problem in adjacent Chao Hu Lake, which has significant nitrogen and phosphorous pollution. The questions regarding this project are abundant, for example: would a pretreatment or permit program approach be feasible? Would treatment wetlands and aquaculture be more effective? Decisions such as these will be increasingly common in China as it seeks to address its wastewater problem.

Financial and Institutional Challenges

China faces the following challenges in meeting its wastewater reduction goals:

• There is minimal or no municipal government experience on sewage projects. This makes it difficult for decisions to be made on the questions raised above.
• There is a continued reliance on foreign aid to fund sewage treatment projects. The Transcentury Green Plan calls for $7.2 billion in water resource management and wastewater treatment projects, with the Chinese willing to pay for up to half of this amount. It is

anticipated that the other half will be provided bilaterally or through multilateral banks.
• The Chinese have not accounted for training, and operations and maintenance costs in their projects. In order for sewage treatment plants to work properly and efficiently, there must be continual funding for operation of the plant.

Water and Agriculture

The United States Department of Agriculture (USDA) has worked in the Hai River basin since the 1930s. This basin is key to China's food security as it includes much of China's most fertile agricultural lands—and also some of its most severe water quality and quantity problems. The most pressing water problem in the Hai River basin is groundwater depletion, with water tables at levels 80-90 meters lower than they were in the 1930s. In 20-30 years, groundwater levels could become so low that the vast agricultural production of this region could collapse.

The origins of the groundwater problem in the Hai can be traced to the 1960s and 1970s when farmers were told to dig shallow tube wells that, in combination with the application of chemical fertilizers, allowed them to grow corn. This unsustainable form of agriculture has lead to serious problems: without large water transfer projects, water tables in the region will continue to decrease, leading to lower crop yields and necessitating grain transfers from the south of China and increased grain imports.

If the current trend of water shortages continues in the Hai, farmers will likely adjust by: (1) concentrating available water on the most productive fields and high value crops such as fruits and vegetables; (2) switching from irrigated grain crops such as corn and wheat to less water intensive crops; and (3) planting more dryland crops such as sorghum and millet. This would result in decreased grain yields mainly because dryland yields are lower than irrigated ones.

China has a number of options for addressing water scarcity problems in the Hai River basin:

• Initiate water savings strategies. Water savings strategies would include market-based pricing for water use and wastewater treatment. However, there is currently no system for collecting water use fees, little investment in water treatment facilities, and a lack of enforcement of water quality standards.
• Transfer water into the basin. While a large scale engineering project is attractive to the Chinese, it is unclear what regions would supply water diverted to the Hai, where funding for the initial construction of a diversion canal and maintenance costs would come from, and how diverted water would be allocated to various end users.
• Transfer grain to offset the decrease in grain output due to falling groundwater supply. Again, this option includes questions about what region would be tasked to deliver grain to the Hai River basin and at what price. There would also need to be increased infrastructure to move the grain from supply regions to unloading facilities in the Hai.
• Support the movement of businesses and people from the Hai to areas that are more economically and environmentally sound. Perhaps the least attractive option, this policy would require not only massive relocation of people and businesses, but could also create political, economic, and social problems.

Additional Comments

Flood Control Measures
• The Chinese should not only look at flood water control through technological fixes such as dams, but also at flood planning. Such planning would reduce damage during major floods.
• Over 3 million Chinese live within the retention basins of rivers. While it would decrease flood damage if these people lived outside of river dikes, there simply are no other areas to which they can be relocated.

Financing Environmental Protection
• The goals set out in China's Transcentury Green Plan will be impossible to meet given current funding for environmental projects. Even with increased foreign direct investment and multilateral loans, China will not be able to meet the goals described in the plan within its given time frame.
• Many water projects in China need foreign assistance—$1 billion in Chinese water projects rely on international contractors.
• The Chinese not only need foreign funding but also foreign technology.

Other Comments
• Water conservation efforts and water recycling in industries can be greatly improved in many provinces in China. Water efficiency efforts could help alleviate some water shortage problems.
• More information is needed about the size of China's aquifers. The North China Plain, for example, could rest upon a huge aquifer, or it could be virtually completely drawn down.
• Water transfers can either be moved by gravity or pumps. There is some doubt about whether gravity transfers will work over long distances. The energy for pumped transfers would be provided by hydroelectricity and coal.
• Neighboring provinces were not adversely affected by the water diversion project to Shanxi province.

Chinese Fisheries and International Cooperation on Oceanic Issues

1 October 1997

Chinese Cooperation with International Agreements on Oceanic Issues

Multilateral Issues

The starting point for discussion of international cooperation on oceanic issues with China is the United Nations Convention on the Law of the Sea (UNCLOS). Through UNCLOS, the United States has experience with China on international fisheries issues and as a bilateral fisheries partner. Three areas governed under UNCLOS are of specific importance to the United States. They are:

- Conflicting claims over the Spratly Islands. This is an area of tension and potential multi-state conflict;
- Disagreement between the United States and China over straight baseline exclusive economic zone (EEZ) claims; and
- China's expanding marine power trends. China would like to further develop its navy and expand its distant water fishing fleet (over 200 miles from the shore), sending signals of worry to other regional states.

Due to China's increasing influence on maritime issues and fish stocks, PRC participation in maritime conservation regimes is important.

Habitat Issues

China's size and rapid economic growth have unsurprisingly led to near shore habitat loss. Combined with growing demand for fish and river impacts from development (i.e. dams), China's available saltwater natural resources have become even more vital—and scarce. In order to help preserve its resources and fish stocks, China has become a member of several international agreements governing fisheries, such as the:

- UN Agreement on Stradding Fish Stocks and Highly Migratory Fish Stocks. This agreement has been ratified by China and 18 other states; 35 ratifications are needed to bring this agreement into force;
- Food and Agriculture Organization (FAO) Compliance Agreement. This agreement requires flag states to be responsible for the actions of their fishing vessels on the high seas; and
- FAO Code of Conduct for Responsible Fishing. This code is not yet in force. China's endorsement/implementation of the code will be crucial to its success.

Other key Pacific Ocean fisheries agreements/committees include the:

- FAO Committee on Fisheries (COFI). This committee has stressed the importance of Chinese aquaculture and of China's participation in intersessional COFI activities;
- Asia Pacific Economic Cooperation (APEC) Fisheries Working Group. Importantly, both China and Taiwan (as Chinese Taipei) are members of this working group. This is significant because Taiwan and China have the largest and second largest long distance fishing fleets in the region, respectively;
- International Commission for the Conservation of Atlantic Tunas (ICCAT). China surprisingly became a member of ICCAT last year and it is currently unclear how this will affect Taiwan's observer status;
- North Pacific Anadromous Fish Commission (NPAFC). This commission, of which China is not a member, regulates salmon fishing in the North Pacific Ocean. While China does not fish North Pacific salmon, it sometimes catches these salmon as bi-catch. For this reason, it is important for the Chinese to become a party to NPAFC; and
- Convention for the Conservation and Management of Pollock Stocks in the Central Bering Sea. Also known as the "Donut Hole Convention," this informal commission includes China as a member. The commission has currently placed a moratorium on fishing in a portion of the Bering Sea.

The Department of State is also establishing tuna conservation and management regimes in the Pacific. The success of these regimes will be partially dependent on having all fishing States—including the PRC—at the table from the onset of these regimes and during the negotiation period. The State Department expects three to five years of negotiations before a tuna strategy is put into effect.

Bilateral Issues

The United States and China are engaged bilaterally on oceanic issues in a variety of ways, including:

- The United States has a General Fisheries Agreement with China, which is one of the last of these agreements still in use. Under the agreement, China is allowed to fish surplus United States fish stocks;
- The United States has enjoyed a positive bilateral relationship with China on the turtle-shrimp issue. U.S. law requires wild-caught shrimp imports to be trawled in a manner that protects sea turtles. U.S. experts ob-

served a Chinese trawling technique, previously unknown in the West, that protected turtles effectively, thereby avoiding a potential trade problem;
• On 18 December 1997, the United States will begin to enforce HACCP (hazard analysis, critical control point) standards for imported seafood to ensure food safety. While this deadline will most likely be flexible, China's ability to meet HACCP regulations is not yet known and could halt Chinese seafood exports to the United States;
• In December 1992, a UN General Assembly consensus resolution imposed a moratorium on large-scale (greater than 2.5km), high seas (outside a state's EEZ) driftnet fishing. The United States and China have often worked together through ship-rider programs to monitor the use of drift nets in the Pacific.

While China participates in the conservation and management processes of many oceanic issues, their domestic enforcement efforts appear to be limited. Businesses in Taiwan and China have found ways to circumvent driftnet regulations, and cooperation between these business interests has allowed both governments to escape responsibility for the actions of its citizens. Greater transparency in fishing agreements between Taiwan and China are key to ensuring that both countries enforce the driftnet agreement on their respective fishing fleets.

Chinese Fisheries

Fishery Production

The Chinese fishing industry is growing extremely rapidly: from 1980 to 1995, the total Chinese fish catch increased from 5 million metric tons (MT) per annum to 25 million MT per annum, ranking China first in terms of global annual output of aquatic products and accounting for more than 20 percent of world fishery production. Aquaculture growth has increased faster than wild fish catch in the 1990s, and now accounts for approximately two-thirds of total Chinese fishery production.

Within aquaculture, fresh water production increased more than ten times, from less than 1 million MT in 1980 to 9.4 million MT in 1995, accounting for 70 percent of total Chinese aquaculture output, and making China the largest fresh water aquaculture producer in the world (44 percent of total world output).

There are several fundamental economic forces that drive the sustainable high growth of Chinese fishery production:

• China is land scarce but labor abundant;
• Fishery production does not compete with crop production for land;
• Fish have a better feed to animal weight ratio than chickens or pigs;
• Freshwater aquaculture is more labor intensive than grain production; and
• Farmers engaged in fishery production earn approximately 2.1 times more than other farmers.

As the government adopts increasingly liberal policies in rural areas that give farmers more freedom of choice in what to produce, there are greater incentives for farmers to switch from grain to fishery production. In fact, after 1984 when reforms were extended into urban areas and prices were reduced, the fisheries industry grew more rapidly than the crop or animal husbandry industries.

Chinese Fish Consumption

Since 1984, consumption of fishery products by Chinese households has increased steadily because of growing fish supply, increases in household income, and rising living standards. Fish consumption has consequently become the fastest growing portion in both Chinese urban and rural households' meat demand. After 1991, all meat consumption except for fish consumption declined. This is mainly due to three factors:

• Price increases of fishery products have not been as high as those of other meats or crops;
• Consumption of fish accounted for a 55 percent increase in meat demand from 1985 to 1995; and
• Consumption of fish products shows a greater variation across geographical location than income group.

Chinese Trade in Fishery Products

As the production of aquatic products has expanded rapidly in China, so has its fishery trade with the world. Since the late 1980s, Chinese fishery exports have generated $2-3 billion in hard currency each year. In 1993, China's aquatic exports accounted for nearly 10 percent of the world market.

U.S. imports of fishery products from China have also increased dramatically: from less than $50 million in 1985 to more than $400 million in 1992. Since then, they have decreased to $300 million a year. This reduction was the result of a sharp decline in Chinese shrimp production due to a shellfish disease in South China.

Before 1993, more than 80 percent of U.S. fishery imports from China were shellfish (mostly shrimp), but since then shellfish imports have declined. Fresh and prepared fishery products accounted for almost half of the total U.S. fishery imports from China in 1996.

U.S. fishery exports to China increased sharply from less than $5 million in 1990 to nearly $90 million in 1996. Although Chinese imports account for only a small share of overall U.S. fishery exports, it is an important market for U.S. shellfish exporters: China imported more than 20 percent of total U.S. shellfish ex-

ports in quantity terms last year and 5 percent in value terms.

Chinese fisheries will most likely continue to be the fastest growing sector within China's agricultural economy during the next decade. The Chinese government plans to increase aquatic production to 35 million MT per year by the year 2000. Aquaculture will account for 85 percent of this increase and, accordingly, 3.5 million hectares of coastal and inland waters will be developed into aquaculture fields.

The Importance of Chinese Fisheries to the United States

Chinese fishing practices are important to the United States for the following reasons:

• Increases in China's marine catch may have an impact on ocean fish populations and species;
• Chinese fisheries are an important source of U.S. imports due to their relative inexpensive cost; and
• As fishery production and consumption increases in China, U.S. feed grain and meat exports could decrease.

Additional Comments

Growth in Aquaculture

• A major source of growth in aquaculture is in freshwater systems, which are generally small scale. Carp farms are the largest source of growth in small scale aquaculture systems. Marine aquaculture systems, generally designed to grow shellfish, are larger and more intensive than freshwater systems and have more severe environmental impacts.
• In South China, there are larger freshwater fish farms than in other areas of the country. In general, however, freshwater farms are small in size.
• There are massive marine aquaculture projects in the coastal areas of China. This has probably contributed to increases in harmful algal blooms and red tides.
• China is expanding aquaculture systems because it does not want to depend on international grain markets for food supply. Freshwater aquaculture is also a labor intensive activity, which has employment benefits for the Chinese.
• The Chinese government has encouraged its citizens to get more protein from fish consumption.

Multilateral Activities

• APEC is examining oceanic issues and sustainable fisheries. APEC can be a useful forum to discuss these issues because both Taiwan and China are present at these meetings. APEC is also looking at the live reef fish trade.
• The Chinese are generally moving in the right direction on fisheries issues, having joined eight conventions and agreements. However, the strong U.S.-PRC relationship on fisheries issues may be partially due to the distance of the United States from China: unlike Mexico and Canada, the United States does not share a border with China.

Other Comments

• Red tides in China are beginning to be linked more closely with land based pollution, such as agricultural runoff and increased use of pesticides.
• NGO interest in fisheries issues was highest a few years ago during the anti-drift net campaigns. At the time, NGOs sought increased transparency in international fisheries negotiations. However, NGO interest in fisheries issues has declined since then.
• NEPA and the Academy of Fisheries and Agriculture are responsible for monitoring the invasion of hazardous wastes into fisheries.
• It is important to ensure the safety of U.S. fish and shellfish imports from heavy metals and PCBs. The United States should carefully inspect imports of these foods from China to better monitor their safety.
• China is increasing its transparency in the fisheries sector, which is helping support strong U.S.-PRC relations on these issues.

U.S.-China Environmental Fund

The U.S.-China Environmental Fund (USCEF) works to integrate environmental planning with economic development, and to strengthen bilateral relations between the United States and China. As the only American environmental nonprofit organization to open a permanent representative office in China, USCEF links U.S.-China environmental communities through teams of environmental professionals from government agencies, universities, NGOs, and industry.

One of USCEF's lead projects balances conservation and tourism through the design and development of the International Friendship Forest, a 100 acre natural park at Badaling, the most popular section of The Great Wall. With technical support from the U.S. National Park Service, the International Friendship Forest will serve as a model for interpretation and planning for China's national parks and prominent cultural sites. Other major USCEF activities include an experiential environmental education initiative for Chinese high school students, a technical assistance program for China's national parks, and a study on methods to increase foreign private sector investment for pollution prevention control projects.

Hazardous Waste and Urban Water Scarcity in China

5 November 1997

Hazardous Waste in China

Problems with Hazardous Waste Management in China

• Industrial growth in China, especially in the chemical, mining, and metal industries, has generated increasing quantities of hazardous waste. Estimates on the amount of hazardous waste in China vary widely, but the most reliable numbers indicate that there is 600 million tons of waste in China, of which approximately 5-10 percent is hazardous. There are also approximately 6.4 billion tons of abandoned waste piles over 56,000 hectares in China.
• The amount of hazardous waste in China is in excess of the capacity to treat, store and dispose of it safely, leading to accidents that threaten human health and the environment. There is a greater risk to human health from hazardous waste in China than there is in developed countries due to the close proximity of people and agriculture to waste sinks.
• Many waste generators in China are simply unaware of the hazards associated with improper waste management.
• China has little financial resources for waste management, exacerbating an already troublesome problem.
• Waste is considered a secondary problem to air and water pollution in China. Waste problems therefore fall short in competition for limited financial resources.
• The cleanup costs for areas polluted with hazardous waste in China are already very high, ranging from 9-30 million renminbi.

Background Information on Chinese Waste Generation

• Not including township and village enterprises (TVEs), China produced 587,590,000 tons of industrial solid waste in 1991, and 645,100,000 tons in 1995. It is estimated that 5-10% of this waste is hazardous.
• Piles of industrial solid waste grew from 5,962,530,000 in 1991 to 6,641,030,300 in 1995.
• Reuse and recycling of industrial solid wastes increased from 36.6 percent in 1991 to 43% in 1995.
• Most hazardous waste in China is generated from commerce and agriculture.
• Since 1980, surface and groundwater resources in China have grown increasingly polluted due to increasing emissions of industrial waste. These increased pollution levels could have long term effects on river ecosystems and China's economy.
• Storage of hazardous wastes along rivers is a common—and dangerous—practice in China.
• Once the heavy metals, solvents, pesticides, and organic chemicals used in agriculture and industrial processes leech into groundwater resources, it becomes extremely difficult and expensive to clean them up. With many provinces in China facing water shortages, pollution of groundwater could create water scarcity crises in may parts of the country.

Areas for Improvement

• *Laws and Regulations*. China recently promulgated a Law on Prevention of Pollution by Solid Wastes, which is a step in the right direction towards controlling the emissions of hazardous wastes. This law became effective on 1 April 1996. China also revised its criminal code in 1997 to expressly penalize unauthorized waste imports. This regulation was effective as of 1 October 1997.
• *Enforcement*. China has had problems with illegal foreign exports of hazardous waste, but seems to be taking these cases very seriously. There have also been illegal province-to-province transfers of hazardous waste. Better monitoring and enforcement of hazardous waste export/import laws is important to halt trade in hazardous waste.
• *Facilities*. China's solid waste law calls for centralized waste facilities, but there are currently only a few of these facilities operating in China. China is seeking World Bank financing to build and operate more of these centralized facilities.
• *Training and Technical Assistance*. There are efforts underway to increase training and technical assistance with the Chinese on waste issues. For example, many Chinese waste officials have visited the U.S. Environmental Protection Agency and other U.S. locales through exchange programs. A National Cleaner Production Center has also been established in China. Waste management is gaining increased attention from the Chinese, making this a promising area for U.S. environmental exports.

Chinese Urban Water Scarcity

Basic Diagnosis

• China's water scarcity problems are more a result of uneven spatial and temporal distribution of water resources than of a lack of resources. For example, the North of China is very dry (per capita availability of water resources is only 750 cubic meters, and 80 percent of the rain falls during two summer months), but water is much more plentiful in the South (per capita

availability of water resources in 3,400 m^3/capita). In comparison, per capita availability of water resources in Canada is 98,000 m^3/capita, in the United States availability is 9,400 m^3/capita, and the world average for per capita availability of water resources is 7,100 m^3/capita. This uneven temporal and spatial distribution of water has led to severe water shortages in the North and massive floods in the South.
• Soil erosion from forestry and agriculture is filling water reservoirs and water courses, leading to further water shortages.
• Water demand in urban areas is rising, drawing water away from agricultural use and increasing reliance on groundwater resources.
• Continued overdevelopment is leading to increased water pollution, further exacerbating shortages.
• A lack of investment in sewage and wastewater treatment infrastructure, and a lack of reform in the water sector, have placed a burden on urban water resources.
• Three hundred of China's largest six hundred cities experience water shortages annually leading to major but uncertain losses in industrial output.
• Groundwater tables, especially in the North, are dropping as farmers and cities rely more heavily on groundwater resources for irrigation and drinking water. In the Huai River basin, groundwater levels have dropped 100-300 meters. The lower the water table drops, the more costly it becomes to pump water.
• Water is used most heavily for irrigation (82%), followed by industrial use (10%), rural activities (6%), and municipal use (2%).
• Sixty percent of irrigation water passes through open, unlined irrigation ditches. There has also been an expansion of wetland rice irrigation in the North, which is very inefficient. Additionally, there is little or no industrial water recycling in China, and outdated industrial processes use excessive water.
• Wastewater accounts for 4 percent of surface runoff in the North and 1 percent in the South, underscoring the poor water quality in Northern rivers.
• There has been an increase in the intensive use of fertilizers and pesticides in the past decade, creating eutrophication in many Chinese waterways.
• Chinese urban river reaches have become exceedingly polluted: 34 of 66 urban river reaches in the North and 18 of 69 river reaches in the South exceed Grade 5 quality standards (only acceptable for use in irrigation).
• The municipal capacity of all of China's water bodies, with the exception of the Yangtze, has been exceeded.

Water Resource Management
There are three agencies responsible for water resource management in China:
• The Ministry of Water Resources is responsible for water quantity;
• The National Environmental Protection Agency (NEPA) is responsible for water pollution regulation; and
• The Ministry of Construction is responsible for wastewater treatment plants and collection systems.

There are also seven River Basin Commissions in China, which are well staffed and coordinated. These Commissions are largely responsible for flood monitoring, but also monitor the quality and quantity of water resources, and resolve conflicts over water resources. However, they are somewhat ineffectual and hold little power over provincial governments. The seven Commission also rarely coordinate their efforts.

Problems with Water Resource Management
• There is little or no management of water resources on the scale of river basin boundaries.
• Except for flood control, there is no real time management of water resources.
• There is little interagency coordination on water projects.
• Planning design tends to maximize provincial benefits rather than basin-wide benefits.
• Water discharge fees are too low.
• Approximately 47 percent of wastewater is collected, but only 5 percent is sent to wastewater treatment plants. Additionally, only 5 percent of the plants to which wastewater is sent are operational.

Possible Solutions
• River Basin Commissions should have more authority over water use in order to instill a sense of comprehensive watershed management. Also, real time basin monitoring should be utilized.
• Water prices should be raised to reflect their value and the amount that end users are willing to pay. Current urban prices vary between 0.5-1.0 yuan/m^3, but urban residents have shown a willingness to pay up to 1.8 yuan/m^3. The economic value of water to industry has been estimated at 24 yuan/m^3.
• There needs to be more effective treatment of wastewater. A doubling in the price of water would generate enough funding to construct and operate wastewater treatment plants throughout the country.
• Institutional reforms are necessary to corporatize River Basin Commissions, strengthen local EPBs, increase the frequency of environmental audits, and create a method for pretreatment of toxins and heavy metals.

Additional Comments

Hazardous Waste
• The United States imports 40 percent of China's shellfish aquaculture. If the United States placed greater emphasis on inspection of these shellfish, it would force China to more closely monitor the levels of hazardous

waste and pollution in aquaculture farms.
• Hazardous waste is a very important problem for some provinces, necessitating immediate action. Other provinces, however, have not yet reached levels of high risk.
• China's current method of dealing with solid waste is storage. These storage sites have the potential to be future Superfund-level problems.
• A greater public awareness of the problems associated with hazardous waste will be necessary to generate action on these issues.
• It is very difficult to get information on hazardous waste generated from military activities in China.
• U.S. businesses in China have problems in dealing with hazardous waste because China does not have proper waste disposal facilities. The Chinese have banned intra-provincial trade in hazardous waste, which is uneconomic and problematic for U.S. firms in China because many provinces do not have the capacity to treat waste generated by foreign firms. The Chinese would like to build one hazardous waste plant per province, but even this would not provide enough capacity to deal with the hazardous waste problem while still being economic. While U.S. firms want to properly dispose of the waste they generate in China, they are reluctant to build their own facilities because they do not generate enough waste to support these plants and do no want to get into the business of treating waste. These firms desire a safe place to which they can send their waste—this might be a good market opportunity for U.S. waste firms.

Other Comments
• China's water quality and quantity problems are important to the United States mostly because of the market opportunities that these problems create. There is a small market for wastewater treatment plants in China, and markets for laboratory equipment and instruments are growing.
• Water issues are important to the United States due to concerns about state stability and protests over water availability.
• Water issues are also a good way to start a dialog with the Chinese on the environment.
• The Chinese are borrowing money to perform water quality testing and sampling, which is an indication that they are taking these issues seriously.
• The pace of development in China is so rapid that no effort to address environmental problems will be able to keep up.
• There have been noticeable health impacts due to polluted water bodies in China. In Shanghai, for example, there was a sharp rise in stomach cancers in children due to polluted drinking water from river intakes.
• The link between health and the environment is very strong, and this has become an important issue to NEPA. Media coverage of environmental issues in China is also increasing.
• There have been public protests regarding environmental problems in China, and NGOs are emerging to address these problems.
• There needs to be a stronger emphasis on an education-based bottom up approach to environmental problems in China.

Water and Agriculture in China/ Chinese Watershed Management Practices

3 December 1997

Water and Agriculture in China

In an effort to determine the impact of China's water problems on its agricultural capacity, dynamic models of four critical infrastructures—water, agriculture, energy, and greenhouse gas—were developed to simulate, respectively, hydrological budgetary processes, grain production and consumption, energy demand, and greenhouse gas emissions in China through the year 2025. The four models were integrated into a comprehensive critical infrastructure model for all of China to capture the overall dynamics of the integrated system.

• The water model was designed to assess the effects of changes in water use requirements in the urban, industrial, and agricultural end-use sectors on the availability of water, and to develop estimates of China's water surplus and/or deficit on a regional basis.
• The agronomic model was developed to compare China's projected grain consumption requirements based on population growth with projected grain pro-

duction to estimate grain surplus and/or deficit. The agronomic model was also designed to generate projections of cultivated land area and the amount of water required to service China's agricultural sector.
• The energy model was developed to project the growth in energy use for coal, oil, natural gas, hydroelectric power, and nuclear power in each of six sectors (agriculture, industry, construction, transportation, commerce, and residential and other) based on alternative scenarios of future growth in China's gross domestic product (GDP) and sector energy industries.
• The greenhouse gas model was designed to project the greenhouse gas loading (methane and carbon dioxide) for all of China and to compare these projections with world totals.

An integrated infrastructure model was also run, which consisted of the coupling of commodity flows for water, methane, carbon dioxide, hydropower, and pumping between the various models.

Results of the China Water Model

The China water model computes violations of sustainable yield constraints for specific provinces. These constraints occur when groundwater extraction exceeds an amount equal to the average recharge rate plus agricultural return flows. If the available water does not meet the water use requirements, a deficit results.

The projected total water needs are compared with projections of available water to estimate any water surplus and/or deficit and to determine the expected frequency of water deficits. It is assumed that any deficit is being met by ongoing groundwater mining, a practice that is not sustainable.

According to the model, the Haihe drainage region (which includes Beijing) will be in critical water deficit yearly through 2025. The Huanghe (Yellow River) drainage region will almost always experience water deficit through 2025. All other regions show a sustainable water yield in this time frame. However, intermittent water deficits in most of these areas will most strongly impact the agricultural sector. It is important to note that the unknown variable in this analysis is groundwater resources, which can either be very extensive or relatively limited.

Scale and Nature of the Water Problem on Agriculture

• For most of the major basins in China, water scarcity is not a problem. However, the Haihe Basin has been running a water deficit for over 25 years, potentially leading to significant water quality and quantity problems in this basin.
• China's lack of comprehensive watershed management planning has the potential to negatively impact water scarcity, quality, and efficiency. However, the Chinese are aware of this problem and are taking steps toward the development of watershed management plans. It should be noted that this is a formidable task and that U.S. expertise can play a valuable role in assisting the Chinese in this area.

U.S. Interests in the Relationship Between Water and Agriculture

• While it is not likely that water quality and scarcity will significantly increase Chinese imports of U.S. agricultural products over the next decade, the potential effects of stresses such as major droughts and floods during this time period should not be ignored.
• Opportunities for U.S. actors in the fields of watershed management planning and agricultural water efficiency include the development of: (1) decision support systems; (2) policy portfolios; (3) investment portfolios; and (4) instrumentation and agricultural technologies.

Watershed Management in China

Some of the most significant problems with watershed management in China are caused by siltation and erosion. On the Loess Plateau, over one and a half billion tons of erosion are threatening to clog irrigation canals and cause significant flooding damage. The Chinese are currently working with the World Bank on a $250 million project to cut silt loads in the Yellow River by 50%. The project includes the introduction of better agricultural practices and crop types in the region to reduce erosion.

River Basin Issues

Most Chinese river basins have ample volumes of water but the quality of water resources is often poor. To escape surface water quality issues, the Chinese have increasingly turned to groundwater and pre-treatment of drinking water.

In order to address watershed management concerns, China created river basin management commissions which hold legal and planning authority over watershed management planning. These commissions were designed primarily to manage flood control, and consequently have a great deal of planning authority in determining which water basins will be utilized and which dams will be closed during a flood emergency. While these commissions were granted more authority after the 1995 water quality emergency, they still experience difficulty in implementing water use policies in many provinces.

In addition, provinces often fail to use these commissions to solve water pollution problems—commission authority is generally limited to water quantity concerns. This has resulted in a general lack of comprehensive water management in China. Water offtake, for example, is self reported in China, and water licenses are almost always ignored. Downstream short-

ages are therefore common occurrences which could be avoided by stricter enforcement.

Opportunities for Change

• There is a tendency in China to implement physical solutions to water problems rather than policy changes. Physical solutions, however, are often ill-advised and much more expensive than policy changes. Due to these expensive infrastructure projects, water prices are heavily subsidized. Encouragement of policy solutions to water problems would be both less expensive and have a greater short term impact on water availability.
• China has looked extensively at United States examples of watershed management, especially the Tennessee Valley Authority (TVA). They have learned a great deal from these examples, even if changes come slowly. It is important for these lessons to be put into China's cultural and political context.
• Agricultural water is vastly under priced. Agricultural water use is more of a problem than urban water use because is has been so highly subsidized. A market-based pricing of water would help increase efficiency and encourage the use of new technologies.
• There is a great deal of room for U.S. technology and effluent treatment sales in China. Wastewater treatment, for example, is being pushed heavily by the Chinese government.

Additional Comments

Food Security

• Food security concerns can partially be addressed by regulating the types of crops grown in an area. Certain types of crops are much more water intensive than others, and should not be grown in areas with severe or constant water deficits.
• A 5 percent increase in Chinese grain imports would reduce Chinese water demand enough to make all of China's planned water diversion efforts unnecessary.
• In the Huaihe basin, the Chinese are already beginning to use drip and spray irrigation techniques. The Israelis have provided a great deal of help to the Chinese in this area.
• It is very important to build confidence between the United States and China on grain export issues because the Chinese fear that they might be cut off from the world grain market. The Chinese consider grain imports to be a very serious national security concern. They are therefore reluctant to rely on the world grain market for their grain needs.

Watershed Management

• The Chinese are not looking at water issues on a national level, but on a provincial or even county level. This makes it difficult to implement comprehensive watershed management policies.
• The Chinese have the technical means and expertise to estimate aquifer size, and are currently performing these analyses in the Huaihe basin.
• A risk-based approach to flood control and other water related activities is being investigated for application in China.
• The Chinese have the answers to many of their water problems. The difficulty is the implementation of these solutions.
• The Chinese have a great deal of raw data on water problems and the impact of agricultural runoff or industrial pollution on water quality and health, but this data is not entered into databases and manipulated.
• The Huaihe River Basin Agency is supposed to be jointly run by NEPA and the Ministry of Water Resources (MWR) in order to control pollution in this river basin. However, friction between NEPA and MWR has created a lack of cooperation and communication in the management of this basin.
• While diversion of the Yangtze to irrigate the Loess Plateau is the type of physical solution that is attractive to the Chinese, so much money is tied into the Three Gorges Project that such an undertaking is unlikely to happen anytime soon.

Engagement Strategies

• U.S. companies should try to sell all the equipment and technology to the Chinese that they can. Short term business opportunities are bountiful at the moment.
• It would be extremely beneficial for both the United States and China to work together on water issues. The United States has a great deal of experience with managing water, from TVA to California to Texas. Teams of students or scientists working together on water management could help both countries improve their techniques and policies.
• It is important to relate watershed management plans to issues which are of current concern to Chinese decision makers. For example, relating health, relocation, flooding, and economic problems to watershed management might cause the Chinese to more vigorously pursue and implement watershed management plans.
• U.S. farmers have become much more efficient in their use of water in the past few decades. The key to this improvement was a strong agricultural extension service. There may be good opportunities for U.S. businesses to help the Chinese develop such extension services.
• When working on agricultural issues with the Chinese, the United States should focus most intensely on water issues.
• The United States Department of Agriculture and China's Ministry of Agriculture signed a Memorandum of Understanding in January 1997 which included 15 technical personnel exchanges, as well as cooperation on flood control, water efficiency, and water pricing.
• If China's water diversion projects would be unnecessary with a 5 percent increase in grain imports, the

United States and China should sign an MOU that would: (1) ensure China that grain exports would not be used as a weapon against them; and (2) increase grain exports to China by 5 percent so that Chinese water concerns could be met.
• Cooperation on risk management for water issues is a good idea, as are exchange programs with students and assistance on developing extension services.
• The United States should not expect China to solve its water problems any quicker than the United States did. China's water situation will probably improve in 25-30 years, and not in 5-10 years.

Other Comments
• The Chinese have traditionally been hesitant to allow international companies to invest in water distribution programs.
• The Chinese are not looking at the impact of water quality on food safety.
• It has recently become necessary for many Chinese industries to pre-treat water, at a high cost, before it is used.
• There is a much greater focus in China on industrial pollutants than agricultural runoff. Pesticides are the greatest problem related to agricultural runoff. However, these pesticides also raise crop yields, making restrictions on their use unpopular.
• The monetary resources necessary to address water and agricultural problems in China simply may not be available. Industry is a growing focus for water concerns because it is generating the highest levels of economic growth.

Chinese Transboundary Water Issues

7 January 1998

Ussuri Watershed Sustainable Land Use Program

The Ussuri Watershed Sustainable Land Use Program was undertaken to bring Russia and China into close cooperation in environmental and land use planning in the Far East. The Ussuri/Wusuli River joins two remote regions of these nations, in part forming the border between Russia and China. On the western side of the river, comprising roughly one third of the watershed, is Heilongjiang, China's northernmost province. On the eastern side of the river, two-thirds of the watershed lies within two territories of Russia's maritime Far East: Khabarovsk Krai and Primorskii Krai, about twice the size but with barely a tenth of the population of Heilongjiang. Two major cities separated by 800 kilometers of forested mountains—Vladivostok and Khabarovsk—are in or near the Ussuri watershed. The project was coordinated by the National Committee on U.S.-China Relations (NCUSCR) and Ecologically Sustainable Development (ESD), with support from the Rockefeller Brothers Fund, John D. and Catherine T. MacArthur Foundation, Trust for Mutual Understanding, Weeden Foundation, The Asia Foundation, and the Eurasian Foundation.

While this project was undertaken to provide a sustainable land use plan for an ecologically sensitive and rapidly developing area, the project was more about international relations than water or sustainability. The program was most importantly about bringing two countries together around a common cause—a shared natural resource.

The program sought to accomplish two main goals:

• To create cooperation between Russia and China on economic, political, and environmental levels. This was especially challenging in the Ussuri watershed region because past migration and border conflicts had created political tension in the area.
• To develop a sustainable development plan for the watershed that built upon the needs of its inhabitants and reflected the sensitive nature of the ecosystem.

The project was initiated with a series of steering committee meetings with Chinese and Russian representatives in both Vladivostok and Harbin in 1993. Based on the recommendations from these meetings, fieldwork was undertaken to accurately map the watershed.

The first step in the development of the land use plan was defining the boundaries of the Ussuri watershed itself. This was as much a political exercise as it was an ecological one: three areas not ecologically included in the watershed were included in the land use plan because of political reasons.

After the initial fieldwork was performed and a survey of existing land use data on the watershed was collected, an idealized land use system for the watershed was created, resulting in a detailed map which differentiates areas for certain types of development or protection. It was agreed that four cross-border pro-

tected areas would be created: the Three Rivers Plain International Peace Park and Wildlife Refuge; Lake Khanka/Xingkai International Wildlife Refuge; Big Cat (Panthera) International Park and Wildlife Refuge; and Wandashan National Park and International Tiger Refuge. Another recommendation of the project was to remove borderline fences, which inhibit the movement of wildlife within the watershed.

Whether the sustainable land use plan will affect Chinese and Russian land use planning in the years to come is yet to be seen. The ecological success of this program, therefore, will not be known for years. However, the ultimate success of the program may not lie in the implementation of its land use recommendations, but in the dialog that it succeeded in creating between Russian and Chinese government agencies within the watershed, and in promoting better communication and cooperation between local Chinese government authorities with overlapping responsibilities in the region.

Tumen River Area Development Program

In the late 1990s, the Tumen River Area Development Program (TRADP) emerged as Northeast Asia's predominant intergovernmental economic cooperation effort. The program—coordinated by the United Nations Development Program (UNDP) and comprising China, Russia, North Korea, Mongolia, and South Korea—was launched in 1991 to foster cooperation and economic development in Northeast Asia: a region more often defined by its stagnating economies, border conflicts, and politics, than regional cooperation and economic growth. This effort was spearheaded by Jilin province in the PRC, which was seeking a way to match the economic development of China's coastal exclusive economic zones (EEZs) and wanted to gain access to the Sea of Japan.

TRADP hoped to capitalize on the region's beneficial geographic location (deep sea ports, access to Trans-Siberian railways and East Asian markets), and combine Japanese and Korean capital and know-how with low cost Chinese and North Korean labor to exploit and process the natural resources of Mongolia and the Russian Far East. Moreover, hopeful UNDP policymakers projected that economic cooperation would provide a functional base of interaction between states, thereby leading to further non-economic cooperation. In essence, economics would become the driver of regional cooperation and political stability.

TRADP plans also included environmental cooperation. On the heels of the Earth Summit, the TRADP was to serve as the UNDP's first attempt to inject sustainable development criteria into a major program.

At its genesis, the TRADP seemed to include all of the components necessary for success: the program included both suppliers of raw goods and services, and the countries which desperately wanted to consume them; eager new markets for western goods, and foreign investment to nurture them; and an international organization providing a tacit guarantee of quality for investors.

Despite all of its goals and calls for cooperation, the TRADP has failed to meet expectations. Driven by the animosity between parties, the difficulty of converting planned economies, core-periphery governance conflicts, and a historically driven heightened importance of borders, TRADP members dropped a multilateral framework for a "concerted unilateralism" approach in 1995.

In that year, member states agreed to focus TRADP's efforts on creating an "enabling environment" for investment in the three riparian countries' individual development plans within the TREDA region (in essence, the plan would use UNDP involvement as a seal of approval to attract investment to the otherwise poor investment climate of the individual country programs). This has allowed economic growth to continue—albeit with redundant infrastructure projects, competition between states driving down tax incentives to unrealistic levels, and little real work on trade facilitation—but the breakdown of multilateralism is threatening the shared ecological makeup of the region. Placed within the region's greater historical, political, and economic context, this threatens the future of economic development in the region, as well as the political security of Northeast Asia.

The interaction between environmental degradation and economic cooperation in the TRADP is a security concern for three primary reasons:

- The absence of exogenous incentives for capacity building has left state environmental governance weak or non-existent. In early plans for the TRADP, state capacity was to be developed, cleaner technologies made available, and eventual harmonization of environmental standards was to occur. Without a multilateral framework, efforts to increase capacity have faltered, thereby decreasing incentives for compliance and increasing driving forces contributing to the pollution of transboundary waterways.
- The lack of a fundamental framework has led to a transboundary political vacuum, which, due to the absence of mitigative channels for resolving conflicts over chronic or exigent environmental problems, is increasing tensions between riparian states. Although TRADP is based upon the geographic attributes of the region's shared resource—access to the Sea of Japan, and the Tumen, Hunchun, and Gaya Rivers—there is no coordination in the management of these transboundary resources. Given the stakes, without proper mid-level channels of communication, environmental problems could seep into the political realm.

• The absence of an overall framework has led to a "tragedy of the commons" scenario in the Tumen River Economic Development Area (TREDA). The multilateral effort has failed to develop a sufficient community of interests among riparian states, leading to massive pollution of shared water resources.

The Ecological Landscape

While Northeast Asia's isolation, historical tensions, and cold war legacy have frozen economic development in the region, it has also preserved the region's vast, globally significant, terrestrial and aquatic biodiversity.

The shared transboundary water resources in the region alone are significant:

• The Tumen River Delta, spanning over 88,000 hectares of wetlands in China, North Korea, and Russia, is critical to regional coastal zone management, and a crucial point for migrating birds along the East Asian/Australasian flyway.
• Peter the Great Bay, the Sea of Japan's most biologically productive area, is home to thousands of species of marine invertebrates, hundreds of species of fish (eleven of which are globally threatened), three species of whales, and over 200,000 water fowl. Moreover, the bay is the only habitat suitable for fish stocks on the continental coast of the Sea of Japan to lay eggs and raise fingerlings. The Russian coast supports a lucrative export-oriented mariculture industry.
• The waters of TREDA also include the Tumen River and its tributaries, which are vital for downstream municipal and industrial water use, wetlands, and spawning grounds for North Pacific Salmon.

The impact that economic development will have on these resources can be separated into three phenomena: water withdrawals, catchment area deterioration, and point and non-point water pollution.

Water Withdrawals
• TREDA will increase the demand for water withdrawals as population growth, affluence, and industrial use rises with economic growth.
• Multiplier effects from industrial and economic growth will increase demand for water.
• Withdrawals during low flow periods could heighten shortages, pollution levels, and saltwater intrusion in the region.

In addition, the short length of the region's rivers means that surface water is not abundant year round. This may necessitate interbasin transfers from other municipal and industrial centers.

Catchment Area Deterioration
• Deterioration of the region's mountainous catchment basin will cause increased storm run-off, flooding, erosion, and sedimentation. Deterioration has already exacerbated water shortages during the dry season, and the large, irregular injection of fresh water is having a detrimental effect on the marine biodiversity of Peter the Great Bay.

Point and Non-point Water Pollution
• Due to the region's lack of wastewater treatment for municipalities and large industries, water pollution is already extremely high on the middle and lower stretches of the Tumen.

Impacts to Date
• Water quality in the middle to low reaches of the Tumen is now unfit for industrial and municipal use.
• There has been a collapse of the traditional fishing industry on the river.
• A high level of tumors and carcinomas on fish and large invertebrates in Peter the Great Bay has emerged. Genetically altered gills and kidneys of fish have been reported.
• River spawning habitats have been severely threatened.
• There has been flooding and pollution of internationally important (Ramsar designated) wetlands vital to the migration of several globally threatened birds.
• Increased freighter traffic without proper ballast water disposal has led to the introduction of alien species in the region.

Russian officials consider river pollution a severe threat to Peter the Great Bay, and particularly to its economically valuable mariculture industry. Russian officials are also concerned about Chinese attempts to build water reservoirs upstream, as the retaining walls of such reservoirs are considered to be of poor quality and a reservoir break would have disastrous downstream consequences.

Historical Context

The driver of cooperation on the TRADP has been China's Jilin province, which is seeking coastal access to spur its economic growth. Without hope for gaining navigation rights on the Tumen River due to the ecologically damaging dredging process that this would entail, Jilin is dependent on the Russian port of Zarubino for coastal access. However, Jilin continues to pollute its shared water resource, irritating Russian officials who suffer from upstream Chinese pollution.

Russia, therefore, has become TRADP's most reluctant partner—it has much to lose by Jilin's continued economic development and accompanying increased pollution problems. Russia is the only TREDA member without an action plan and the only state which has canceled development plans in the delta due to ecological concerns.

The political, economic, and cultural makeup of the region is best defined by the spatial relationship between the periphery and core of the individual states involved; from the Western coast of Japan, to China's Jilin Province, to the Russian Far East, the littoral provinces of the Sea of Japan can largely be defined by their impertinent relationship with their capitals.

The poor core-periphery governance structures of each country have left most of the negotiations and implementation of TRADP objectives (particularly in the environmental realm) to the provincial governments. Negotiations are therefore in the hands of officials who have been forced to fend for themselves in the international arena, who are not likely to take into consideration international objectives of the state, and who have little experience in international relations. This lack of capacity is providing stronger drivers for scenarios where ecological degradation could increase tension between two states, and more likely, between provinces.

Second Attempt at TRADP Multilateralism

With this in mind, UNDP has been working since 1995 to develop a multilateral environmental framework within TRADP.

The TRADP environmental effort was launched in 1995 with a Memorandum of Understanding on the Environment (MOU). The MOU, signed by all five TRADP countries, sought to outline a plan for environmentally sound and sustainable development in the entire TRADP region. The MOU tasked governments to coordinate and cooperate to protect the region's environment, exchange data, conduct environmental impact assessments, enhance public participation, seek outside funding, and consider harmonization of standards. However, to date, the MOU has never been acted upon.

In May 1997, as the Tumen Secretariat faced the termination of its mandate and sought to make another attempt at re-affirming it through a multilateral environmental framework, the Secretariat held the first Environment Working Group Meeting of the TRADP. The goal of the meeting was to gain regional input for the development of a Strategic Action Plan on the Environment (SAP) that the TRADP Secretariat was developing for submission to the Global Environment Facility (GEF) for funding in 1998.

The Goals of the Strategic Action Plan are to:

1) identify the current status of TREDA's environment;
2) identify development related environmental problems in the region;
3) outline the national and regional priority action areas of TRADP;
4) identify where the GEF and other donors are needed;
5) discuss the means to greater community participation in the SAP processes; and
6) clarify the potential interaction between TRADP environment strategies and other Northeast Asian efforts.

In October 1997, the Second Regional Environment Working Group approved a project brief and submitted it to the GEF. If approved, project implementation will begin in the summer of 1998.

The projected cost of the SAP is $5.5 million, and member states have been asked to help implement the plan. Early indications, however, show that most TREDA members want to take a back seat in the development and implementation of the program and default to the UNDP as the implementing body. Conversely, the UNDP wants to confine its responsibilities to organizing international agreements, intergovernmental relations, and joint economic development, leaving implementation to member states.

Gaining member interest is only the SAP's first challenge. Under its current proposal, the SAP is following a similar model to the early efforts of the TRADP. This may make it difficult to overcome the historical, cultural, and political hurdles which caused the breakdown of multilateralism from the start. If the SAP does not aggressively seek to build individual government capacity, foster binding riparian agreements, and build an effort where the benefits and costs of using the region's transboundary waterways are pooled, the effort will be unlikely to succeed.

If the SAP does fail, and with it the program's last attempt to create multilateral governance in the TREDA, then tensions between China, Russia, and the DPRK are likely to continue to grow in scope and scale.

Conclusion

The issue of environmental security is a double-edged sword. On one hand if an environmental problem has political and security implications, chances are that the political will in addressing the issue will increase proportionally. Simply, without the security implications or transboundary impacts, it would be "just" environmental degradation—low on many countries' list of priorities. However, given the same scenario of state-to-state environmental transgression, but between highly competitive states, coupled with weak institutional responses and governance failures—as we see within the riparian states of TRADP—the issue may in fact not be resolved, and intra- and inter-state tensions may increase.

Given the economic stakes, historical animosities, and geographic proximity of its actors, TRADP is a complicated scenario. If a multilateral environmental framework is not effectively developed—for either the inherent environmental implications or for the fabric of economic/environmental/security implications outlined above—then TRADP may serve as a greater source of conflict than cooperation in Northeast Asia.

Upper Mekong River Basin

The Upper Mekong River, known as the Lancang River in China, is the second largest river in Yunnan province, after the Jinsha River. The Lancang originates in Tibet with a total drop of approximately 5,000 meters and a catchment of 795,000 square kilometers. Within Yunnan, the river course has a total length of 2,000 kilometers, and exits China at the common border of Yunnan, Lao PDR, and Burma.

The Lancang is one of six major river systems in Yunnan, and its watershed has a population of nearly 5 million people. The fertile Lancang valley is known as Sipsongpanna, and is surrounded by steep hills with about 75 percent forest cover that are home to over 5,000 known plant species and 400 species of animals.

Existing and Proposed Hydropower Dams on the Upper Mekong

Most of the hydropower potential in the Upper Mekong is in Yunnan province. There are fourteen power plants planned for cascade development along the Lancang with a total installed capacity of 22,260 MW. The Asian Development Bank (ADB) has prioritized five projects along the Lancang as suitable for private sector participation. If completed, the projects would submerge about 6,500 hectares of cropland and would displace more than 56,000 people. The two largest of the proposed projects are the Xiaowan (3,600 MW) and Nuozhadu (4,500 MW) dams, both with large storage reservoirs for stream flow regulation. The other dams in the area which have either been completed or are under development include:

• Manwan Dam (1,500 MW). This dam was completed in 1995, with operation beginning in June 1993.
• Dachaoshan Dam (1,350 MW). Construction on this dam began in 1996.
• Jinhong Dam (1,500 MW). This dam is located near Jinhong city, the capital of Xiangsuangbanna in Southern Yunnan. A 1995 ADB study identified Jinhong for development to export electricity to the Thai city of Chiengmai, which is 390 kilometers away. Thai and Yunnan authorities have requested permission from the Lao PDR government to build a transmission line through Lao PDR to link the hydro project to the Thai electric grid. A feasibility study for this project is in progress, and the project is expected to begin construction in 1998.

Chinese Agencies Involved in Development of the Lancang

The following agencies have differing levels of authority over the development of the Lancang. The roles of some of these agencies are clear, while others remain less transparent.
• The **Yunnan Provincial Electric Power Bureau** is responsible for the power sector in Yunnan Province. It plans to develop the middle and lower reaches of the upper Mekong within the next two decades for export and domestic needs.
• The **Kunming Institute for Power Survey and Planning** operates under China's Ministry of Power Industry. Their plans for the river are unknown.
• The **Lancang Jiang Planning Office** operates under the Yunnan Planning Commission and was established in 1987.
• The **Lancang Jiang Mekong River Coordination Office** was established in 1994. The connection of this commission to local or central government authorities is unclear.
• The **Yunnan Provincial Commission for Science and Technology** and the Beijing-based **National Natural Science Foundation** have reportedly created two research teams to undertake studies of the Lancang by the year 2000. These studies will include research on the coordinated management and development of Lancang water resources, and the environmental effects of hydroelectric dams on the Lancang in cooperation with the five downstream countries.

Detailed information from the Chinese on the status of project planning and construction of hydropower projects on the Lancang has not been made available to ADB hydropower consultants or to the Mekong River Commission.

International/Regional Agencies Involved in the Development of the Mekong

Asian Development Bank (ADB)

The Asian Development Bank has been the lead planning and coordinating agency for hydropower development in the entire Mekong basin since the early 1990s. The ADB is responsible for promoting economic cooperation in energy and infrastructure development within the six-country Mekong basin. This basin has come to be known as the Greater Mekong Subregion (GMS). ADB initiated the Greater Mekong Subregion Program in 1992 to promote economic cooperation in the six Mekong countries and to provide technical assistance to Mekong governments.

ADB sees its role as promoting private sector participation in large-scale hydropower development: hydropower projects require donor and government support to attract private capital and reduce risks to otherwise reluctant commercial investors. With this goal in mind, the ADB set up the Mekong Subregional Electric Power Forum in 1995 to: (1) establish a technical framework for subregional cooperation in the field of electric power; (2) facilitate technical coordination of electric power production and transmission in the subregion; and (3) prioritize hydropower projects for development. This forum has become the most im-

portant decision making fora for hydropower development in the region.

As of 1997, the ABD had provided approximately $18 million in technical assistance and $300 million in loans for infrastructure for Mekong regional projects, and has earmarked another $300 million in future funding for these projects.

The connection of the Jinhong Dam in Yunnan to Thai power grids is a top priority project for the ADB. While the ABD is not funding Jinhong directly, they are funding feasibility studies and have advised the Yunnan government to seek private investors for the project.

The Mekong River Commission (MRC)

The Mekong River Commission, originally known as the Mekong Committee, was created in 1957 with United Nations financial and technical assistance, and has received bilateral and multilateral aid for the planning of hydropower dams on the lower Mekong since that time. The Committee was originally composed of only the four lower Mekong countries (Thailand, Lao PDR, Cambodia, and Vietnam), and did not include China or Burma.

The Committee was reconstituted in 1995 to include the four lower Mekong countries, with a provision for the upper Mekong countries (China and Burma) to join in the future. China and Burma currently have observer status at Commission meetings. The aim of the Commission is to begin a new era of cooperation in the region after decades of political upheaval which has kept development plans on hold.

The MRC has three permanent bodies: (1) a ministerial level council for policymaking; (2) a joint committee to implement policies; and (3) a secretariat to provide technical and administrative support. However, the MRC is largely considered a failure by environmentalists, the media, government officials, hydropower consultants, and donor agency representatives because it has developed no clear guidelines on the rules of mainstream water use.

Chinese authorities have expressed an interest in the MRC but have no intention of joining until it is clear what the MRC rules for water utilization will be. China will not join if it believes that the new rules would interfere with its plans for the use of the upper Mekong.

Environmental Effects of Mekong Development

Based on experience with dam construction in the region and internationally, and given what is known about the importance of Mekong flooding and siltation patterns, it is reasonable to expect that the construction and operation of hydropower dams and reservoirs will adversely affect the Mekong river system. The MRC and international hydropower consultants are aware of the serious threats posed by hydropower development but have systematically failed to follow-up on recommendations for comprehensive studies and assessment of environmental impacts. The effects on the river system, from the delta to upstream of the Yunnan dams, are as follows:

Mekong Delta (Vietnam)

- Annual floods and sediment deposition which rejuvenate soils and trigger fish productivity would be reduced; and
- Construction and operation of upstream dams will reduce water, sediment, and nutrient flow to the delta which threatens the delta's agriculture and fisheries-dependent economy.

Upstream of Mekong Dams (Yunnan)

- Farmland would be submerged by dam reservoirs;
- Fish migration would be obstructed by dams;
- Fish habitat would be destroyed by dam construction and regulation of the river for hydropower production;
- Communities would be displaced leading to environmental degradation in the uplands of Yunnan; and
- Increased pressure on, and competition for, upland resources would lead to conflicts between settlers and other highland communities.

Potential for Conflict over Hydropower Development

Hydropower dams in the Mekong region have proven to be inherently conflict-provoking at a local level. Conflict has arisen between upstream and downstream water users with competing interests and priorities. Conflict at the local level has also arisen between affected villagers and government authorities, and between displaced peoples and upland communities.

At the regional level, conflict is perhaps less likely. However, extensive dam construction on the Lancang in Yunnan could lead to downstream water shortages, affecting the hydropower projects of lower Mekong countries. If a crisis looms, conflict could erupt.

One reason that this is unlikely is that the lower Mekong is largely a rain-fed river—the Lancang portion of the Mekong only accounts for 20 percent of the total Mekong river flow. Therefore, development plans on the upper reaches of the Mekong are not the only determinant of water flows in the river's lower reaches.

Conclusions

The Mekong Commission was created specifically to address issues of conflict in hydropower development between the six regional countries, but its efforts have been largely unsuccessful. As a consequence, governments are competing with one another for international funding and have adopted a rhetoric of cooperation and sustainable development to mask underlying conflicts and competition for donor support.

Despite feelings of hostility, especially among the four lower Mekong countries, conflict is unlikely mainly because those affected most by upstream hydropower development—the farmers and fishers of the Mekong delta—have no voice in either their governmental politics or the politics of the MRC.

Additional Comments

• A key factor in improving international cooperation on water issues is decentralization. It is easier to gain support and cooperation among different government agencies at the local level than at higher levels of government.

• Countries in the Mekong region are unanimously in favor of hydropower development. However, they differ in opinion on the type of development they feel is necessary and the amount of mainstream water they feel should be utilized for a project.

• The potential for conflict in the Tumen region can be estimated as about a 70 percent chance. Conflict is not as likely in the Mekong region.

• One accomplishment of the Ussuri project has been that local authorities are now more likely to work with each other and seek outside advice for their planning problems.

Summary Session of Working Group Discussion on Water Issues

4 February 1998

Water Politics in China

Insufficient Authority

Within the matrix of institutional actors, the environmental protection apparatus in China is relatively weak. However, over the past twenty-five years, this apparatus has developed tremendously and there is now an extensive body of environmental protection bureaus and monitoring stations throughout the country. On a national level, the State Environmental Protection Administration (SEPA) has risen from an office in the mid-1970s to an agency with the rank of ministry in 1998. At the provincial level, 27 out of 31 provinces have Environmental Protection Bureaus (EPBs) of first tier rank, meaning that they report directly to the provincial government without being subservient to another bureau. At the city level, most cities have now had EPBs of first tier rank for some time. At all three of these levels, EPBs are better staffed than they were at their inception.

Still, the dominant interest within the political system is economic growth and, therefore, government agencies that work toward this goal are the most powerful in local politics. This is most pressing at the county level where the majority of EPBs are seriously impeded in their work by insufficient bureaucratic rank. While 40 percent of county level EPBs are of first tier rank, general institutional subservience to economic interests is apparent if one examines the financial relationship between EPBs and local governments.

Although EPBs receive policy guidance from central level SEPA (formerly NEPA) directives, funding to support their staff comes largely from local governments. Local government authorities determine things such as annual salaries, funds for buildings, the number of automobiles necessary for the staff, and occasionally staff housing. It is local governments, therefore, that environmental agencies listen to, and not central policy mandates.

Extremely Limited Funds for Environmental Protection

EPBs receive funds from city governments and from discharge fees that they collect from polluting firms. However, neither is an abundant source of funding. In fact, local EPBs receive barely enough funds to run their offices. Only in rare cases will the central government provide funding for a local EPB.

Not only is there limited funding for EPBs, but there is also limited funding throughout the environmental protection system. For example, wastewater treatment plant localities receive little or no provincial government funding to build a plant, and none to operate the plant. This explains why there are so few wastewater treatment plants in operation in China. It also explains why large industrial cities have had idle wastewater treatment plants for almost a decade: they simply have not found a way to generate enough funds for daily operation and maintenance of these plants.

Lack of Coordination Between Various Institutional Actors

The lack of coordination between various institutional actors manifests itself in three main ways: (1) within the environmental protection apparatus; (2) between the environmental protection apparatus and other government agencies involved in aspects of environmental protection; and (3) among international actors.

Lack of Coordination Within the Environmental Protection Apparatus

Although there is communication between higher and lower levels of the environmental protection apparatus through formal channels, there is only very limited and informal communication between environmental units at the same administrative level (for example between two city EPBs or two county EPBs), even within the same watershed. This helps explain why it is not uncommon for an EPB to approve an environmentally harmful project in their city with the stipulation that the project is sited downstream from their city's drinking water intakes, seemingly not caring that the emissions from the project will pollute other cities downstream.

Lack of coordination between EPBs also explains why hazardous wastes have managed to be transported from one locality to another—potentially creating serious water problems due to leaching—without the local EPB in the affected jurisdiction knowing about it.

Lack of Coordination Between Various Actors Responsible for Environmental Protection

There is a multiplicity of actors involved in the different aspects of environmental protection in China, which is known in China as the problem of "multiple dragons." For example, the State Oceanic Administration and the State Fishing and Ports Administration both deal with issues related to the depletion of fisheries. Moreover, at least four agencies monitor and collect data on fisheries depletion: the State Oceanic Administration, EPBs, the Ministry of Transportation, and the Ministry of Agriculture. Although all of these agencies collect data, it is very rare within the Chinese administration that data is shared between different functional units. For example, in Wuhan the Bureau of Water Conservation and the Yangtze River Commission are responsible for monitoring the water quality of the Yangtze, but the local EPB can neither collect its own data nor receive data from either of these agencies.

For water pollution issues, the Ministry of Agriculture, Ministry of Water Conservation, Ministry of Navigation, Ministry of Transportation, Ministry of Communication, the water basin commissions (which are largely responsible for flood control), and EPBs all have differing levels and areas of responsibility. This multiplicity of actors and the lack of coordination between various government agencies and regions can create serious water quality and quantity problems.

An example of how this lack of coordination can lead to a near catastrophe can be seen in the case of the Huai River. For two decades, industrial development and accompanying pollution had been mounting in the four provinces along the river. Although central leaders had urged these provinces to work together in addressing pollution problems, none of the provinces took action. Instead, each province blamed the others for worsening environmental conditions in the river. In July 1994, the problem reached catastrophic levels when the middle and lower reaches of the river were left so polluted that hundreds of thousands of people were left without drinking water, in some cases for weeks. Factories were also forced to be closed and dozens of fish farms were destroyed.

While it is true that the United States can offer technical assistance in developing watershed management policies to address problems such as those of the Huai River, it also needs to be recognized that the lack of regional coordination in China is a long standing feature of the Chinese political system. The United States should therefore encourage policy solutions that minimize the need for coordinated action between multiple actors. For example, the Chinese have proposed numerous South-North water transfer projects, which are perfectly in line with the Chinese tendency to seek large technical answers to problems. However, reaching agreement between provinces about how to: (1) distribute water rights and pay for the costs of the project; and (2) coordinate management of a water diversion project, would be difficult to achieve. This is further reason to encourage the Chinese to seriously consider water conservation efforts and technological retrofitting as less expensive and more simple solutions to water shortage problems.

Lack of Coordination Between International Actors on Environmental Issues

In both the Tumen River area and along the Mekong River, it has been demonstrated that international actors often fail to coordinate their efforts to protect water resources. In the Tumen River area, cooperation between local officials, and among international actors, broke down as all of the parties involved attempted to secure economic gains. The Mekong River Commission has likewise failed to adequately coordinate the activities of the six countries through which the Mekong flows, and its existence has even exacerbated competition between countries to secure funding for hydroelectric projects.

Conclusions

- In order to obtain full support for a project, one needs to make sure that all of the relevant actors are involved in project negotiations and discussions—and not just the relevant EPB.
- One should attempt to work at the lowest level of government possible.
- The U.S. government should work to increase concern for environmental protection at the central level and should emphasize the role that the U.S. government has played in domestic fiscal outlays to localities for wastewater treatment.
- U.S. actors should explore policy options that neces-

sitate the least amount of horizontal coordination but still accomplish the desired objective. Where this is not possible, it should be recognized that each locality is looking out for its own economic interests and will need to see these interests addressed in order to become a participant in a policy or project.

Investing in China's Water Market

A business assessment of China's market prospects must evaluate two fundamental risk factors: *economic* and *political*.

Economic

China's double digit growth has required a massive amount of capital. Significant additional amounts of capital will be needed to finance industrial restructuring, new enterprises, privatization of state owned enterprises (SOEs), and massive infrastructure projects such as water plants. Without such capital, China will have serious economic difficulties. The Hong Kong Stock Exchange is no longer an option for major capital infusion with its recent troubles, and China's banks cannot help much given their own large slate of nonperforming loans and debt burden. It is estimated that bad loans total 15-30 percent of China's gross domestic product (GDP). For example, profits at the Bank of China, the nation's largest foreign exchange bank, plummeted to $726 million last year from $1.4 billion in 1996, largely as a result of bad loans and the current economic crisis. Some economists feel that each of China's four main banks are technically already insolvent. Corruption and bribery, which are rampant, also contribute to these problems.

Up to now China has been able to avoid the economic collapse of its neighbors because it restricts stock and currency trading. The yuan does not trade freely, and its value is fixed by the government. In addition, China's capital markets are strictly controlled, and its foreign short term debt is a much smaller percentage of its overall debt than is the case of its neighbors, particularly South Korea.

Statistically, foreign investment in China fell almost 50 percent to $23 billion during the first half of 1997. This was before the economies of the other East Asian nations collapsed in late 1997. Economists warn that China's growth will likely stall if foreign investment continues to decline. Also, indirectly working against Beijing are neighbors who are taking capital away from China to mend their own troubled economies. About $150 billion in funds will need to be poured into Korea and Indonesia alone to help them survive their present difficulties. That is money that won't go to infrastructure investment in China. The Asian Development Bank (ADB) estimates that China alone has $800 billion worth of infrastructure needs, but many of these loans today are being redirected to China's neighbors. Additionally, the ADB does not make soft loans to China.

In November 1997 China's State Statistical Bureau announced that third quarter growth had slowed to 8 percent, down from 9.5 percent in the first half of 1997. Economic growth will likely weaken further this year. While the International Monetary Fund projects 8 percent gross domestic product (GDP) growth in 1998, private sector investment analysts say growth will more likely be in the 5-6 percent range. In China, any growth of less than 8 percent borders on recession.

Like its neighbors, China is suffering an overcapacity crisis—a real estate bubble and massive inventories of cheap goods, mostly from SOEs. The collapse of major trading houses and stock market tremors in Hong Kong also could not have come at a worse time for Beijing.

Finally, with currencies being devaluated throughout Asia it has become harder for China to export its goods. Nevertheless, China's Vice Minister of Foreign Trade promised in January 1998 that China would not devalue its currency, something it did in 1994, which some believe to have been the root cause of Asia's current economic problems. The prospect of further devaluation of the yuan makes U.S. businesses contemplating foreign investment in China nervous.

One of the few positive notes in the current economic crisis is that China has $140 billion in foreign exchange reserves (second only to Japan's $228 billion), and has exhibited leadership by giving $1 billion each to Indonesia and Thailand to assist these countries.

Political

Labor unrest has increased significantly across China over the past year. Slower growth and industrial restructuring has meant fewer jobs, which has increased protest activity. According to China's Academy of Social Sciences, 11 million Chinese workers will lose their jobs in 1998 alone. While the official jobless rate in China is 4 percent, many Western economists think it may be closer to 10 percent and rising.

The U.S.-China relationship has been uneven and strained during the past two years. Differences over Taiwan, human rights, nonproliferation, intellectual property rights, and trade have exacerbated the relationship. This tension adds political risk and economic uncertainty to the investment equation, and it makes business management's efforts to convince stockholders of the desirability of investing in China more difficult. Corruption, lay-offs from the 270,000 SOEs, the growing income gap, unemployment, economic disparities between the interior and coastal regions, and unrest in northwestern China add additional risk and uncertainty for U.S. business planning and investment.

Finally, the Communist Party itself is a source of concern and unpredictability for U.S. businesses. The Party governs in its own self-interest, is not account-

able to its citizenry, often defies western laws and conventions, and practices policymaking that is not transparent, predictable, or challengeable.

Water Economics

Investment totals for infrastructure in China's Ninth Five Year Plan (1996-2000) are $295-370 billion. Of this, Chinese officials would like roughly 15-20 percent of infrastructure capital investment to come from foreign sources. However, shifting foreign investment to infrastructure projects and away from export-oriented industries presents some difficulties. Infrastructure investments have long payback periods, with no ready source of foreign exchange. Concerns about China's legal structure, enforceability of contracts, access to foreign exchange, and the cumbersome approval process, all work against foreign participation in such projects. Changes have been made in guaranteeing foreign exchange convertibility, so some (albeit little) progress has been made.

When trying to evaluate China's own estimate of the size of its water market, one has to look at what Beijing categorizes as the environmental goods and services sector. In this sector, Beijing estimates current overall environmental spending at 0.8 percent of GDP—roughly $6.7 billion in 1996. This includes everything from local garbage collection to construction of wastewater treatment plants. Chinese officials have pledged to raise environmental spending to 1.5 percent of GDP by 2000. Even if realized, however, only a small portion of this market will likely be accessible to foreign firms due to financing and hard currency constraints, low-cost local competition, closed bidding practices, and other market barriers. Demand is strongest for water and wastewater and associated instrumentation. Most Chinese end-users and regulators hold a favorable opinion of U.S. technology, and projects backed by multilateral and untied bilateral funding still offer the most viable export opportunities for American companies.

Cost Recovery

The collection of fees for using water is important for both irrigation and for water supply and sanitation (WSS) projects. Fees are used to ensure the financial sustainability of water supply systems, to ration the withdrawal of scarce water, to insure cost recovery for the plant operator which should pay for both operation and maintenance, and for private sector firms to insure a fair return on capital investment.

Several years ago, The World Bank reviewed a number of completed irrigation projects and found that cost recovery was rated unsatisfactory in 80 of 114 projects evaluated. For WSS loans, the World Bank found that financial covenants were not fulfilled in 94 out of 120 projects. In 49 of these projects, fees were not raised high enough to meet financial requirements due to government constraints. Fee levels are often not sufficient to recover costs nor are they high enough to ration water use efficiently. These types of economic deficiencies are a major disincentive to private investors in large infrastructure water projects and operations. Unless an acceptable rate of return can be provided, within an acceptable economic and political risk level, private firms are less likely to want to make major investments in China's water sector.

Privatization

Privatization requires an appropriate free market environment which still does not exist in China. Business experience suggests that the government entities involved in project negotiations are often distrustful of the motives of vendors in privatization situations. Government entities often ask for an open-book review of project financials and then attempt to negotiate the bidders down to return on equity in the 12 percent range. This is too low for the risks associated with large, multi-year projects in China.

Most U.S. companies doing water business in China today are involved in equipment supply, consulting, technical assistance, and provision of services, where the risks are minimal, the investments small, and the nature of the business often short term. Even large construction contracts and design engineering opportunities are generally set aside for local Chinese partners in major privatization deals. Canadian, Japanese, and some European construction and engineering firms have been more active with these large projects than U.S. firms.

Conclusion

Early next century, as Chinese income levels rise and environmental conditions worsen, China's environmental (and water) market may grow to become one of the world's largest. However, American companies may find that their competitors have already gained firm beachheads because these firms are now winning contracts with the help of concessional financing, grants, and other tied aid from third country governments. Many U.S. companies cite tied aid as their biggest competitive challenge.

As was learned during the Mexican peso crisis several years ago, American companies that remained in the Mexican market reaped the economic benefits of ultimate market reform, recovery, and business opportunity. Likewise, U.S. companies that persevere during East Asia's current crisis are most likely to realize economic success several years down the road. Water projects and business opportunities in China will probably be among the most profitable and available for U.S. companies. Patience, a long time horizon, and deep pockets are essential for the ultimate success of American businesses in China.

Financing Environmental Protection in China: Promoting Environmental Technologies and Investment

4 March 1998

U.S. Government Efforts to Open Environmental Markets in China

Background on Department of Commerce Involvement

The majority of funding for environmental projects in China comes from multilateral banks and not bilateral financing. This lack of bilateral financing, however, has led to a successful cooperative effort between U.S. government agencies in China, which must pool their resources to accomplish their objectives without U.S. Agency for International Development (USAID), which includes the U.S.-Asia Environmental Partnership (USAEP), or Overseas Private Investment Corporation (OPIC) programs and funding.

The Department of Commerce's (DoC) environmental technologies initiatives fall under the auspices of the International Trade Administration (ITA). ITA assists U.S. companies in exporting their products and has excellent resources throughout the world to identify potential markets and customers for U.S. technologies.

A move to push U.S. environmental technology exports was initiated by former DoC Secretary Ron Brown in 1994 with the creation of the Environmental Technologies office under the ITA. This office was designed to take advantage of the $450 billion global environmental technology market in which U.S. products are strong. While there are 45,000-60,000 U.S. environmental technology companies, many cater to niche markets in the United States and have not pursued international opportunities. The Environmental Technologies Exports office assists these companies by performing advocacy work on their behalf, sponsoring trade shows, and arranging delegations to countries for U.S. firms.

China's environmental market is still developing and it is therefore premature to use some of the DoC's standard commercial tools. The Chinese are often not ready to purchase U.S. products: they want training and demonstration projects to better determine how U.S. environmental technologies can help them.

Main Department of Commerce Efforts on Environmental Technologies in China

There are three main categories of DoC work on environmental technologies in China:

• **The Joint Commission on Commerce and Trade (JCCT)**. The Commerce-to-Commerce JCCT has been an excellent vehicle for creating cooperation between the United States and China. The environmental technologies subgroup of the JCCT was created in October 1995 and the two countries have since signed two workplans that map out and guide their cooperative actions. Under the JCCT, the two countries have cooperated on more than 24 events, including training programs, trade missions, trade fairs, and delegation visits.

• **The U.S.-China Forum on Environment and Sustainable Development**. This Forum was formalized during Vice President Al Gore's March 1997 visit to China. It is comprised of four working groups, including a broadly focused group on commercial cooperation. Under the Forum umbrella, a successful meeting on Natural Disaster Mitigation was held in Beijing in November 1997 and created a great deal of Chinese interest in U.S. products. There have also been discussions on developing a focus on water technologies, which account for the largest environmental market segment in China.

• **Energy and Environment Initiative**. The Energy and Environment Initiative was signed by Department of Energy Secretary Fredrico Peña and his Chinese counterpart in October 1997 and targets three areas: 1) urban air quality; 2) rural electrification and energy sources; and 3) clean energy sources and energy efficiency. This initiative could help support U.S. exports to China in these areas, while addressing key challenges in China's development plans. For example, the U.S. is working with China to help it acquire new air monitoring stations for eight to ten cities. China is strongly considering U.S. technology for the project, and the U.S. EPA has offered to help with a technical assistance grant of about $150,000. This deal could be the first concrete project under the initiative.

The DoC has also sponsored training courses in China by the U.S.-China Training Institute. An executive session of this training that included participants from five U.S. companies was held in December 1997 and focused on technologies for air pollution control in the power sector. It is hoped that the Chinese involved in this training will turn to U.S. firms for future technology purchases.

Environmental Business Efforts in China: Success and Failure

China's Environmental Market

There is an emerging market for environmental goods and services in China, resulting from a fairly comprehensive set of laws and regulations and a coun-

trywide system for monitoring and enforcing them. Also, China is responding to increasing international and internal pressures to deal with a significantly impaired environment. The Chinese estimate that they will spend approximately $54 billion on pollution control during the Ninth Five Year Plan period. However, China's environmental market has more of an emphasis on industrial development than environmental protection. Most of China's environmental funding is earmarked for the improvement of industrial processes, especially in increased efficiency and cleaner production. The emphasis on return on investment is also very high: projects must have an economic benefit and not just an environmental one. Materials recovery and pollution avoidance are also key aspects of the market, and are given more emphasis than installation of end-of-pipe controls.

Market Characteristics

•The Chinese environmental market can be a tough one to break into. Despite the apparent size of the market, both environmental enforcement and investment in environmental goods and services are spotty and selective. Activity has generally been centered on the more highly publicized cleanup activities such as the Three Lakes-Three Rivers program, and it is challenging to keep track of the evolution of these major projects and how much money is being invested in them.

• The Chinese government is trying gradually to improve environmental conditions while maintaining high rates of economic growth. However, industrial development is clearly a priority over the environment.

• Funding for projects in China is paramount: dissimilar to the United States, projects in China must almost always be self funding or have external funding.

• China is very interested in developing an industry out of the environmental industry—there are trade associations, environmental industry parks, and trade shows, and the Chinese are being quite aggressive in getting foreign firms to participate in these activities. The Chinese have become adept at attracting investment while reaping the rewards from firms trying to enter their market.

• Unlike Western countries, there does not seem to be significant pressure from NGO organizations within China to hasten the cleanup of the environment.

Reasons Why U.S. Firms have been Successful

U.S. firms that have been successful in China's environmental markets have adopted several of the strategies listed below:

• Adopted a long term entry strategy with high-level support for this strategy from within the firm;

• Established an in-China presence;

• Found and stayed within a defined niche. This not only helps build a reputation of expertise within the market but also helps in developing strong Ministerial contacts;

• Creatively adapted to cultural differences;

• Provided services to existing multinational clients within China;

• Found a multinational strategic partner to increase resources, recognition, and risks; and

• Obtained governmental support in both the United States and China.

Reasons for Failure

The following are reasons why U.S. firms have not had success:

• Lack of staying power. Many firms stay for only 3-4 years, become frustrated, and leave. The Chinese environmental market takes longer for success than some firms can sustain.

• Product is of unacceptable quality. China has an exceptional negative word of mouth system and great horizontal communications within an industrial sector. Early mishaps can ruin a firm's entire future in China.

• Arrived late to the market. The attractive niches are already occupied and easy entry points are increasingly difficult to find.

• Have high cost product. Some firms have great products that are too highly priced to compete with Chinese products, or they are unable to learn how to blend foreign and domestic labor to compete well in China. The Chinese are very cost sensitive, as are multinational manufacturers entering the China market with environmental service needs.

• Unable to demonstrate their product. The Chinese often want to see a product demonstrated before purchasing it. There are virtually no grant funds to support U.S. firms in this process, and the Chinese typically will not pay for demonstrations. Those without deep pockets are simply unable to compete.

• Cultural differences. One of the largest barriers to doing business in China is cultural differences. Some U.S. firms have been unable to adapt to Chinese requirements or ways of doing business, and simply fail in their efforts to enter the market.

Areas of Opportunity

• Joint ventures seem to be the most promising path for U.S. firms. The Chinese would like to manufacture 80 percent of environmental products domestically, and joint ventures seem to be the best way to meet their requirements and still be involved in the market. Keys to successful joint ventures include a good partner, timing, and investment capability.

• Recovery and reutilization technologies are attractive to the Chinese because they can improve profitability of industries while improving the environment. Coal ash utilization and sulfur recovery are examples of technologies with promise. Again, investment on

the part of the foreign firm is the key issue.
• Water pollution and control equipment capitalize on the priorities of the Chinese government and are more likely to receive governmental approval.
• Mature technologies are attractive to the Chinese; newer, uncommercialized technologies are too risky and expensive for use in China.

Suggestions for the U.S. Government
• Remove restrictions on Trade and Development Agency (TDA), USAID, and OPIC programs for China. These restrictions anger the Chinese and put U.S. firms at a disadvantage.
• Provide tied grants to multilateral banks earmarked for U.S. firms to conduct studies in China. Bank sponsored feasibility and pilot studies will have more impact and credibility than privately financed ones.
• Make trade development funding directly available to companies rather than to or through NGOs. This funding could assist in specific feasibility studies, pilot programs, or training in target areas.
• Provide high-level, written testimonials for U.S. firms, when warranted.
• Provide better research and information dissemination on fundamentals such as tariffs on environmental goods.

Chinese Efforts to Attract International Investment in Environmental Markets

There are three main funding sources for environmental projects in China: 1) private; 2) multilateral/international loans; and 3) multilateral grants, which include grants from the World Bank, Asian Development Bank, United Nations Development Programme and other United Nations agencies, donor governments, the Montreal Protocol, and the Global Environmental Facility (GEF), among others.

China's Agenda 21 Program

China's Agenda 21 is a combination of a statement of principles and a wish list of environmental protection/sustainable development projects for which Chinese project partners are seeking partial international funding support. China's Agenda 21 projects are therefore a useful way to gain insight into Chinese environmental priorities.

China's Agenda 21 currently has 128 projects listed in 9 areas, with a total planned investment of over $5 billion. The nine Agenda 21 project areas include:
• Capacity building for sustainable development;
• Sustainable agriculture;
• Clean production;
• Clean energy/transportation;
• Natural resource conservation;
• Environmental pollution control;
• Regional development;
• Population, housing, and social services; and
• Global change, desertification, and biodiversity.

By October 1996, 42 percent of the 128 Agenda 21 projects had reportedly been completed with a total investment of $1.3 billion. Of this $1.3 billion in funding, $0.96 billion was reported to have come from China, and $0.33 billion from international sources.

Montreal Protocol Fund

Through the Montreal Protocol Fund, developing countries (known as Article 5 countries under the Protocol) are eligible to receive funding support to phase out production and consumption of ozone depleting substances. Under the Protocol, $540 million in funding is available for developing countries for the period of 1997-1999. China has received the largest amount of Montreal Protocol funding, totaling over $100 million since the inception of the Protocol fund, for over 150 approved projects (not including $65 million recently approved to phase out China's halon sector).

The Montreal Protocol has seven project areas: 1) aerosols; 2) foams; 3) solvents; 4) fumigants; 5) fire fighting agents; 6) household and commercial refrigeration; and 7) chemical production. Within these project areas, there are six main business opportunities: 1) sectoral strategy development support; 2) project development support; 3) project proposal technical review; 4) project implementation support; 5) technology provision; and 6) project evaluation. The Protocol has four implementing agencies, which are: 1) The World Bank; 2) the United Nations Development Programme; 3) the United Nations Industrial Development Organization; and 4) the United Nations Environment Programme. In addition, donor countries can develop and implement projects on a bilateral basis with Article 5 countries totalling up to 20 percent of the donor country's contributions to the Fund.

Global Environmental Facility

The Global Environmental Facility (GEF) serves as another means for developing countries to receive funding for environmental projects. Developing countries are eligible to receive funding to support the incremental costs of GEF-related activities, which include ozone protection. The GEF currently has $2 billion in funding available, and China has received over $120 million of this funding for over ten approved projects.

The GEF has four projects areas: 1) ozone protection; 2) climate change; 3) biodiversity; and 4) international waters. Opportunities for GEF-related work are similar to those under the Montreal Protocol: 1) country plan development support; 2) project development support; 3) project proposal technical review; 4) project implementation support; 5) technology provision; and 6) project evaluation. Similarly, there are three GEF implementing agencies: 1) the World Bank; 2) the

United Nations Development Programme; and 3) the United Nations Environment Programme. Project execution may be undertaken by either an implementing agency, a Chinese government entity, or by a United Nations agency different from the implementing agency.

Multilateral Funding Example—the China Refrigerator Project

The China Refrigerator Project was the first to receive funding from both the GEF and the Montreal Protocol. Initial Montreal Protocol funding for the China Refrigerator Project was approved in 1993 in the amount of $396,000. Initial GEF funding was approved in 1996 in the amount of $243,000. The goal of the project is to develop, design, and build chloroflorocarbon (CFC) free and energy efficient refrigerators in China. The energy efficiency side of the project receives funding from the GEF, while the CFC reduction aspect was funded under the Montreal Protocol. Full GEF funding was approved by the GEF bilateral committee in February 1998 in the amount of $9.6 million.

Additional Comments

Financing Environmental Projects

- It is very difficult to quantify how much U.S. business is lost to foreign firms due to TDA and Overseas Private Investment Corporation (OPIC) restrictions to operate in China. Foreign embassies track how much business their domestic firms do in China, but many foreign companies have not been receiving follow-on contracts.
- There are currently no set guidelines for export credit agencies to ensure that a potential project will not be detrimental to the environment.
- Restrictions on the TDA can be waived by the President, but USAID restrictions can only be waived by Congressional statute.
- The Clinton Administration may be willing to consider removing TDA restrictions once the certifications to allow trade in peaceful nuclear technology have successfully been approved by Congress.
- Even China's Environmental Protection Bureaus (EPBs) are often more concerned with cost than environmental protection. For example, an EPB was recently required to conduct audit training for a project that was to receive multilateral bank funding. The EPB saw this requirement as a hindrance with no economic benefit to them, and hired the lowest foreign bidder for the program although the bidder's proposal omitted work elements required by the bank.

Marketing Environmental Technologies in China

- There has been a recent trend in China towards 'green' consumer products. While some of these products have been successful, the Chinese are attracted more to the fact that they are high-tech than that they are environmentally friendly. Market research in China has shown that 'green' products are not a draw, but that new technology is very attractive to consumers.
- A problem with U.S. technologies is that, while they are generally high quality, they are often also expensive.
- Local and Provincial governments have the most power in signing contracts for new projects. EPBs have an indirect impact because they often play the role of bringing foreign firms and technologies to potential buyers.

Other Comments

- The International Performance Measurement and Verification Protocol (http://www.ipmvp.org) is a document which discusses procedures that, when implemented, allow building owners, energy service companies (ESCOs), and financiers of building energy efficiency projects to quantify energy conservation measure performance and energy savings. The IPMVP can provide lenders and Chinese energy utility managers a basis for negotiating the contractual terms which ensure that an energy efficiency project achieves or exceeds its goals of saving money and improving energy use.
- Health impacts due to environmental degradation are becoming increasingly important to the Chinese and should be an area of focus for U.S. assistance.
- It is important to have a broad based effort and coherent postures on environmental issues when engaging the Chinese. Different branches of the U.S. government must work together and in cooperation with NGOs, Universities, National Laboratories, and the private sector for research and policy assistance.

Financing Environmental Protection in China: The Role of Foundations and NGOs

1 April 1998

Congressional Outlook for Removing Aid Restrictions to China

Congressional Perspectives on China

• China has very few friends on Capitol Hill. Even Congressional members who support at least decent relations with China concede that this position is difficult and a hard sell to other Congressional members. In addition, members who vote to support granting China most favored nation (MFN) status often do not have particularly warm feelings towards China.

• The prevailing steoreotypes of China that one finds on the Hill are almost all negative. China is seen as: (1) being a bully, especially in its attitudes towards Taiwan and Tibet; (2) having aggressive and probably expansionist ambitions; (3) being untrustworthy, especially on nonproliferation and intellectual property rights issues; and (4) being a repressive dictatorship that does not care about Western values.

• Congressional opinions of China, however, tend to be very one-sided and lacking of any historical perspective. There is no sense of the progress that China has made in recent decades, or of its historical difficulties with foreign countries. China is often judged solely on American standards, with little regard for its history, culture, or current reforms.

• Members of Congress tend to be very single-issue driven in their attitudes towards China, with a tendency to overlook the geopolitical or strategic consequences of their stances. Very few members ask how American interests will be affected by changes in the relationship, or how the United States can best advance its interests through its relationship with China. In addition, very few members look at the connections between various components of the U.S.-PRC relationship and ask, for example, how a decision to impose new trade sanctions on China might affect U.S. policies for the Korean peninsula.

• Congressional perspectives on China are not governed by partisanship. In recent years, a majority of members in both parties have supported MFN renewal, even though an overwhelming majority of members on both sides do not support China. In the past two years, Republican support for MFN has been about ten percentage points higher than Democratic support. Opinions about China have also led to interesting alliances between liberal Democrats and conservative Republicans.

Implications of these Perspectives

• The Senate recently voted by a count of 95-5 to pass a resolution recommending that the United States sponsor a memo criticizing China's human rights record at the United Nations Convention on Human Rights in Geneva.

• Skepticism on Capitol Hill regarding Department of State proposals to undertake rule of law programs in China may halt or slow down implementation of these programs.

• Efforts by the United States Agency for International Development (USAID) to extend the United States Asia Environment Partnership (USAEP) to China have been halted in the Senate Foreign Relations Subcommittee.

Congressional Landscape

• Although the Senate is somewhat less confrontational towards China than the House, a single member of either the Senate or the House has the ability to stop a bill from moving forward.

• Under the Foreign Relations Act, U.S. agencies are not allowed to fund assistance activities in communist countries. Therefore, USAID and its USAEP are not allowed to operate in China.

• The Executive Branch can issue National Interest Waivers that would allow the Overseas Private Investment Corporation (OPIC) and the Trade and Development Agency (TDA) to operate in China, but the Clinton Administration is reluctant to issue these waivers due to the opposition that such actions would face on the Hill.

The Role of NGOs in Financing Environmental Protection

The World Resources Institute (WRI) is currently examining the relationship between international financial flows and the environment. In an effort to understand how financial flows impact the environment, WRI has mapped out the private financial services industry and attempted to learn whether NGOs can lead money to environmentally sound projects, and find the levers which would allow them to do so. Is there a way, for example, for NGOs to shape decisions in China as to how money will be spent on infrastructure and environmental projects? The initial focus of this research has been on pollution, health, and urbanization, with future research focusing on capital inflows, forests, and ecosystems.

While it is clear that NGOs cannot influence and organize the trillions of dollars being invested in China, it is also apparent that NGOs can have a significant impact on international financial flows. The key is to

find the proper levers and channels to exploit which would provide NGOs the opportunity to have the most influence. There are three main factors that make it seem as though NGOs might have a good opportunity to find these levers in China in the near term:

• *Scale of the Problem*. There are tens of billions of dollars being invested in China annually, and over a trillion being spent on infrastructure. Much of this infrastructure investment will have a large impact on air pollution levels, energy intensity, and carbon emissions for decades to come.
• *Timing*. With the recent elevation of Zhu Rongji to Premier, China is committed to economic restructuring. There is currently tremendous potential to integrate the environment into economic decision making. The timing therefore looks right to try and find these levers, create them, or pull them.
• There currently also seems to be access for NGOs to Chinese decision makers. The China Council for International Cooperation on Environment and Development (CCICED) is a good example of such a non-governmental channel. This type of Track II diplomacy has been effective and may continue to be in the future.

With the current positive climate for finding levers, WRI has targeted a number of key sectors: electric power; trade and development; township and village enterprises; agriculture; forestry; water; urban issues; transportation; and electricity distribution.

Recent research has led to the identification of three key factors in China which influence how money is invested: (1) a non-convertible currency; (2) statutory limits on the rate of return an investor can earn; and (3) prescribed technology choices by the State Planning Commission which dictate the type of project an investor can build. If a fluidized gas desulfurization project is not on the SPC's list, for example, it simply cannot be built.

The Role of Foundations in China

Frustrations of Working in China

• *Agenda 21*. The Chinese have crafted an extensive Agenda 21 plan with the hope that donor agencies will take an interest and support Agenda 21 projects. However, China's Agenda 21 seems to be a way for the Chinese to externalize much of their responsibility for worsening environmental problems. Therefore, many NGOs and small- to medium-sized foundations have stayed away from Agenda 21 projects.
• *Beijing Bureaucracy*. There is often too much bureaucracy, too many undelivered promises, and too much access and exposure to the international donor community for many smaller foundations to work through Beijing. It is often beneficial for these foundations to instead focus on province and county level strategies.

By not working through Beijing or with Agenda 21 projects, foundations may miss a number of opportunities, but small- and medium-sized foundations with a regional program scope need to search for particular niches in which they can make a difference.

Alternative Approaches

Instead of operating within Beijing, the Rockefeller Brothers Fund (RBF) has focused on smaller projects at the provincial or county level. Examples of these projects include:

• A long-standing relationship with a Nanjing-based grantee who works on organic farming methods. RBF strongly encouraged this grantee to try to make money from organic certification programs paid for by exporters, as well as from consultant services on sustainable agriculture. This grantee went from 100 percent dependence on foreign funding in 1993 to 80 percent self-funding in 1997—an enviable record for any NGO in any country in the world. Noting the success of this project, the Ministry of Agriculture established the "China Green Food" program.
• Support for the South China Agricultural University's exploration of the connections between restoration ecology and regenerative agriculture in the badly damaged agroecosystems of Guangdong province. This grant has helped fund the publication of an English language book, "Improving Degraded Lands: Promising Experiences from South China," which demonstrates China's experience in reversing land degradation. RBF is now working to build a combined program of research and agricultural extension based on this publication.

RBF is also working to explore how the targeted use of rural credit might be able to play an important role in developing a modest commercial infrastructure for organic and "green" foods in China. These programs are thought to be important—even in wealthy provinces such as Guangdong—because, under the Governor's Responsibility System, provinces are supposed to retain a level of food security for themselves. For Guangdong, this would mean a need to focus on its comparative advantage in agriculture, which is in subtropical fruits and vegetables. South Korea has shown how a wealthy East Asian state with limited arable land can nonetheless provide some safeguards to its farming sector and still compete in the global economy by concentrating on value-added agriculture. With assistance and direction, wealthy Guangdong can perhaps do the same.

RBF has additionally begun working with several Chinese partners to rethink urban and regional planning from the perspective of food security, safety, and supply. This may involve grant support for examining

the commercial viability of large-scale composting of domestic wastes; for working with architects to build gray-water recycling systems into multi-unit residences to grow fish in basements and vegetables on roof terraces; and for integrated transport planning. This project holds great prospects for mutual learning.

It has been the experience of RBF that organic foods can have a substantial price premium based on quality alone—not too surprising in a part of the world where beautiful food is still the preferred form of consumption. As incomes continue to rise, demand for clean and high quality food will also grow, and organic producers will be ready to meet this demand. Through these projects, RBF is hoping to assist the development of a green agriculture base in China, and to get the greatest return on its funding investments by focusing on small, entrepreneurial operations, rather than the large, bureaucratic projects of Beijing and Agenda 21.

Additional Comments

Congress and China

• The Chinese themselves are in part responsible for their negative image in Congress. The Chinese do not make it easy for their friends in Congress to support them. From trade issues to nonproliferation to human rights, the Chinese consistently make a friendly posture in Congress politically difficult.

• Negative feelings towards China in Congress are also the result of a lack of interest by current members in foreign policy issues. Seventy percent of House members have been elected since the end of the Cold War, and are consequently less inclined to think that overseas matters will have a direct impact on U.S. citizens.

• The lack of interest in foreign policy in the House can also be traced to the fact that the International Relations committee is not a very powerful one, and therefore not attractive to powerful members. Three straight chairs of the Senate Foreign Relations Committee were defeated in Senate races because they were perceived as spending too much time on foreign affairs and, consequently, too little time on the needs of their constituents. This atmosphere has made it difficult for Congressional members to take a strong interest in foreign affairs.

• It is clear that China's public relations efforts on Capitol Hill are not working. Suggestions for improving China's public relations efforts include: (1) being more cooperative on nonproliferation and human rights issues; (2) encouraging overseas travel. This is the best way to broaden the perspectives of members. In 1997, China was the top destination for overseas travel by Congressional members, with Hong Kong ranking second; (3) realizing that Congress plays a significant role in how policy is created and perceived in the United States; and (4) undertaking better outreach to Congressional members.

• Some vocal Congressional members who do not look favorably upon China have the backing of strong constituent groups, such as the domestic Chinese community and human rights activists. For Congressional perspectives on these issues to change, equally vocal groups that support friendly relations with China will need to emerge.

• Leadership on geopolitical issues should come from the Clinton administration and not Capitol Hill. The Clinton administration should create a geopolitical atmosphere in which its foreign policy objectives can be successful.

• Attitudes on Capitol Hill can change. They changed in the 1970s, and changed again in 1989. Executive Branch leadership is key to these shifts.

• Many House members vote for resolutions condemning China because they see these votes as without negative political consequence. However, these resolutions are harmful in the overall climate of bilateral relations. Many House members also vote for these resolutions because they support MFN renewal, and view these resolutions as a way to prove that they are tough on China.

Agenda 21

• China's commitment to its Agenda 21 program is very strong. China's Agenda 21 program can be a very useful framework for undertaking environmental improvements, and has become a laundry list for the types of projects that bilateral and multilaterals can work on.

• Agenda 21 projects involve a great deal of time and capital inflow. Many NGOs and foundations are therefore skeptical of these projects and would prefer to focus on unofficial projects.

• While many Agenda 21 projects are to be undertaken at the local level, many do not have local level support. These projects have mainly been driven by NEPA and State Science and Technology Commission (SSTC) support.

Organic Foods

• In order for organic foods to be successful in China, there will need to be better market differentiation between organic and non-organic foods.

• The Japanese fund many organic food projects in China due to food safety concerns. Domestic Chinese concerns about food safety will rise as incomes continue to rise.

• Organic foods are currently largely marketed to Chinese hotels, which are in search of high quality and clean foods.

Other Comments

• If the United States asks China to take action on climate change, the United States would be asking them to do many of the things they are already doing. China, for example, has good energy efficiency levels and is

undertaking structural reform in the energy sector.
• China is a world leader in energy efficiency and would like to see a lessening of carbon emissions. They still take a hard-line stance on climate change issues, however, which makes negotiations with the Chinese on these issues difficult.
• As leaders of the two largest climate change camps, negotiators are trying to move China and the United States towards convergence on this issue.
• There is a perception in the developing world that the Global Environment Facility (GEF) has become a tool of Western countries. This makes the GEF somewhat less useful in working on climate change issues, such as the clean development mechanism, than it otherwise would be.
• There are a number of environmental education programs underway in China: (1) World Wildlife Fund-China has started a program on environmental education with Beijing Normal University. The project will focus on the development of a water textbook for primary and secondary schools; (2) Mobil Oil recently gave a large grant for environmental education programs to NEPA and Beijing Normal University; (3) WRI is translating an environmental education teacher's guide into Chinese; (4) Friends of Nature trains teachers on the environment and produces teacher manuals; (5) new programs are opening on the environment in universities throughout China, many of which are offering graduate degrees; (6) IUCN recently completed work on biodiversity and education in China; and (7) Friends of the Earth-Hong Kong and the Hong Kong Conservation Association are taking Hong Kong-based environmental education programs into China.
• Restrictions on Trade and Development Agency (TDA) operations in China can be lifted by a presidential national interest waiver. The TDA would like to focus on energy and environmental projects in China.
• The United States Export-Import Bank is much more concerned with the environmental impacts of a project than European or Japanese export banks. Incorporating minimum environmental standards into export credit agencies lending requirements would be a significant step towards stopping development projects that harm that environment.

Environmental Policymaking in China

26 May 1998

On 26 May 1998, the Working Group held a public meeting on environmental policymaking in China, featuring Changhua Wu of the World Resources Institute and Wen Bo of China Environment News. *Following is a summary of their remarks.*

China's Governmental Restructuring and the Environment

Governmental Restructuring

Zhu Rongji, China's newly elected Premier, immediately faces three formidable tasks:
• *Reforming State-Owned Enterprises (SOEs)*. The operations of SOEs have become so poor, that the total annual sales of the 500 key SOEs in China are less than those of Mitsubishi alone. While shutting down these factories and laying off workers are important steps to improving China's economy, these actions might also bring about social instability. This transition, however, will help SOEs emerge from the current economic system into a new, modern enterprise management system.
• *Revamping the Financial System*. The Chinese government has historically given 75 percent of bank loans to SOEs, resulting in up to $240 billion of bad debt. China's governmentally-controlled banking system has become a major obstacle in its desire to establish a market-based economy. The government is planning to establish a central banking system similar to the Federal Reserve system in the United States but, in the interim, commercial banks will be given more freedom from governmental influence.
• *Shrinking the Size of the Government*. Before restructuring, the massive size of the Chinese government had not only increased bureaucracy, but had also created a burden on the government to support its workers. It is hoped that the governmental restructuring will aid China in moving towards a more market oriented economy. The restructuring also holds important political consequences. Through governmental restructuring: the authority of some agencies has been reduced (the State Planning Commission, for example, has become the State Development Planning Commission), some departments have been downgraded (the State Science and Technology Commission was downgraded to the Science and Technology Ministry), some agencies power has increased (the State Economic and Trade Commission, for example), and some agencies have been promoted (the National Environmental Protection Agency was elevated and renamed the State Environmental Protection Administration, for example). At the same time, half of current government employees will

be made redundant by the end of 1998, with the governmental restructuring complete within three years. The government will help redundant employees find new jobs through training and other measures.

At this point in time, the result of the governmental restructuring is as follows:
• The Cabinet ministries have been reduced to 29 from 40;
• At the highest level, China now has four Vice Premiers rather than six;
• China now has five State Councilors instead of seven;
• The new leadership is younger than usual—the average age is 62 years old—and is considered to be pragmatic, competent, efficient, and technocratic.

The goal of the institutional restructuring was to separate the functions of the government and enterprises in order to allow the enterprises to operate in more of a free market system, both domestically and internationally. The major task of the government and these enterprises, therefore, is to continue to achieve high rates of economic growth. The three main economic goals of the government for 1998 include:
• To guarantee that China's economy grows at 8 percent;
• To guarantee that the inflation rate will be kept at less than three percent; and
• To guarantee that the yuan will not be devalued in the foreseeable future.

In order to achieve these goals, China is investing heavily in infrastructure projects in a similar fashion to Roosevelt's "New Deal." The energy sector will continue to be the key to overall economic growth. China's commitment to improving energy efficiency will continue despite pressure to achieve economic goals, and China will move to shut down factories which consume too much energy and/or produce too much pollution. Sustainable development will continue to be the country's overall development strategy, and environmental protection and population control will continue to be the two fundamental national policies.

The current restructuring has given the State Environmental Protection Agency (SEPA) more leverage in dealing with other government agencies. However, due to the complexity of the restructuring—especially when half of SEPA's employees will be made redundant—it is not yet clear what the final results of the restructuring might be. This period of policy and institutional flux does provide a major opportunity to identify and promote policy and institutional changes that could meet sustainable development goals.

China's Current Environmental Policymaking Landscape

Along with rising incomes and improved literacy rates, China's reforms have increased environmental awareness among Chinese citizens. Recent studies have shown that as communities have become wealthier and better educated, they have begun to push for stronger environmental regulations and enforcement of environmental laws. Although the government has already begun to address particulate and sulfur emissions, a great deal of progress still needs to be made. While regulatory standards will likely reduce emissions from power plants and SOEs, residential sources of pollution, and emissions from township and village enterprises (TVEs), continue to threaten air quality. Despite stronger enforcement of regulations towards SOEs, the health impacts of household burning of coal for cooking and heating, and the growing problem of mobile source pollution, will continue until China moves towards a universal adoption of cleaner fuels.

Environmental Laws and Regulations

Since the promulgation of the Environmental Protection Law in 1979 (China's first environmental law), five pollution control statutes and ten natural resource conservation statutes have been enacted in China. The Environment and Natural Resources Conservation Committee of the National People's Congress (NPC) submitted a five year legislative plan for the environment to the NPC in 1993. According to the plan, approximately seven key environment and natural resources statutes will be created or amended in 1998, and more than seventeen such statutes will be created or amended by the end of 1999. The United States, in comparison, has passed approximately twenty-one major environmental acts in the past four decades.

One of the most important of these new laws is the Energy Conservation Law, passed on November 1, 1997 and enacted on January 1, 1998. The scope of the Energy Conservation Law extends to energy from coal, crude oil, natural gas, electric power, coke, coal gas, thermal power, biomass power, and other energy sources. The law may be the harbinger of strengthened efforts by the Chinese government to prohibit certain types of industrial projects that are wasteful of energy and utilize old and inefficient technology.

Despite a variety of new laws and strengthened regulations, however, enforcement of these laws and regulations remains low. This is mainly due to the fact that economic development, and not environmental protection, is China's priority at all levels of society. As part of its effort to strengthen environmental law enforcement, the government revised its criminal code to include environmental crimes. However, the vagueness of the standards in many laws and regulations, coupled with the lack of a comprehensive enforcement regime, has created a situation in which many of the current environmental laws are the result of deals between local environmental protection agencies, NEPA, other ministries, local governmental bodies, and the polluting enterprises themselves. Therefore, the de-

gree of actual compliance and enforcement depends on the region concerned and the personalities of the different players involved.

The Use of Economic Instruments to Assist Compliance

During its transition from a command to a market economy, China is attempting to harness the market to work for the environment instead of against it. Many aspects of the economic reform will benefit the environment, such as:

- Reforming state enterprises so that they respond to environmental penalties;
- Liberating international trade to give Chinese industries access to the latest environmental technology;
- Developing a capital market to provide financing to firms and municipalities supplying environmental infrastructure; and
- Adjusting the pricing system of environmental goods to more accurately reflect their true costs.

Despite the fact that China is resource poor, its energy and water prices are far lower than the actual costs of these goods. However, great strides are being made to rectify this situation. Over the past three years, the government has raised and partially deregulated coal prices; in many areas, coal prices now reflect the actual costs of delivery and production. In addition, many cities and provinces are preparing to increase sewage and water charges to consumers and industries. In Taiyuan of Shanxi Province, for example, the price bureau has announced that water prices will quadruple over the next five years in order to recover supply costs. Shanghai recently increased tap water prices by 25-40 percent in order to fund water quality improvement programs and to make sewage treatment self-financing. Guangzhou and Chongqing are eager to do the same.

Increasing Environmental Investment

The Chinese government has attributed the continued deterioration of the environment largely to a lack of funding. Insufficient investment in environmental projects has thwarted previous ambitious five year plans to control pollution. Now, in its Ninth Five-Year Plan period, the government has adopted the Trans-Century Green Plan, which sets targets for environmental protection through the year 2010. In conjunction with other environmental protection plans, SEPA is striving to stabilize the emissions of twelve major pollutants by the year 2000. The percentage of sulfur dioxide, particulates, untreated sewage, and heavy metal sewage treated would be increased from its current rate of nineteen percent to twenty-five percent, and treatment of industrial wastewater would be expanded by about 70 million metric tons. This ambitious plan, which SEPA estimates will cost approximately 450 billion yuan (1.3 percent of China's GNP), accords top priority to certain areas, especially along the east coast and in some parts of inner China: the Hai, Huai, and Liao rivers; the Chao, Dianchi, and Tai lakes; and two areas in southwest China with very high sulfur dioxide levels and acid rain problems.

Industries and local governments are increasingly looking for new sources of funding to support their projects, including the use of the "polluter pays" principle, urban environmental infrastructure funds, and even bank loans. The central government is playing a more supportive role in seeking loans and foreign investment, and in implementing economic policies. The government intends to increase the proportion of GNP spent on controlling pollution from the current 0.8 percent to more than one percent by 2000. Some cities are investing an even higher proportion of their GNP for environmental protection measures. For example, Beijing, Shanghai, and Xiamen have decided to allocate up to three percent of their GDP towards pollution control. Tainjin will set aside up to two percent. In the meantime, China also hopes that foreign investment will continue to provide funds supporting its ambitious plans to address pollution.

Chinese Media and the Environment

As environmental issues have become an important aspect of China's development, media coverage of environmental events and problems has also increased. While environmental reporting in China first emerged with coverage of international Greenpeace demonstrations in the mid-1980s, environmental reporting in China currently focuses on environmental meetings and conferences, and significant global and domestic environmental problems. The Chinese media has been very successful in raising environmental awareness in China, but not necessarily in informing citizens about how to get involved in environmental activities.

Structure of the Media

The Chinese media has developed very differently from Western media. Chinese media organizations are started by government agencies and primarily act as agency spokespeople. The largest of these groups in China is the Xinhua News Agency, which has established a vast media network that covers every region of the country. Due to its vast influence and high rank within the media structure, other papers must follow the line of Xinhua News Agency when covering sensitive issues.

China Central Television (CCTV) is another powerful media outlet in China, with its broadcasts reaching a total population of approximately 0.9 billion. CCTV has recently begun to carry environmental programming, helping to increase awareness of environmental events and issues within China. One program

carried on CCTV, Fox Interview, has featured in-depth reporting of environmental issues, and is sometimes critical of government policy or action.

In addition to these large media organizations, many government ministries, local government bureaus, and municipalities have their own newspapers or newspaper columns, many of which focus on environmental issues. *China Environment News* (*CEN*), the first national newspaper specializing on environmental issues, was established by the National Environmental Protection Agency in 1984, for example. During the 1980's, *CEN* was a groundbreaking newspaper, reporting on a broad spectrum of environmental issues that other papers were reluctant to cover. Over the past decade, a number of other influential environmental newspapers have emerged, including: *Green Weekly*, a four page column included in the *Science and Technology Daily*; *China Green Times*, a daily newspaper operated in cooperation with the Forestry Bureau; and *Environmental Protection Herald*, which was established jointly by a number of major environmental agencies in southwest China.

The Role of the Media in Promoting Environmental Awareness

The Chinese media has been very important in promoting environmental activities by both nongovernmental organizations (NGOs) and government agencies. Both the Global Village Environmental Culture Institute and Friends of Nature have used media coverage to publicize their campaigns, increase awareness about environmental issues, and inform the public about how their actions can make a difference. The success of these organization's efforts is due in large part to the amount of media coverage they are able to generate.

The government has also attached great importance to the role of mass media in environmental protection. The government utilizes the media in two main ways: (1) to publicize new laws and regulations, and (2) to broadcast environmental messages from government environment departments. Many environment departments have used publicity funds in a variety of ways to increase environmental awareness. NEPA has used these funds to support its press conferences, sponsor environmental columns in national newspapers, and support television programs on Beijing TV. Dalian Environmental Protection Agency has used publicity funds to sponsor a half-hour radio program on Radio Dalian entitled "Voice of Green" which aims to raise public environmental awareness in the province.

Media has not only promoted governmental and NGO activities, but it has also helped promote environmental action. This is most vividly demonstrated by two examples:

• *China Century Tour on Environmental Protection.* In 1993, the Environmental Protection and Natural Resources Conservation Committee of the NPC launched the China Century Tour on Environmental Protection, a wide reaching, fact-finding investigation to raise awareness about environmental pollution. Each year, a single theme is chosen as the Tour's focus topic. The Committee then convenes and develops media activities at the central level on this topic, while twenty-seven provinces, cities, and autonomous regions simultaneously carry out their own local Tours. The Tour has been extremely influential: its coverage of polluting industries along the Huai River, which supplies water to over 150 million people, alerted government officials to the severity of this problem.

• *Yunnan Snub-nosed Monkeys*. In 1995, Xi Zhinong, a wildlife photographer at the Yunnan Provincial Department of Forestry, raised an alarm regarding the fate of the Yunnan Snub-nosed monkeys. Spurred by a local Deqin County decision to log over 100 square miles of primitive forest, which comprised over one-fifth of the endangered monkey's habitat, Xi embarked on a campaign against the county's logging plans. With the assistance of Friends of Nature, Xi was able to generate a great deal of coverage on Deqin's logging plans, including two front page stories in *China Environment News*. The media coverage eventually helped convince the central authority to intervene in the situation, and halt Deqin's logging scheme.

Constraints on the Media

While Chinese journalists have been successful in covering general environmental issues and some NGO activities, there are still many areas that fail to receive adequate coverage. A majority of Chinese environmental reporting concentrates on meetings, tree-plantings, and environmental sanitation efforts. There continues to be a lack of in-depth environmental reporting that can have a resounding impact on the public and decision makers. The Chinese media has also failed to raise awareness on the following important environmental issues:

• *Overseas Polluters*. China views foreign enterprises as essential to its economic growth and, therefore, the impact of these firms' operations on China's environment is largely ignored. Foreign enterprises can produce as much pollution as Chinese enterprises, yet they tend to have a more positive environmental image within China.

• *Nuclear Power*. There is virtually no reporting of nuclear power issues in China and, consequently, there is a lack of awareness among the Chinese public about the environmental impacts of nuclear testing and nuclear power production, the generation of radioactive waste, and the potential for devastating nuclear accidents.

• *Hydroelectric Dams*. Due to the fact that China's problems with floods have historically been so severe, hydroelectric projects are hailed as a means to conquer

nature and halt flooding. In addition, after the Three Gorges Project began construction, articles opposed to hydroelectric projects, or their negative environmental impacts, have seldom been allowed to be published in China.

• *Marine Conservation*. For centuries, China's marine awareness has been low, creating a lack of action regarding China's marine pollution and the destruction of China's marine resources. Although a few publications focus on marine issues, their circulation is too low to impact public perception of marine issues, or to influence governmental action.

Additional Comments

Governmental Restructuring

• Before the restructuring, the Ministry of Forestry had two responsibilities: (1) to protect biodiversity; (2) to manage forests. The Ministry has now been downgraded to the Forestry Bureau, and its conservation responsibilities have been transferred to SEPA.

• The restructuring will clearly affect enforcement of environmental regulations, but it is currently unclear what the impact will be.

• Now that SEPA is a ministry, it directly reports to the Vice Premier in charge of environmental protection. This should make things easier for SEPA, as it will no longer be required to first go through the State Science and Technology Commission. SEPA, however, is still not on an equal level with other ministries.

• The ministries of each major industrial sector have been canceled and made into cooperatives. For each industrial sector, a bureau has been created under the State Economic and Trade Commission (SETC). Prior to the restructuring, each industrial ministry had its own bureau for environmental protection. However, with these ministries being downgraded to bureaus, there will not be personnel in each industrial sector responsible for environmental issues.

The Chinese Media

• The Chinese media is especially thorough in covering water pollution. Water pollution is probably the most serious environmental problem in China because it has an immediate impact on the lives of Chinese people. Also, most large Chinese cities are located along rivers or beside lakes, therefore making it easy for journalists to access the areas in which there are problems. However, readers are not as interested in water issues as they are in saving endangered species, such as the giant panda.

• There is little coverage of protests or demonstrations on environmental issues in the public media, but such coverage is included in Internal Reference memos prepared for the party leaders.

Other Comments

• It is important for NGOs in China not to become too big because the larger their activities, the more the government will scrutinize their existence.

• In June 1997, the Ministry of Civil Affairs passed a regulation which will not allow any new NGOs to register for three years. This regulation was the result of an increase in the prevalence of NGOs: the Ministry felt it needed to take some time to sort through existing NGOs and create a new system for registration. In response, a new type of NGOs have emerged that are not registered, and are organized informally.

• The loaning of China's giant pandas to a foreign zoo can generate funds of up to $1 million per panda each year. Most people in China would not mind if captive pandas were loaned to foreign zoos, and this is an excellent way to generate badly needed funds for panda conservation efforts.

• Eco-tourism and the harvesting of forest mushrooms are potential solutions to helping local communities develop alternative means of income to logging.

• SEPA and the Ministry of Education are working on developing environmental education curriculum for secondary schools. WWF-China is also actively involved in developing teaching materials on environmental issues. Shell and Mobil Oil have also supported environmental education efforts.

• The United States and China have agreed to three bilateral activities this year: (1) the two countries will hold a forum on oil and gas this fall in Beijing; (2) a project financing seminar will be held in China in September; and (3) the two countries' Export-Import Banks will develop a cooperative relationship.