

## The Difference a Legislature Makes: Administering Market-Driven Air Pollution Control Regulations in Taiwan and China

By Eric Zusman

In 2002, I attended a meeting that was organized by the Asian Development Bank, Resources for the Future, and local Chinese partners to evaluate the progress of a stalled pilot emissions trading program in Taiyuan, China. At the meeting, I watched attentively as participants argued over the seemingly mundane details of how permits would be allocated and enforced (Research Notes, 2001). Almost four years later, I interviewed officials about the progress of a fully implemented emissions trading program in Taipei, Taiwan. Like their Taiyuan counterparts, Taiwanese officials encountered numerous disputes over administrative issues that hindered the implementation of the trading program, which had been in consideration since the late 1980s (Interview File 1, 2005).<sup>1</sup> Though Taiwanese and Chinese regulatory experiences in adopting a market-driven mechanism differ, they have more in common than meets the eye.

Both Taiwan and China have found that the most challenging aspect of implementing market-driven regulations (i.e., tradable permits and emissions fees) is perhaps the most mundane: designing a set of administrative rules supporting the enforcement of these innovative pollution control measures. This difficulty stems from another similarity; namely, both rely upon local environmental protection bureaus (EPBs) (*difang huanbaoju*) to enforce regulations, necessitating that they overcome regional government intransigence to implement directives adopted at the central level.<sup>2</sup> The weakness of the EPBs underscores the importance of clear administrative rules specifying how regulations should be enforced.

To highlight a key distinction between Taiwan and China on this issue, after I finished my interview

in Taipei, I went for a run; after I finished the meeting in Taiyuan, I went to sleep because I did not want to endanger my lungs in the city's coal-filled air. Taiwan's market-driven air pollution control regulations have greatly improved air quality in Taipei, while Taiyuan still has smoggy air that threatens the lungs of runners and walkers alike. This air quality contrast stems in great part from the difference in administrative rules supporting the enforcement of the market-driven regulations. Ultimately, the more accountable political institutions make legislators for the administration of air pollution regulations, the more likely they are to clearly explicate the enforcement responsibilities of environmental agencies, thereby facilitating the evaluation and pressure on EPB bureaucrats charged with administering market-driven regulations. This is the difference a legislature can make. In this commentary, I examine this difference by looking at the impact of Taiwan's Legislative Yuan on the design of one type of market-driven regulation, emissions fees. Insights from this case offer lessons for other types of market-driven pollution regulations on both sides of the Taiwan Strait.

### TAIWAN'S AIR POLLUTION FEES: THE CASE OF ARTICLE 10

During the late 1980s, policy advisors to Taiwan's leadership concluded that to manage the island's pollution problems more was needed than the command-control standards, subsidies and tax breaks granted to polluting industries for end-of-the-pipe abatement technologies that had constituted the core elements of Taiwan's regulatory regime up to that point (Shaw & Hung, 2001). This conviction coincided with mounting popular discontent over

the pro-business leanings of the ruling Nationalist (*Kuomintang*, KMT) government and the subsequent establishment of Taiwan's Environmental Protection Agency (TEPA) (Yeh, 1993; Reardon-Anderson, 1992).<sup>3</sup> It also resulted in the strengthening and passage of a number of new regulations, most notably the insertion of provisions for pollution fees into Taiwan's third revision of the 1992 Air Pollution Control Act (APCA) (Tang, 1994).<sup>4</sup> To avoid encountering objections from industry and give TEPA enough discretion over the pollution fee, the now infamous Article 10 of the 1992 APCA was left deliberately vague (Interview File 3, 2005). Article 10 in the 1992 APCL states:

[Environmental] agencies at each level should, according to the type and the amount of a pollutant, assess a pollution prevention fee. The variations and the method for collecting the fee from the pollution sources are to be determined by the primary (environmental) agency at the central level [e.g., TEPA] in consultation with other relevant agencies.

When TEPA interpreted this language, it decided to transform the fee into an easy-to-collect surcharge on gasoline under the pretense that it would reduce automobile use and emissions from mobile sources. The logic underpinning such an interpretation, as environmental organizations, consumer groups, and the then rival DPP noticed, was fundamentally flawed. The demand for gasoline—to give one example of a charge these opposition groups leveled—was relatively inelastic and thus did not cut into automobile use or reduce emissions. More seriously, the fuel surcharge missed large stationary polluters that were still the biggest contributors to Taiwan's air pollution problems at the time (Tang & Tang, 2000).

Soon after the release of the implementing rules, representatives from the Legislative Yuan made it a point to highlight these shortcomings. Representative Zhao Yuanqing remarked to the news media that, “the polluter pays principle has morphed into the gasoline user pays principle, the name of environmental regulation is being used to [disguise] a tax to raise funds for TEPA.” Shortly thereafter Zhao and several of his colleagues called for a special report from TEPA explaining the fee's

use and intended effects. Remarks and requests like these initiated a prolonged debate within the Legislative Yuan on the interpretation of Article 10 and eventually resulted in an appeal from 67 legislators to the higher courts for further clarification (He, 1996; Zhang, 1996; Interview File 4, 2005).

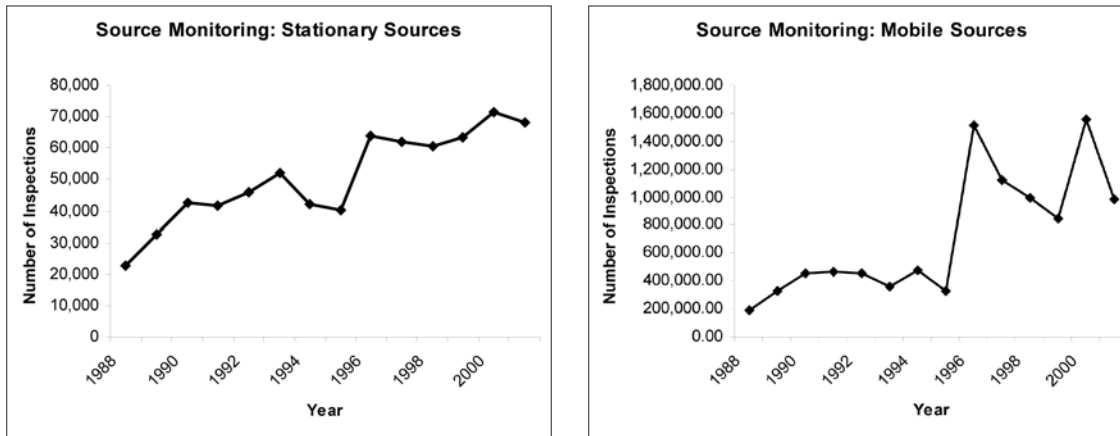
After several rounds of legislative deliberations and a court decision, TEPA substantially revised the rules supporting the administration of Article 10. Currently, Taiwan's air pollution control fee is assessed on automobiles, stationary sources, and construction sites. There are carefully scripted rules governing how the funds will be collected and apportioned, including statutes that require a committee with reserved seats for members of non-governmental organizations (NGOs) to oversee the fee's allocation and expenditure. The above rules were further refined at least seven times between 1992 and 1999 and placed in the next revision of the APCA in 1999 (*Huanjing Baohushu, Xingzheng Gongbao*, 1993, 1995, 1996, 1997, 1998).

The politicization of Article 10 led to significant improvements in Taiwan's air quality through the better targeted fee system, and considerably changed the workload of the environmental agencies. One official from a local level Taiwan EPB spoke revealingly of how his job had changed when asked about the fee's impacts:

Before the pollution fee our jobs were pretty relaxed (*qingsong*). We would visit a factory once a month to ensure that abatement equipment was operable and that there were no extreme incidences of emissions. After the introduction of the air pollution fee, our workload exploded. We were now visiting the large polluters once a week to make sure that we were measuring emissions correctly.... We are also now forced to improve our human resources management, as we now have more employees and a heavier monitoring load (Interview File 4, 2005).

Demonstrating that his comments reflect broader trends, data from Taiwan's environmental yearbook show that there has been a significant rise in monitoring of stationary and mobile sources after implementing rules were released in 1995 (See Figure 1). (*Zhonghua Minguo*, 2002).

FIGURE 1.



### CONCLUSION: THE DIFFERENCE A LEGISLATURE MAKES

The increased monitoring leads back to the argument advanced in the introduction. On Taiwan, the establishment of a truly representative legislature altered the rules of the political game (*youxi guize*). On the one hand, reforms to the Legislative Yuan made it easier for environmentalists to articulate their interests and perhaps slowed the regulatory reform process; on the other, it has made policymakers increasingly accountable, creating an electoral linkage between a representative's job security and the success or failure of a new regulation. When that success or failure hinges on the performance of bureaucratic agents, it is not surprising that legislators have focused their energies on clarifying the administration of Taiwan's market-driven regulations.

Notably, the Environmental Protection and Natural Resource Committee (EPNRC) of China's National People's Congress (NPC) also has pushed for provisions bolstering the administrative rules in China's air pollution regulatory regime. However, comments from the NPC's EPNRC on the recent revisions of the 1995 and 2000 Air Pollution Control Law (APCL) are less about instituting new regulations, than closing administrative loopholes in old ones (Lin, 1995; Qu, 2000).<sup>5</sup> This may augur well for China, as it has already accrued significant experience with emissions fees and appears primed to expand its local-level experiments with emissions trading. But it is nonetheless important to emphasize that the NPC is still a developing legislature that is

accountable to other agencies within the state, not society (Alford & Libeman, 2001).<sup>6</sup> Overall, weak EPBs in China continue to be ineffective in preventing growing pollution problems in China.

These caveats notwithstanding, the growing assertiveness of the NPC and the institutionalization of the Legislative Yuan may also represent an opportunity for the leadership on both sides of the Taiwan Strait to consider something else that China and Taiwan share in common—the need to undertake more political reforms to strengthen their environmental governance systems. Specifically, tightening the relationship between environmental regulation and administrative rules is less about the language in policies than how accountable political institutions make policymakers. Recognizing that such a relationship transcends physical boundaries and historical enmities may also open up possibilities for further cross-straits cooperation on air pollution, as well as other issues where dialogue on like interests and complementary concerns would be mutually beneficial. Less ambitiously, it might make it easier to run in Taiyuan.

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## NOTES

1. Taiwanese policymakers have discussed emissions trading since 1986. As early as 1992 provisions were included in the Air Pollution Control Act for intra-firm trading bubbles (but not between firms). Pilot projects were undertaken beginning in 1999.
2. While their vocabulary was slightly different, local environmental officials on both sides of the straits see local administrative obstacles as the "key barrier" (*guanjian de zhanai*—in Taiwan) or the "core problem" (*hexin de wenti*—in China) frustrating local level air pollution control enforcement.
3. See Yeh for an early history of the development of Taiwan's environmental legislation and Reardon-Anderson for social movements that motivated the leadership to take environmentalism seriously.
4. Tang is sharply critical of Taiwan's air pollution legislation in the early 1990s. Note that Tang is comparing Taiwan's regulatory regime with the United States.
5. Note that comments from Lin Rongtang and Qu Geping focus on strengthening management and enforcement of regulations.
6. Alford & Liebman are not convinced that the EPNRC will be able to exert a meaningful influence on legislation.

# COMMENTARY

## A New Model for Chinese Rural Development? Industrial Agriculture and Renewable Energy in Rural China

By Ben Greenhouse

Over the last two decades, China's economy has witnessed unprecedented double-digit rates of annual growth—10.2 and 11 percent in the 1980s and 1990s, respectively (World Bank, 2001). The average annual rate of expansion slowed slightly between 2000 and 2003, but—at 8.25 percent—remained markedly higher than either Canada or America, at 3 and 2.5 percent, respectively (World Bank, 2005). The environmental and social hazards of such booming growth seems to be understood by the Chinese government, which has been trying since 2003—unsuccessfully—to slow this growth by tightening monetary policy, reducing spending on capital projects, taking measures to slow lending, and reducing the liquidity in the market by issuing bonds and bank notes (Bremner, Balfour, & Roberts, 2005; DOE, 2004). Despite these measures, the growth rate in 2004 remained at a high of 10 percent (World Bank, 2005).

### MIND THE GAP—URBAN/RURAL INEQUALITY IN CHINA

With this rapid development has come growing inequality; during the first wave of market reforms from 1978 to 1992, income equality throughout China remained relatively constant, however the second phase of reforms starting in 1993 brought increasing inequality, particularly between rural and urban areas (Bhalla, Yao, & Zhang, 2003). While some of this imbalance can be attributed to a general decline in world agricultural prices that has disproportionately impacted rural areas (Benjamin, Brandt, & Giles, 2005), the problem has been compounded by the lack of rural non-farm employment and barriers to urban employment



The Cang Dong biogas digester (*shui feng chi*) has a massive “floating” cap, which gets pushed up by the biogas. The cap is weighed down by cinderblocks, creating pressure sufficient to drive the gas the 2 kilometers to the village and the electricity generator. © Ben Greenhouse

markets raised by the *hukou* (resident registration) system (Liu, 2005; Khan & Riskin, 2005).

Rural residents are becoming increasingly impatient with the growing divide between themselves and their urban counterparts, as evidenced by an increased incidence of rural unrest over the past few years and the every-increasing mass migration of residents to urban areas (McGregor, 2005). In an effort to reduce this disparity and stem the tide of migration, the central government has undertaken

various campaigns and new policies to improve rural economic opportunities, such as relaxing *hukou* regulations, building major transportation and electricity infrastructure (most notably under the Go West campaign), and investing heavily in rural economic development projects (Zou, 2005). Unfortunately, many of these rural infrastructure and development projects have had adverse effects on local environmental conditions (Muldavin, 1997; Economy, 2002). However, some government-led projects have recognized the need for sustainable development and produced environmentally friendly results. Most notable have been the little heralded rural biogas initiatives that have been underway since the 1970s.

## EXPLORING SUCCESSFUL RURAL BIOGAS INITIATIVES

From late 2004 to early 2005, I conducted four months of research on a biogas project in Cang Dong, a small village in the north of Hainan Island. This project is a unique example of a new, more environmentally friendly model of rural development incorporating commercial agriculture with a large-scale biogas plant that generates electricity for the farm while providing cooking gas to the nearby village.

In 1998, in an attempt to boost Cang Dong's stagnant economy, the village government permitted a national food company to establish the *Wan Tou* pig farm on village land. In return for the use of the land, Cang Dong acquired one million shares (approximately 8 percent) of the farm. Government at all levels heralded the partnership between local government and industry. However, soon after the farm was established, environmental problems began to surface; the farm was releasing 250 tons of waste from 10,000 pigs into the local environment every month with minimal treatment. These emissions, coupled with the farm's proximity to the local reservoir, resulted in severe contamination of the village's water supply. Moreover, air pollution from the farm caused the village—approximately 2 kilometers from the farm—to smell badly of pig excrement. The villagers and their government protested this pollution, prompting the provincial government to give the pig farm an ultimatum: solve the problem within two months or the farm would be closed.

In response to this ultimatum, the pig farm contracted Hainan Huafu Environmental Engineering Company Ltd. to design and build a water

treatment plant for their liquid waste. The resulting design generated biogas from the farm's liquid pig waste as part of the treatment process.

Biogas—methane gas produced from animal and human waste combined with crop residues—has been used in China for more than sixty years in various forms, the most common of which are small household digesters producing gas for cooking and minor illumination. The substitution of biogas for other cooking fuels can benefit households both economically and in terms of health (Wang & Li, 2005).<sup>1</sup> Furthermore, the solids remaining after the biogas production are an ideal source of naturally derived fertilizer for agricultural purposes. Recognizing these benefits of biogas, since the late 1990s the Hainan provincial government has offered 1,200 Yuan (\$150) worth of subsidies to households wishing to install biogas systems. This promotion of biogas has been very successful, and by 2003 110,000 household biogas digesters were operating in Hainan.

In Cang Dong, the water treatment plant uses a much larger digester than the typical subsidized household biogas systems operating on Hainan. (See Photo 1). This digester produces 800 cubic meters (m<sup>3</sup>) of biogas per day from the pig farm's waste. The biogas is used to power a generator that provides approximately 80 percent of the farm's electricity. The electricity is sold back to the farm at roughly half the price of grid-supplied electricity—providing substantial savings to the farm and a source of income to the treatment facility—while the solids generated in the digestion process are sold to nearby farmers as natural fertilizer. The plant's electrical generator only consumes 75 percent (600 m<sup>3</sup>) of the biogas produced by the waste treatment plant. The treatment facility offered the surplus gas to the villagers if they would build the pipeline to carry the gas from the farm to the village at a cost of 270,000 Yuan. In an inventive step, the village pooled the provincial biogas subsidy available to each household in order to raise 128,400 Yuan. The remaining funds were borrowed from the pig farm with the village's ownership in the farm serving as collateral. The resulting pipeline—finished early in the fall of 2004—delivers 1.2 m<sup>3</sup> of gas per day to each of the 107 of the households in Cang Dong, free of charge. This gas is used for cooking by local households (see Photo 2), replacing liquefied natural gas for an estimated yearly savings of approximately 720 Yuan per year per household (almost 20 percent of a villager's annual income).



A typical biogas installation in a household kitchen.  
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### THE “3-POINT” MODEL OF RURAL DEVELOPMENT

The central government is promoting the biogas plant at Cang Dong as the first example of a new “3-point” model of rural development, combining the treatment of waste from commercial agriculture with biogas technology to produce cooking gas for nearby villages. Since the project’s completion, two similar plants are underway in other provinces. The central government recommends (but does not yet require) that this technology be used at any farm with more than 10,000 pigs. The technology used in Cang Dong is not overly expensive or complex; construction of the entire water treatment plant cost only 2,000,000 Yuan and is predicted to pay for itself in 3 to 4 years, with an operational lifespan of 10 to 15 years before any major maintenance is required. Furthermore, in an effort to reduce the use of chemical fertilizers, the central government has set a target that 60 percent of all fertilizers be naturally derived within the next 3 to 4 years. Solids from biogas plants such as Cang Dong’s will become an important source of this fertilizer. This new “3-point” model impacts three areas

of concern to the Chinese government: rural participation in the market economy, an increase in the quality of life of rural residents, and environmental protection. Addressing the former two areas without adversely affecting the latter will help China slow the growth of urban/rural inequality and stem the tide of rural emigration, which threatens to engulf Chinese cities.

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## NOTES

1. In areas where liquefied natural gas is used as a cooking fuel, the substitution of biogas results in considerable savings. In areas where other biomass sources (e.g. dung, wood, straw) are used, economic benefits are realized as timesavings due to the reduced need for fuel gathering activity. Indoor air pollution from the combustion of biomass for cooking is one of the leading causes of disease and mortality in developing countries (Ezzati & Kammen, 2002).



## Prospects for Developing Meaningful Public Participation in Environmental Decision-making in China

By Christine Chung

Social unrest in China has been visibly on the rise, with official Ministry of Public Security figures citing approximately 74,000 so-called “mass incidents”—demonstrations or actual riots—in the first half of 2005, an increase from 58,000 the year before, and only 10,000 a decade ago.<sup>1</sup> Some of these protests are sparked by a growing awareness among citizens of their legal rights and a failure of more formal channels to address their complaints.

Protests and registration of complaints usually are triggered by corruption or abuse of power by local officials—the most common being land seizures that dislocate farmers without adequate compensation and uncontrolled pollution that destroys the livelihood of rural citizens. Local and international news media have covered many of these incidents, including the April 2005 riot of thousands in Huaxi village in Zhejiang Province, which was sparked when police attacked elderly protestors who had been blocking the entrance of a highly polluting industrial park. Chinese officials have turned to promoting public participation as one means to mitigate tensions that produce such violent incidents. Thus, over the past few years some citizens have been turning to litigation and other forms of non-violent protest. While the forms of formal citizen participation in China remain highly controlled and limited both in scope and impact, recent laws and trends in the environmental protection sphere indicate growing government expectations of a more meaningful role for the public that ultimately could further expand political space in China.

### THE PROMISING ARENA

Environmental protection is one promising arena for advances in public participation, for not only are there growing incidents of serious citizen discontent about

pollution, but the State Environmental Protection Administration (SEPA) is actively advocating greater citizen voice, although this is a major challenge since it is contesting for power against other government bodies with more resources and clout. Moreover, in the environmental sphere a grassroots civil society has been evolving since 1994 when registration of nongovernmental organizations (NGOs) was legalized. Over the past twelve years China has witnessed the emergence of a myriad of green NGOs that are strengthened by a growing number of academic advocates and interested individuals.

### NDI's Public Participation Work

Since 2000, the National Democratic Institute for International Affairs (NDI) has been engaged with various Chinese partners interested in increasing public participation in environmental decision-making processes from lawmaking within the provincial and municipal people's congresses to community-level activities in urban neighborhood committees. In 2002, NDI began working with local environmental protection bureaus (EPBs) throughout China to share experiences on public participation in environmental governance. China's initial experiences with formal public hearings are an opportunity to understand some of the complex issues that challenge modern China as the government attempts to balance conflicting demands for ongoing economic development, better environmental protection, liberalization of political rights, and maintaining both party hegemony and party legitimacy.

China's legal framework for environmental governance now explicitly allows for public participation. The Environmental Impact Assessment (EIA) Law and the interim measures on the permitting process have requirements for public participation

in some circumstances. EPBs have created a variety of forms of public participation, ranging from the availability of phone hotlines for complaints, to questionnaires for affected populations, and actual formal public hearings. China's EPBs appear to regard these measures as opportunities to increase both the efficacy of their work and the legitimacy of their actions. In August 2004, the Beijing EPB conducted the first administrative hearing under the new EIA permitting process to determine the fate of the Baiwang Jiayuan power lines. After this hearing in November 2004, SEPA Vice-Minister Pan Yue announced the development of a system to hold hearings on large-scale and controversial projects. In April 2005, SEPA followed with its first public hearing on the EIA for the lake restoration project at the Old Summer Palace in Beijing. The lake restoration and power line hearings were animated and hotly contested affairs, which sparked EPBs around China to begin experimenting more with hearings.

#### *The Tai'an City Hearing*

In September 2005, NDI was invited to attend and provide feedback on an environmental permit hearing in Tai'an city in Shandong Province as part of an international seminar on citizen participation in environmental protection in the province. According to Shandong officials, the province ranks second in energy consumption in China—surpassing both Jiangsu and Guangdong—and suffers from water shortages and tremendous pollution emissions from its cement, paper, chemical, and other industries. The provincial authorities appeared to be enthusiastic about the promise of greater public participation in environmental governance, with senior representatives from the provincial legislature and legal offices joining EPB officials in the two-day seminar. During the seminar, Shandong officials boasted about their public participation innovations, from open legislative meetings (for which they pay the travel expenses for observers from outside the capital city Jinan) to e-governance.<sup>2</sup> Moreover, the provincial EPB has set up a fund to reward citizens who report pollution violators (currently capped at 2,000 Yuan) and its Environmental Dissemination and Education Center has unveiled a publicly disclosed ratings system of enterprises to assess their compliance with emissions standards.

Chaired by the deputy director of the Tai'an EPB, the hearing on the construction and upgrading of technology at a local, highly polluting textile company was held at the Dongyue Hotel. Lasting just

over an hour, the hearing was a stiffly orchestrated event that the organizers willingly acknowledged to having rehearsed days earlier with representatives of the company and affected villagers. During the hearing, the EPB endorsed the EIA analysis, stating that the changes would comply with regulations on wastewater discharge, particulate emissions, and noise pollution. The village representatives asked questions essentially seeking assurances that the new

**// ...the hearing was a stiffly orchestrated event that the organizers willingly acknowledged to having rehearsed days earlier with representatives of the company and affected villagers.**

equipment would be run properly and that water quality would be monitored. One villager asked whether the factory's wastewater could be used for irrigation after the changes, to which the research institute official responded that the water did not meet the national standards for irrigation usage and would be discharged into the river. This exchange predictably appalled the "foreign experts" whose participation in the seminar was facilitated by NDI.

Although the hearing was something of a *pro forma* affair, it demonstrated to EPB officials the magnitude of the challenges they face in institutionalizing these types of public participation mechanisms. The director of the Legal Affairs Office of Shandong Province explained that the EIA Law says nothing about the results of the hearing while commenting that they were still at the initial stages of protecting citizens' rights. When one of the international participants pointed out that there were no women participating in any part of the hearing, the deputy director of the Tai'an EPB said the villagers should be faulted, as they did not choose to have any female representatives.

After the seminar, the local news media sought out the "foreign experts" for commentary on their views of the hearing. Beyond the absence of women and the dumping of wastewater, the international

participants noted that Chinese citizens remained at a disadvantage for understanding the technical dimensions of EIA hearings vis-à-vis the EPBs and companies—unless resources were provided to level this imbalance. They also noted that the role of environmental protection agencies differ in the United States, where they would comment on the adequacy of the analysis rather than make a recommendation in the hearing. Moreover, hearings in the United States tend to be much more contentious with citizens making specific demands.

## THE CHALLENGES

The development and eventual institutionalization of hearings and other forms of citizen participation in China's evolving environmental governance system will depend on numerous factors. Ultimately, complementary legislation and implementation of practices to allow citizens adequate access to information and protection for whistleblowers will be necessary for truly meaningful citizen participation to take root. At the same time, China's civil society will need to keep pace and expand its capacity to be able to take advantage of these opportunities and coalesce interests into coherent voices with strategic plans. International NGOs, including NDI, have been providing training and technical assistance to some Chinese NGOs on the public hearing processes, but whether these efforts start to impinge on the comfort level of Chinese authorities remains to be seen. While civil society groups attempt to play a more significant role in hearings and other institutionalized mechanisms, the government needs to facilitate their engagement in the process by providing appropriate information in a timely manner and allocating resources to bridge the technology gap to help citizens and environmental NGOs better understand highly technical data.

At present, Chinese officials seem preoccupied with stoking the interest of citizens in these new institutions for participation. The quality of these opportunities, however, remains somewhat questionable. In various seminars and conferences over the years, including the Shangdong EIA hearing described above, NDI staff was often asked how organizations might better utilize the results of hearings or how they could ensure the effectiveness of hearings. In democratic systems, the answer is fairly straightforward; in China it is understandably not, since so much of the necessary legal

and political infrastructure is not yet in place. A follow-up question from officials might soon be how to sustain citizen interest in the process if satisfactory results from participation are missing. And ultimately, what are the hazards of form over substance? Without major improvements, the new public participation mechanisms will not slow the growing trend in protests.

## CONCLUSION

The challenges confronting China's local EPBs as they implement public participation regulations are enormous—from specific problems about dispersal of authority and information across numerous agencies and over various administrative borders to the more generalized problem of China's attempts to superimpose a rule of law regime over traditional institutions such as the letters and complaints system. In fact, what was made clear in the Beijing EPB's experience were the difficulties associated with opening up the channels for citizen participation but not being in a position to remedy the grievances citizens want addressed. In the case of the Baiwang Jiayuan power lines, the Beijing EPB's role was to examine their environmental impact, whereas the affected citizens wanted to discuss the potential negative influence on their economic investments and the aesthetic offense of power lines so close to a cultural heritage monument.

The disconnect between the visions of EPBs and citizens on what issues public participation is supposed to address remains quite large. Nevertheless, the acceptance of citizen participation as both a necessary and desirable tool in environmental governance is a solid development that holds great promise for creating a functioning environmental governance system. In the first exchanges on instituting public hearings in 2000, NDI staff observed debates by provincial People's Congress officials on the merits of citizen participation in the lawmaking process. Numerous local representatives felt

**// The disconnect between the visions of EPBs and citizens on what issues public participation is supposed to address remains quite large.**

that academics would be better positioned to represent the views of “common folk” who would not be articulate enough to voice their own opinions. The debate appears to have moved on, and these days NDI seldom hears impassioned speeches defending the right of peasants to be heard. Shandong Province is in the process of enshrining in legislation the right of all citizens to be involved in the environmental governance process. The Shandong EPB recently passed the “Measure on Citizen Participation of Shandong Environmental Protection,” which it has submitted to the provincial People’s Congress in order for it to gain the status of local law. Over time the normative value of these types of measures could go far in lessening conflict and improving environmental quality in China.

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## NOTES

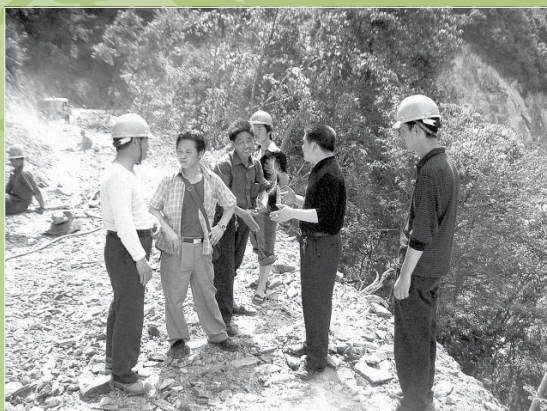
1. For one of many articles on these protests see: French, Howard W. (2005, August 23). “Land of 74,000 Protests (but Little Is Ever Fixed).” *The New York Times*. [Online]. Available: [http://www.howardwfrench.com/archives/2005/08/24/land\\_of\\_74000\\_protests\\_but\\_little\\_is\\_ever\\_fixed/](http://www.howardwfrench.com/archives/2005/08/24/land_of_74000_protests_but_little_is_ever_fixed/).

2. While the provincial government’s e-governance website is still a work in progress it will eventually include: (1) information on the legislative process and an email account that accepts public opinion on upcoming legislation, (2) an email hotline for law enforcement, (3) information on a green community development project with participation by schools, (4) a public environmental education campaign, and (5) news reports that monitor industrial accidents and report on the resolution of environmental disputes. Via traditional news media the province is sponsoring TV announcements on the air quality of 17 cities and publishing monthly water quality statistics in the newspapers.

# SPOTLIGHT ON NGO ACTIVISM IN CHINA

## Pingnan Green Wins Court Case against Chemical Company

By Melanie Pitkin, Global Greengrants Fund



Pingnan Green Association has been partnering with the local environmental officials to halt illegal dam construction in a local nature reserve. © Zhang Changjian

In March 2006, the Pingnan Green Association, a grantee of Global Greengrants Fund, achieved an unprecedented victory against the Fujian-based Rongping Chemical Affiliated Company (*Rongping Lianying Huagongchang*), a part of China's behemoth Fuzhou Yihua Group. Five years after initial complaints were filed, an Intermediate People's Court in Fujian Province ordered the company, China's largest chlorate manufacturer, to pay the people of Xiping nearly \$85,000 in reparations for health and environmental damages. Despite the court ruling, the company still has not paid the villagers and the head of Pingnan Green Association—Dr. Zhang Changjian—continues to be harassed for his work to stop the pollution.<sup>1</sup>

### POLLUTION HAVEN?

In 1994, in the face of increasingly strict enforcement of pollution emission regulations and attracted by cheap hydropower, the management of Rongping Chemical moved a chlorate plant from the provincial capital of Fuzhou to Xiping village. The factory became Asia's largest manufacturer of potassium chlorate, which is used in matches, bleach, fireworks,

and disinfectants. Since the relocation, the plant has dumped sewage and waste residue containing chromium 6 and chlorine into the Xiping River. The plant produces one ton of waste residue containing chrome every day, turning the river bright green, orange, or black. The daily wastewater contains more than 20 times the amount of chromium-6 permitted by national standards, and the plant also has been releasing this dangerous pollutant into the air and soil. According to the U.S. Environmental Protection Agency, inhalation of chromium causes shortness of breath, coughing, and wheezing, as well as complications during pregnancy and childbirth; acute inhalation can cause gastrointestinal and neurological problems, and can hugely increase the risk of lung cancer.

To prevent the waste from seeping into the river, the company built a two-meter high wall. However, the wall was ineffective in preventing chrome from being washed off by rainwater. The factory ignored subsequent orders by local health officials to build a treatment pond to remove the chrome and other pollutants from the wastewater. The provincial environmental protection bureau (EPB) recommended the county government relocate the 24 families living within 130 meters of the plant, but the county deemed the plan too expensive.

### SUFFERING IN THE COMMUNITY

Pollutants from the plant have ruined rice production in more than 11 hectares of nearby farmland, as well as stunted rice production in an additional 12 hectares; and valuable bamboo, fruit, and nut trees now fail to produce. In one instance, the factory leased a local farmer's land as a dump for powdery yellow and white waste, informing the farmer that the waste was a good fertilizer. Since Rongping's arrival, many of Xiping village's 2,000 residents have suffered from symptoms such as headaches, vomiting, nausea, dizziness, itchy skin, dry coughs, teary eyes, and hair loss; children have been developing

painful rashes and blisters. From 1990 to 1994, the village experienced only one cancer death—a stark contrast to the 17 cancer deaths between 1999 and 2001. According to studies conducted by Zhang Changjian, a local doctor, since 1994 life expectancy in Xiping has dropped from 68.3 years to 59.7. In a place where the average annual income is less than \$300, costly medicines and medical procedures are financially devastating.

## GRASSROOTS ORGANIZING

The challenge of halting this pollution extends beyond just the managers of the Rongping Chemical Affiliated Company. The company has protectors in the local government, which is not surprising considering the county owns 30 percent of Rongping Chemical and gets a quarter of its revenue from taxing the company. Officials refuse to test water pollution samples taken by the villagers, claiming they are “unofficial” samples. In order to combat this huge corporation, the villagers, led by Dr. Zhang, formed the Pingnan Green Association and took the unusual step of filing suit against Rongping Chemical. The villagers donated \$1,600 to the lawsuit, but local police confiscated the money and beat two of the villagers who tried to resist. Initially, the lawsuit was completely ignored, but the case began to gain momentum with help from two Global Greengrants Fund donations and a free lawyer from the Center for Legal Assistance to Pollution Victims (a Beijing-based NGO). In April 2005, the court awarded the village \$30,000 in damages, but the villagers decided to appeal for more. In the appeal, 1,721 villagers joined the lawsuit, making it the largest environmental case ever in China.

## ONGOING STRUGGLES

The court rulings have helped improve the lives of the villagers and embolden them to continue fighting for their rights to a clean environment. Since being permitted to register in 1994, China’s environmental NGOs have predominantly focused on relatively “safe” issues, but the Pingnan Green Association partnership with CLAPV highlights the growing influence grassroots groups are having in changing environmental governance in China. Since the second court ruling, the factory has improved its production methods, but still secretly dumps waste in the river and releases dangerous chemicals into the air. The river still cannot sustain fish and farmers have difficulty selling their produce, because Xiping is now known as a toxic area.

Despite continued harassment by local officials, Pingnan Green Association continues to monitor the factory and push to get the compensation awarded to the villagers. Pingnan Green Association also has begun working on other issues to protect the local ecosystem, such as partnering with the provincial EPB to halt illegal dam construction that threatens the fragile Yuanyangxi nature sanctuary and endangered species like the Chinese mandarin duck and macaque.

*For updates on Pingnan Green Association see [www.pnlszj.ngo.cn](http://www.pnlszj.ngo.cn) and for information on other grassroots groups supported by Global Greengrants Fund see: <http://www.greengrants.org>.*

## NOTES

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## Agroforestry Systems in Northern China: Promoting Development and Environmental Improvement

By Dave Daversa

In 1987, China's State Forestry Administration named Heze prefecture in Shandong Province a model for its progress in expanding forested area. This accomplishment is impressive considering that in the 1950s, forested land in this prefecture ostensibly did not exist. Since the late 1970s, Heze and other prefectures in northern China have undertaken extensive afforestation efforts by converting farmland into intensively managed agroforestry systems. In Heze, the total forest coverage accounts for 313,000 hectares (ha) of mainly poplar trees. As a result of integrating fast growing and high yielding trees into the rural landscape, farmers are receiving larger monetary gains from their land, a regional wood product manufacturing sector is flourishing, and timber shortages in the area have greatly eased. Moreover, the region's ecological conditions have improved.<sup>1</sup> This paper discusses briefly the key national, regional, and local socioeconomic factors that have contributed to the evolution of agroforestry in northern China over the past twenty-five years, and some of the positive impacts this reforestation work has had on local livelihoods.

### FACTORS DRIVING AGROFORESTRY DEVELOPMENT IN NORTHERN CHINA

#### National Household Responsibility System Policy

Since 1978, China has undergone a series of reforms involving decollectivization of land use and the liberalization of the economy. The organizational change in land tenure was initiated informally by farming households, and after recognizing the potential of this new organizational structure, the central

government adopted the Household Responsibility System (HRS) in 1978 (Lin, 1992; Wen, 1993). The HRS greatly increased the decision-making capabilities of farmers to market new crops and forestry products. Both agricultural and silvicultural production rose dramatically in Shandong and other provinces. In northern China many farmers used the HRS for agricultural innovation that led to today's booming agroforestry development.

#### Regional Resource Scarcity and Free Markets

Particularly rapid deforestation and inadequate forestation over the past fifty years has translated into high timber demand throughout China (Zhang et al., 2000a). Demand has been more pronounced in northern China due to intensive agriculture and deforestation over many centuries. Thus people living in the north have had little access to timber for construction material or fuel. This scarcity and the resulting high demand for forest products has been another important factor driving the development of agroforestry in northern China (Zhu, 1995).

Because forest resources were virtually nonexistent in the north, regional and local forestry administration offices were small and forests weakly monitored. Lacking strong government control, individuals in northern China took advantage of the free timber market. This economic freedom proved to be a key factor in agroforestry's success in the region once the HRS began (Yin & Xu, 2002). In southern and western China where the forestry administration was better established, forestry officials intervened in local timber markets, which resulted in lower profits and poorer incentives, thereby hindering agroforestry development (Lieberthal, 1997; Yin & Xu, 2002).



Hybrid poplar-wheat intercropping by a farmer in Heze.  
© Dave Daversa

### Local Government Innovation

Although the weak establishment of forestry administration sparked agroforestry development, active involvement of the local governments in northern China was crucial in helping to establish strong and sustainable agroforestry systems. In Heze, for example, the local government provided subsidies to farmers for land intercropped with poplar and other trees. Furthermore, during my visit to Heze I discovered that the local government provided poplar seedlings free of charge to approximately 95 percent of the households. The local government also offers financial support to people entering the wood products processing sector by providing low-cost electricity supply and low-interest loans. Taxes placed on these production systems have also been reduced. Farmers starting up agroforestry have benefited from government-run technical extension service centers that hold demonstrations on proper planting techniques and application of fertilizer.

During my survey of farmers in Heze, they continually highlighted the local government's role in promoting research and technology to strengthen their work. Specifically, the local government supported research into the biological performance of the fast growing and hybrid poplars. Over 200 varieties of poplar have been collected from Italy and North America, and experiments with these species are being done throughout north China. By investing in hybrid poplar research, Heze and other local governments are seeking the best performing species possible to maximize timber production.

In addition to making advancements in poplar biotechnology, the affordability and rapid growth

characteristics further explain why poplar intercropping has been widely adopted throughout Heze and other regions of northern China. These fast-growing poplar trees allow farmers to realize the economic returns from the timber in short rotations. (See Photo 1). This rapid turnover rate, combined with the sustained output of the intercropped annual crops, and the financial assistance provided by local governments have given farmers a more affordable means of producing timber on their farm lands.

## THE IMPACTS OF AGROFORESTRY

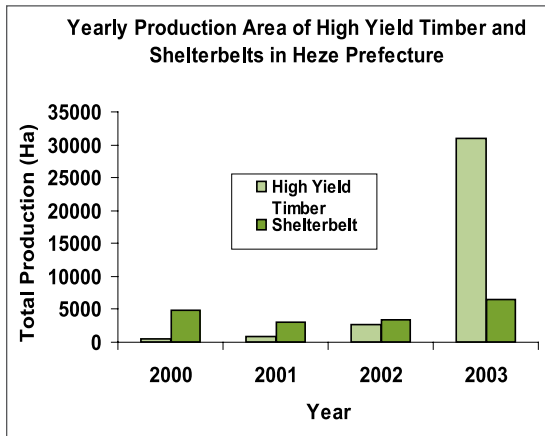
### Socioeconomic Impacts

In Heze, 40 percent of the total cultivated land is being used for commercial agroforestry systems, and officials plan on further bolstering this figure. Of the total forest coverage in the prefecture, 76 percent is managed as intercropping systems, whereas shelterbelts account for 3 percent. Figure 1 illustrates the pronounced increase in high yield timber production in Heze over the past four years. During my visit to this area, farmers reported that the income they obtain from their land has increased by 30 to 70 percent as a result of inter-planting hybrid poplar into their fields. Farmers have continued to grow wheat, corn, peanuts, alfalfa, and other annual crops in between the rows of poplar to maintain a sustained supply of food and income, despite depressed yields due to the shade effect of tall trees. In addition, the intercropped poplar trees have allowed farmers to spend more time away from the fields and partake in other jobs. Finally, the expansion of agroforestry systems in this region has promoted the development of a small-scale wood products manufacturing sector. Many farming households have moved off of their farms to pursue this prosperous business.

The wood products manufacturing sector in China has boomed in recent years. For example, the provinces of Hebei, Shandong, Jiangsu, and Zhejiang currently supply 68 percent of the total national production of wood-based panels. Currently 28,000 mills are established within Heze employing a total of 500,000 villagers. Heze also boasts over 3,000 wood products manufacturers that process the local timber, of which over 90 percent are household based. The total wood used in Heze is approximately 6 million cubic meters per year with an annual processing value of \$0.85 billion. As a result, employment opportunities and incomes have risen considerably for many villagers. These



FIGURE 1.



The sharp rise in high yield timber production area illustrates the success of local government efforts to emphasize poplar intercropping.

Source: Shandong Statistics Bureau

profitable companies have enabled farmers to make further investments in the sector so their businesses can continue to grow.

The sizes of these manufacturing plants vary; one village in Heze has a private household operation with one production line and another large mill with three production lines. Household plants primarily produce unfinished veneer or wood panels, whereas the mills often take the processing a step further to develop more refined products like plywood and fiberboard. According to forestry officials, much of the finished products are sold locally as furniture, paper, and panel boards. However, when I surveyed



Two local women kneeling amongst large stacks of wood panels that a household enterprise of wood-products manufacturing has produced from poplar and paulownia logs. © Dave Daversa

household manufacturing operations and mills, the workers told me that many of their wood products were exported to Korea or Japan to be further processed into furniture or plywood.

## ENVIRONMENTAL IMPACTS

Although farmers have developed commercial agroforestry systems primarily to improve their economic situation, this reforestation also has positively impacted local environmental conditions. The shelterbelt systems in northern China have effectively decreased the harmful effects of wind—often reducing wind velocity by as much as 40 percent (Zhang et al., 1995). In Heze, the extensive establishment of shelterbelt and poplar intercropping systems has reduced the harmful effects of the strong, hot and dry winds on wheat yield and quality. An additional environmental service provided by integrating trees into agricultural lands is carbon sequestration. Studies have been conducted on the potential for fast-growing trees, like the poplar and paulownia that are integrated into the agricultural lands in northern China, to act as carbon sinks (Montagnini & Porras, 1998).

## CONCLUDING REMARKS

The prefecture of Heze and other areas in Shandong have seen widespread establishment of commercial agroforestry systems, which has been accompanied by positive economic, social, and environmental benefits. Due to the success of these systems, the local government is hoping to expand the amount of farmland in agroforestry and the wood products manufacturing sector. Over 330,000 ha of farmland will be utilized in the future for timber production in Heze. Furthermore, officials anticipate that the advancement of technology and scientific research will continue to increase yields.

Despite these large plans for expansion, certain limiting factors in development exist that villagers and government officials should consider. For example, as the wood products sector expands to international markets, officials must be careful to ensure that the local community continues to profit. From a biological standpoint, officials and farmers should carefully monitor these single-tree species forests for pest and disease outbreaks so that large-scale crop damage does not occur. Moreover, further scientific and socioeconomic studies should be conducted on the commercialized agroforestry

systems in northern China. With the advancement of research in this area, the long-term sustainability of agroforestry and its associated small-scale wood processing sector could become even more significant.

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## NOTES

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## On the Way Towards Eco-villages: Upgrading Energy Systems in Rural Hainan

By Lei Bi and Murray Haight

China's booming coastal urban areas are the main energy consumers in China—coal-burning for electricity and private cars filling city streets are not only creating local, health-threatening air pollution, but also SO<sub>2</sub> and greenhouse gas emissions that have global impacts. While urban air quality trends are grim, an equally serious energy consumption problem exists in the developing rural areas of China, where people remain highly dependent upon traditional sources of fuel, exacerbating deforestation and grassland destruction. Among the 1.5 billion people who rely on firewood to meet their cooking needs around the world, 50 percent of them live in rural China (He et al., 2001). Due to an increasing need for energy, the acceleration of deforestation and biomass consumption has become one of the main activities hindering the vision of sustainable development in rural China.

Heralded as “China's Hawaii,” the province of Hainan Island is the country's largest special economic zone (SEZ) in land area and population (more than seven million). Unlike other Chinese SEZs, Hainan is still dominantly rural and more than 80 percent of its population are farmers (Han, 1997). Similar to the other fast-growing SEZs, however, Hainan has been experiencing problems of widespread environmental damage. Most serious has been the loss of mangrove areas due to coastal development and deforestation caused mainly by rural citizens relying on biomass as their major source of fuel (Zhao, Liu, & Lin, 1999; Han, 1997). Rapid population growth, increasing incomes, agricultural development, and improving living standards have all contributed to the increase in demand for forestry resources for energy. However, the associated deforestation activities have resulted in energy consumption beyond the regenerative capacity of forests in rural Hainan (Hainan Department of

Land Environment and Resources [HLER], 1999). Consequently, rural Hainan is caught in a vicious cycle of consumption and degradation with rapidly degrading forest resources becoming one of the main constraints to economic growth.

### PROVINCIAL VISIONING AND EFFORTS ON “ECO-VILLAGE”

In 1999, in order to take an integrated approach to resource management, the provincial government formulated an “Eco-Province Strategy,” aimed at building Hainan into the first “Eco-Province” in China (HLER, 1999). Since Hainan is mostly rural, the key to the success of the strategy was to create what was dubbed “civilized and ecological villages” (CEVs) across the province (Hainan Civilization-Ecology Office [HCEO], 2002). The eco-village strategy aims to turn half of the villages into CEVs within five to eight years. The main objectives of the strategy have been to improve environmental and economic conditions for rural citizens by creating an “ecological culture” (i.e., establishing new norms that prioritize resource conservation) (HCEO, 2002).

The provincial government has identified upgrading the energy consumption systems in rural Hainan as a key foundation to successful implementation of the CEV strategy. Utilization of renewable energy—solar, biogas, and wind—is being encouraged by government subsidies that enable rural households to adopt small-scale renewable energy technologies. In the summer of 2003, a survey conducted by the authors revealed that a large number of villages across Hainan already have adopted small-scale renewable energy technologies with subsidies. As one of the earliest model CEVs in the province, the residents of Meiwan Xincun village (Meiwan village) in Heqing township have carried

out very successful renewable energy technology adoption and diffusion practices, which have freed them from using local timber for energy. With the halt of timber cutting, local forests are recovering from decades of deforestation. The authors administered surveys to the 243 Meiwan village residents on a household basis from May to August in 2003. Of the 52 households in the village, 45 completed and returned the questionnaires.

## ENERGY SYSTEM UPGRADES

Meiwan village is located in the mountainous and largely undeveloped northwest part of Hainan. The village has a total land area of approximately 700 hectares and 100 hectares of ponds and rivers. The mountainous area of the village is covered by small-leaf eucalyptus, rubber, and fruit trees. The main agricultural products in the village are rubber, tropical fruits, and rice. All the households in the village raise pigs, buffalo, chicken, and ducks.

Under the guidance from the University of South China Tropical Agriculture, Hainan Agricultural Academy, and Danzhou Biogas Station, the leaders of Meiwan village have been pioneers in upgrading the household energy systems since 1992. These outside researchers also acted as technology advisors, introducing renewable energy technologies to local residents. The pace of technology diffusion in the village has accelerated since 2000 because of provincial subsidies under the CEV strategy. Under the CEV subsidies, the villagers in Meiwan were encouraged first to provide the labor and cover the costs themselves. They bought materials in the technical equipment market of a neighboring township and built new energy equipment under the guidance of the local research experts. Only after the research experts inspected and approved the project was financial compensation given. The survey revealed that 89 percent of Meiwan villagers received financial support from the government for the installation of anaerobic digesters. The compensation was based on economic need of villagers and ranged from 300 to 800 Yuan, with an average of 400 Yuan (one-third of the average total costs of installing an anaerobic digester).

Local economic conditions in Meiwan have improved as a result of utilizing renewable energy technologies and the development of sustainable forestry. The average annual family income increased from 11,367 Yuan in 1990 to 32,933 Yuan in 2002. With the improving local economic conditions, 100

percent of the households had employed anaerobic digestion, 76 percent solar water heaters, and 78 percent photovoltaic cells by the summer of 2003. Insights from the survey on the use and success of these various technologies are discussed below.

### Solar Water Heaters

The main use of the domestic solar water heaters in Meiwan village is for the early evening bath. Along with implementation of the CEV strategy, houses in the village have added inside plumbing for bathrooms. With the solar water heaters, bathing has become more accessible, hygienic, and efficient for the villagers. A middle-aged woman in the village stated,

Before solar water heaters were introduced in the village, bathing was very difficult for us. We used to go to the nearby lake to have a short bath once a week in the summer. When it was cold, we had to get firewood and warm a lot of water. Since it was difficult for us to store enough hot water to have a bath, we normally had a bath every two weeks in winter...[T]he heater provides a great savings in firewood and water resources (Interview, 2003).

In 2003, about 34 households or 64 percent of all households were using solar water heaters. Among the 45 respondent families interviewed, 29 of them installed the solar water heaters at a cost of several hundred Yuan. The diffusion rate of domestic solar water heaters usage is set to increase within the next two years, as 43 of the 45 respondent families confirmed they would continue using the domestic solar water heaters or consider installing the equipment in their houses.

### Solar Photovoltaic Application

As an experimental CEV project of promoting eco-construction on Hainan Island, the provincial government funded a supply of solar photovoltaic cells to the village of Meiwan. By the summer of 2003, 35 of the 45 respondent families had installed the photovoltaic cells, which although subsidized still cost each household 200 to 300 Yuan. Each cell is two square meters and can generate enough power to run small electronic devices that require less than eighty watts (e.g., electronic fans, bulbs, and tape players). The power can provide the electrical needs of a family for up to seven days after one sunny day, provided they use storage devices such as lead-acid batteries.

# SPOTLIGHT ON NGO ACTIVISM IN CHINA

## Green Eyes: Taking Action to Halt Illegal Wildlife Trade

By Daniela Salaverry, Pacific Environment

Growing up in a rural town in Zhejiang Province, Fang Minghe developed a compassion for animals at a young age; as an only child, they were his playmates. During a middle school trip to Guangdong, Fang was deeply disturbed when he came across photos documenting the cruelties of animal poaching. These photos motivated Fang to take action. Upon returning home to Changnan county of Wenzhou (a major business city on Zhejiang's coast), he shared his concerns with his classmates, and several supported his idea to develop a small club committed to animal welfare.

In 2000, while still in high school, Fang Minghe registered his informal club Green Eyes as an NGO. Over a few years his small club evolved into a professional and well-respected organization with three full-time staff, five offices, and hundreds of volunteers. To expand their activities, Fang set up and registered Green Eyes in three separate cities/counties (Wenzhou and Changnan in Zhejiang and Fuding in Fujian). Green Eyes activities include: (1) environmental education and outreach programs, (2) an animal clinic, and (3) a campaign to stop illegal wildlife trading. Besides receiving three grants from Global Greengrants Fund, Green Eyes receives modest support from local governmental agencies and Green Eyes' members.

*Environmental Education.* Throughout Wenzhou a team of volunteers give lectures and organize games with middle- and high-school students to increase awareness of environmental conservation. Green Eyes also conducts summer camp programs, offering students field trips with unique hands-on experience, such as releasing rehabilitated animals back into natural habitats or investigating water pollution in local towns.

*Environmental Outreach.* Green Eyes also works closely with the Wenzhou Green Student Forum, an alliance of university-based student green groups. Together, they have established a youth council that acts as a forum for management training, information exchange, and resource sharing among student green groups. Green Eyes has a comprehensive

website and monthly print publication, which keep members and the general public abreast of the NGO's activities and provides additional educational information.

*Animal Rehabilitation Center.* Green Eyes built an animal rehabilitation center in Wenzhou. The clinic is modest, consisting of four cages, with all medical services provided by self-taught volunteer veterinarians. They take in any injured wild animals, and often get calls about wild birds caught in illegal nets.

*Wildlife Trade.* Green Eyes plays an important role combating the illegal wildlife trade in Wenzhou. This trade has become a major black-market industry throughout China, where many species are in demand for pets, food, and traditional Chinese medicine. Working with local law enforcement to target vendors illegally selling endangered species, Green Eyes carries out undercover investigations and raids at many markets in Wenzhou. Volunteers are regularly involved in seizing wildlife that is illegally for sale and documenting transactions with hidden video cameras. In doing so, they put themselves at risk; they have been threatened and gotten into scuffles with angry vendors. In 2006, Fang Minghe will act as a key witness in a court case against a vendor who was illegally selling snakes and turtles. Their wildlife trade activities garner regular news media attention, which helps increase general public awareness, and puts more pressure on black-market vendors.

After 6 years of work, Fang still possesses the enthusiasm with which he started Green Eyes: "I hope that one day, Green Eyes can be part of a global youth environmental movement. Until then, I hope that Green Eyes will mature into a major NGO for civil society and environmental protection in China."

*For more information on Green Eyes, please visit <http://www.greeneyeschina.org>. To learn about other Chinese NGO partners working with Pacific Environment please visit: [www.pacificenvironment.org](http://www.pacificenvironment.org).*

### Biogas Utilization

The typical volume of a household anaerobic digester in Meiwan is 6 cubic meters; average construction costs are 1,258 Yuan. The biogas system in use in Meiwan can turn organic wastes into clean biogas by anaerobic processes. Besides being able to use readily available organic wastes, the residue can be composted and later applied directly to agricultural farmlands to produce commercial products. More than 10 years experience of utilizing biogas in Meiwan village indicates that with four or five people and a number of livestock, enough biogas can be generated to meet the cooking energy needs of the households. The provincial government has selected Meiwan's biogas and ecological agriculture program as an eco-village development prototype for Hainan.

### POSITIVE IMPACTS

Compared with traditional wood burning for fuel that exacerbated deforestation, the upgraded energy systems in Meiwan provide a number of economic and health benefits to the village:

- Forest resources in the village are now well preserved; forest coverage has reached a high of 85 percent in 2006 up from 34.4 percent in 1988.
- Solar-based technologies have replaced the inefficient traditional energy sources and reduced the costly dependence on external commercial and non-commercial energy sources. Liquefied gas and coal are now simply complementary energy sources.
- Sanitation conditions have greatly improved, mainly as a result of the collection of organic waste for the biogas. Moreover, the biogas slurry acts as a natural fertilizer and helps to retain the nutrients in the soil.
- Utilization of clean energy has reduced people's exposure to indoor air pollution, preventing respiratory problems.

### POLICY IMPLICATIONS

Given the urgent need to stop deforestation and the importance of upgrading energy systems in rural Hainan, the current programs introducing and diffusing small-scale renewable energy technologies could be strengthened even more. Drawing on the

survey results from Meiwan we have identified several policy recommendations that could address some gaps in the current CEV program.

- *Engaging village leaders.* The government should adopt a "farmer to farmer" extension strategy and make special efforts to teach and train the village leaders as extensionists of small-scale energy technologies. Once the leaders understand and accept the technologies, they can teach local residents so as to create a community-based multiplier effect.
- *Expanding role of research centers.* Local research institutions should expand their current evaluative role and become responsible for providing more ongoing technical support and training. For example, frequent technological introduction seminars and on-site instruction should be provided not only to expand adoption, but also to help train villagers on how to repair their equipment. Thus, farmers can learn from each other and the technology can be transferred or duplicated elsewhere more easily.
- *Establishing local extension offices.* A number of extension offices should be established to serve clusters of village and to facilitate technology diffusion. These offices should be responsible for the implementation of governmental renewable energy strategies and regulations, as well as provide necessary technical support and budget assistance to the villages for ongoing clean energy projects.
- *Expanding subsidy structure.* The current cost-share subsidies to villagers are very effective and should be maintained. The provincial government could put a premium on new economic activities that use renewable energy technologies. As for rural people who regard the up-front costs of the renewable energy systems as too expensive, a finance leasing program could be effective to clear the financing barriers for the rural people. In this program, the end users of renewable energy systems lease rather than purchase the units. Such financing programs could facilitate the creation and better management of even larger renewable energy projects. This approach does require that the government mediate agreements between the end users and leasing companies, in order to prevent heavy economic burden

on rural citizens and to maintain certain profits for the leasing companies.

## CONCLUSIONS

The upgrade of the energy systems in Meiwan has provided clean and safe energy to satisfy the basic needs of life, conserved the rural environment and natural resources, and improved the rural agro-industrial structures, thereby meeting the Eco-Province goals. Hainan's model is one that could be utilized in other rural areas of China and beyond to help promote sustainable development and break destructive energy consumption patterns. Burning less wood and coal in China's vast rural areas also has major environmental and health benefits, both locally and globally. Moreover, the adoption and diffusion of small-scale renewable energy systems could encourage the growth of the clean energy market as well as renewable energy financing business in China. With major equipment made in China, producing renewable energy systems has become a new economic growth point. Notably, China's richest businessman—Zhengrong Shi—made his fortune in his solar energy company Suntech Power. This expanding clean energy industry and locally-led financing programs to promote renewable energy in rural areas could generate thousands of employment opportunities in China and also help make the country a major producer of renewable energy systems for the world.

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