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PROFILE

Environmental Policy Implementation in Rural China: A Case Study of Yuhang, Zhejiang

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ABSTRACT / The rapid growth of rural enterprises has transformed the Chinese countryside. Although rural industrialisation has resulted in increased financial well-being, it has also contributed to decreased environmental quality. While China has strong environmental protection laws, this paper will demonstrate that they are not being effectively implemented in a rural region in Zhejiang Province. This is due to a number of social, political, and economic barriers that prevent agencies from effectively enforcing environmental policies and regulatory mechanisms.

This paper investigates the implementation of China's environmental policies through a case study in Yuhang County, Zhejiang Province. It demonstrates that the implementation of environmental impact assessment, discharge fees, and limited time treatment is limited by inadequate technology, low finances, limited human resources, poor public environmental awareness, faulty data, inferior agency reports, organizational conflict, relations based on *guanxi*, and low discharge fee prices.

China's 1978 economic reforms facilitated rapid industrial development in many regions of the country, particularly in rural areas. By the early 1980s, China already had 18 million rural enterprises producing 28% of the nation's total industrial output (Qu and Li 1994). A significant effect of the reforms was to free surplus rural labor. To accommodate increased under- and unemployment, the government eased restrictions that bound peasants to the land and allowed them to set up small-scale rural enterprises (Lieberthal 1995). Peasants were encouraged "to leave the soil but not the village" (Tan 1993). This initiative reduced the rate of rural to urban migration and encouraged industrial development in rural areas. As a result, millions of peasants abandoned agriculture to work in the emerging rural industrial sector (Lieberthal 1995). In 1983, a key component of the rural reforms was the introduction of a production responsibility system that officially decentralized collective industrial management and directly linked investment and labor input with personal gain (Lin 1997, Oi 1995). This in turn acted as a powerful motivational factor spurring further rural industrial growth (Lin 1997). Rural enterprises are now critical components of local economies. In Zhejiang province, for example, 75% of total industrial output comes from rural industrial product. As output from rural enterprises now accounts for over 50% of the total from China's rural economy, they have become crucial to continued rural growth (Qu and Li 1994).

The majority of rural enterprises began as small industries, initiated either by village and township governments or individual households. They generally produced small commodities and handicrafts using semi-mechanical production methods (Liu 1992). After the reforms, the burgeoning Chinese economy allowed many small industries to thrive and develop into larger rural enterprises. While many successful rural enterprises have grown to employ well over 1000 workers, others remain small. The rural enterprises considered in this paper vary in size from 22 workers to 1000 workers.

While large rural enterprises tend to have advanced technology and sophisticated waste-treatment facilities, small rural enterprises are characterized by outmoded technology, obsolete equipment, poor management, and heavy consumption of resources (Qu and Li 1994). Since they develop in a dispersed pattern, they are extremely difficult to monitor and regulate and many operate without the knowledge or approval of the local environmental agencies. A number of analysts argue that poor regulation and enforcement of environmental measures allow many small rural enterprises to operate without waste treatment facilities (Jahiel 1997, Lin 1997, Qu and Li 1994). Furthermore, rural enterprises

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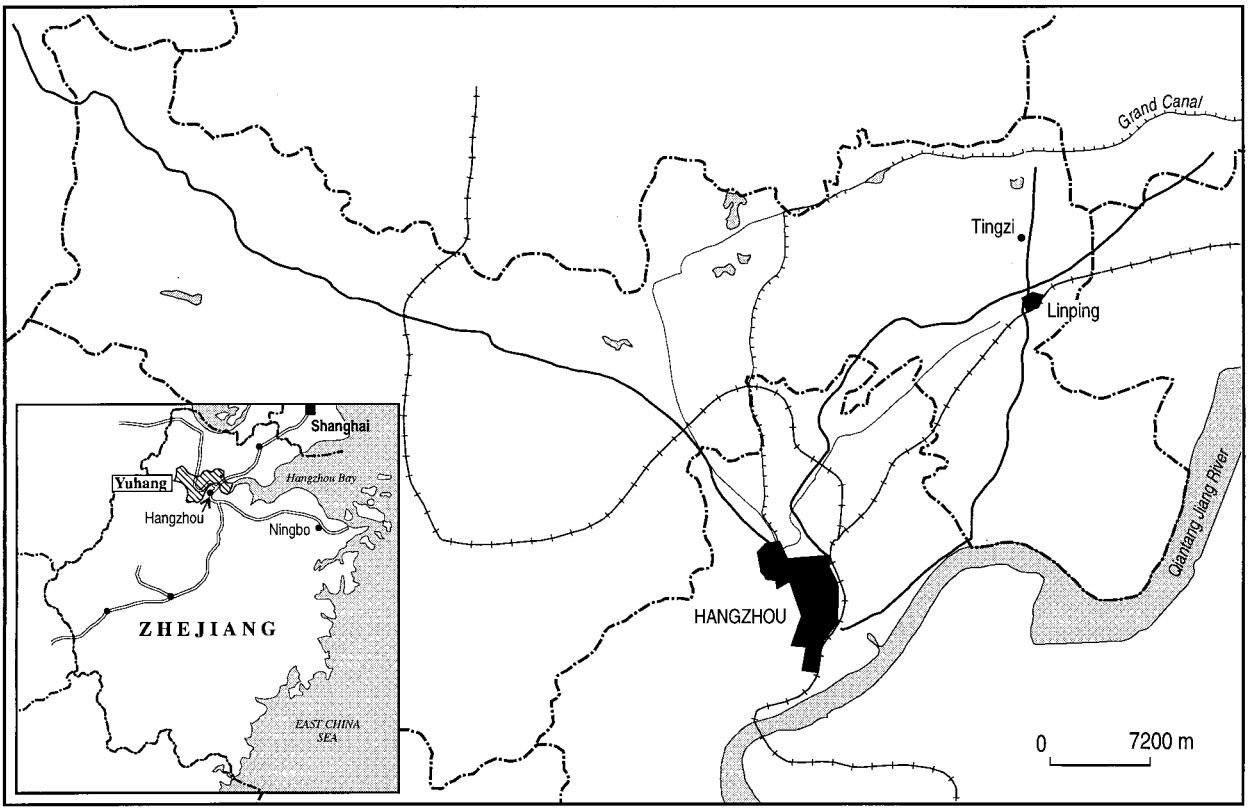

Figure 1. Yuhang County, Zhejiang Province study area.

are closely tied to local governments. They can account for up to 80% of the community's total revenues and, for this reason, many are encouraged to bypass environmental protection in favor of further economic growth (Lieberthal, 1995).

Rural enterprises have a tremendous effect on China's environmental quality (Bradbury and others 1996, Qu and Li 1994, Ross 1992, Smil 1993). Heavy reliance on low-quality coal and inefficient boilers made rural enterprises responsible for 32.7% of the nation's total air pollution in 1987 (Qu and Li 1994). Lack of waste treatment facilities cause rural enterprises to be a major source of water pollution. In the early 1990s, it was estimated that rural enterprises discharged up to 10% of China's total industrial effluents. This figure was expected to more than double by the year 2000.

The purpose of this paper is to describe China's environmental policy mechanisms and to identify barriers and constraints to their effective implementation in rural areas. The empirical analysis is based on field research conducted by the authors in 1998.

Study Area and Data Collection

The primary study site was Yuhang County, Zhejiang Province. Yuhang County has an abundance of rural enterprises and has experienced tremendous land use change since the 1978 economic reforms. Little, if any, research has been published outside of China on factors influencing environmental policy implementation in this region. Available field studies have been undertaken in the Pearl River Delta region (Sinkule and Ortolano 1995, Lo and Tang 1994), in Hubei, in Beijing, Wuhan, Anyang, and Xuzhou (Jahiel 1997), and in Guangzhou and Shanghai (Tang and others 1997). Other articles describe environmental policy implementation in China from a national perspective (McElroy and others 1998, Perlack and Russell 1991, Ross 1992, Wenger and others 1990). Few of these articles approach the topic from a rural or local perspective.

Yuhang County is located in the southern part of the Hangzhou–Jiaxing–Huzhou plain and has an area of 1313.4 sq km (Figure 1) (Wang and Ruan 1998). Linping City, the county capital, is located approximately 20 km northeast of Hangzhou. Linping is an urban area

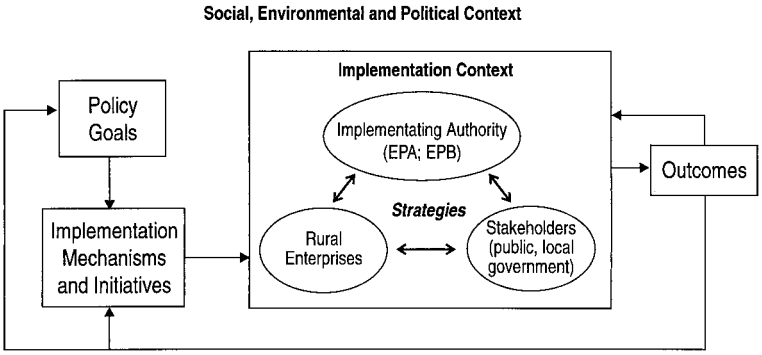

Figure 2. Environmental policy implementation model. Adapted from Sinkule and Ortolano (1995, p. 44.).

with a population of 67,252 (YCLMB 1998). It supports local government offices, including the EPB, more than 200 rural enterprises, and over 100 state-owned industries. Yuhang County's newly developed special economic zone, which presently covers 5.32 sq km out of a total planned area of 12 sq km is also found within the city's borders (Wang and Ruan 1998).

In-depth analysis was undertaken in Tingzi town, located 3.6 km northeast of Linping. In 1996, it had a population of 15,097 people distributed among 3900 households. It encompasses 11 rural villages and one urban district and has a total land area of 14.3 sq km (Tingzi Town Government 1996). Tingzi has traditionally been an agricultural community, but like many other rural communities in eastern China, the town's involvement in the light industry sector and in rural enterprises has increased since the 1978 economic reforms. It now has 100 registered rural enterprises and over 1000 unregistered household enterprises. The six largest industries in Tingzi town are a cement factory, two dyeing enterprises, a brick factory, a bicycle hardware operation, and a plastic molding enterprise.

A series of key informant in-depth interviews was conducted with environmental experts, government officials, and rural industry managers. Thirty-five interviews were completed in July and August 1998. Senior government officials representing a number of departments of the EPA and EPB participated in the study. The selection of participants was based on ensuring that the most knowledgeable and senior officials provided their perspectives. The directors or vice-directors of large industries in Tingzi town and two from Linping also participated. The industries selected were characteristic of the industries in Yuhang County in terms of size and type of operation. Additionally, 18 household industries in Tingzi and surrounding towns were selected randomly to participate.

The study participants were asked a series of questions related to environmental policy, monitoring, and barriers and constraints to the implementation of environmental policies. The questions were open-ended to allow each respondent to identify the issues they believed were the most important and relevant.

The model used to guide this research is based on Sinkule and Ortolano (1995). The model has four basic components: (1) the overall socioeconomic, political, and environmental context in which the process takes place; (2) the implementation context, which includes interactions between key actors; (3) the policy goals and implementation mechanisms and initiatives; and (4) the outcomes of the process (Figure 2). The model illustrates how the outcomes of policy implementation may be quite different from initial policy goals due to the interaction between key actors and the overall context in which the process occurs. Barriers to effective implementation exist because of this interaction and because of the overall socioeconomic, political, and environmental context. In the case study, the key actors included the Yuhang County EPB and the Zhejiang EPA (implementing authorities), rural enterprises, the local government, the public, and all others who had a stake in the outcome of environmental policy implementation.

Following a description of the major impacts of rural industrialization on the environment in Yuhang County, the institutional framework for environmental protection is outlined. The article then focuses on the major policy mechanisms used to enforce China's environmental protection laws among rural enterprises. The paper concludes with a detailed discussion of the main barriers and constraints to the implementation of environmental policy at the local level.

Environmental Impacts of Rural Industrialisation

Rapid industrial development in Yuhang County and the surrounding area has had a profound impact of the state of the environment. Environmental quality has declined sharply since 1978. For example, more than 65% of the region's total precipitation is now

acidic. In 1986, pH levels dropped as low as 4.69. Air quality shows no sign of improvement, given the fact that more than 3.7 billion m^3 of particulate have been emitted annually since 1986. Increasing levels of wastewater have severely degraded Yuhang County's aquatic environments. Total annual wastewater discharge has been above 20 million tons since 1986. Local industries are responsible for approximately 75% of this total. Furthermore, only one third of industrial wastewater is actually treated. Many of Yuhang County's rivers have chemical oxygen demand (COD) values ranging between 73 to 94 mg/liter. This is far above 25 mg/l, China's national standard for class V (minimal) surface water quality. Environment degradation threatens human health. There are more than 200,000 county residents using unsanitary water. Continued contamination of the environment also jeopardizes the ecological foundation of economic development. For example, between 1978 and 1996, mulberry plantations declined drastically from 6266 to 2297 ha, largely due to increasing atmospheric pollution (HEPB 1992, Liu and others 1994, YCACC 1990, YCLMB 1990, 1998, ZEPA 1996).

Rural industries are blamed for much of the region's environmental woes. However, there have recently been initiatives to address this crucial problem. For example, in 1998, the northern part of Yuhang County was subject to the Taihu Directive. The primary purpose of this state council directive was to protect the quality of the Taihu Lake watershed. It specified that 257 industries in Zhejiang province (29 in Yuhang County) treat their wastewater to national environmental standards by the end of 1998 or else face closure. While such initiatives may prove sound, the region's environmental problems cannot be remedied easily after 20 years of extensive economic development. Rural enterprises have transformed rural environments. As stated by a respondent, "20 years ago, the rural countryside produced very little waste, but since 1983 rural industrialization has increased dramatically." Before the reforms, rural people enjoyed much better environmental quality. This is best encapsulated by one longtime Tingzi resident: "Twenty years ago, the water was very clean and there were many fish. Twenty years ago, the river was not full of weeds. Twenty years ago, farmers could use the water in the river. But now, the water cannot be used."

Institutional Framework

The Chinese Communist Party introduced a legal framework for environmental protection in 1979. At the Eleventh Session of the Standing Committee of the Fifth National People's Congress, the Environmental Protection Law (EPL) of the People's Republic of China was adopted for trial implementation (GPRC 1979). Since 1979, the government has implemented a marine environmental protection law (1982), a water pollution prevention and control law (1984), a forestry law (1984), an air pollution law (1987), a noise pollution law (1988), a water resources law (1988), a water and soil conservation law (1991), and an improved environmental protection law (1989) (Jahiel 1997, Ross 1992). The government has also released a series of management guidelines, regulations, and standards for environmental protection (GPRC, 1986, 1987, 1990, 1991). To facilitate the enforcement of these laws and regulations, the People's Republic of China (PRC) developed eight policy implementation mechanisms: environmental impact assessment, the three synchronizations (pollution controls are to be incorporated into the design, construction, and operation phases of new projects), pollutant discharge fees, discharge permit system, environmental responsibility system, annual assessment of urban environmental quality, centralized pollution control, and limited time treatment (Jahiel 1997, Sinkule and Ortolano 1995). China now has a comprehensive legal framework and a nationwide organizational structure for implementing environmental protection measures in urban and rural areas (Jahiel 1997).

The State Environmental Protection Agency (SEPA) is the main body responsible for implementing China's environmental policies and programs. Each level of government below SEPA has an environmental agency. These decrease in authority from the provincial environmental protection agency (EPA), to the municipal and county environmental protection bureaus (EPB). The primary function of the EPB is to carry out national and local environmental regulatory programs and to serve as the enforcement agencies of SEPA. As subsidiaries of SEPA, they have numerous responsibilities including EIA, monitoring, discharge fee collection, and environmental education (Sinkule and Ortolano 1995).

Despite China's legal and institutional framework for environmental protection, major problems persist. As Edmonds (1994, p. 2) notes: "The rapidly developing industrial sector means that China is facing widespread pollution problems often of a sophisticated nature. The degree of environmental degradation is serious." Social, political, and economic barriers have prevented effective implementation of the country's environmental policies (Jahiel 1997, Lo and Tang 1994, Perlack and Russell 1991, Qu 1987, Ross 1992, Sinkule and Ortolano 1995). According to the available literature on China's environmental policy implementation,

some of the barriers include the institutional and bureaucratic structure of SEPA, a Chinese tradition of harmonious relations, *guanxi* (making connections through unofficial routes), and increasing numbers of rural enterprises (Jahiel 1997, Lo and Tang 1994, Perlack and Russell 1991, Sinkule and Ortolano 1995). Many of the barriers to EIA implementation in developing countries are also applicable to the implementation of environmental policy in China. Commonly cited problems are the lack of trained personnel, insufficient financial resources, absence of baseline data, low status of environmental agencies, poor coordination between agencies, limited public knowledge and participation, inadequate legislative framework, and ineffective enforcement measures (Bisset 1992, Biswas and Qu 1987, Brown and others 1991, Wramner 1992).

Implementation Mechanisms

Although China has eight environmental policy mechanisms, only three were being applied in Yuhang County: environmental impact assessment (EIA), discharge fees, and limited time treatment. Each of these mechanisms will be discussed as they pertain to rural industries in Yuhang County.

Discharge Fees

Of the three environmental policy mechanisms, discharge fees were enforced most often. The goals of discharge fees include resource conservation, pollution control, strengthening industrial management, and improving environmental conditions (Sinkule and Ortolano 1995). When asked about their effectiveness, an EPB respondent replied:

> Discharge fees are a good method of management. They are a form of economic management—which is better than administrative management. Discharge fees encourage factories to produce less waste and use more scientific technology. They encourage industries to improve management methods and decrease their waste. They also encourage treatment of waste—discharge fees can be returned to industries as investment for treatment facilities.

Environmental Protection Bureau employees also tend to support discharge fees because a portion of their finances depends upon their collection. While 80% of discharge fees can be returned to industries for investment into waste treatment facilities, up to 20% of the fees are used by the EPB for research in science and technology, environmental supervision, environmental education campaigns, and for employee salaries. The money collected from industries is crucial to the EPB's operation.

While the EPB may feel that discharge fees are effective, many rural industry managers and owners believe that they are unfair. One respondent felt that fees are unfair because there are no central treatment facilities in rural communities. This makes waste treatment difficult, as they must rely entirely upon their own finances and facilities. He stated: "Even in Hangzhou, chemical factories only need to reduce their COD to 300 ppm because they can send their wastewater to a central treatment facility. Because there are no central treatment facilities in Yuhang, industries must reduce their COD to 100 ppm on their own." A Tingzi town representative agreed that discharge fees are a problem for industries in his community because "most industries have low skills and low profits."

Environmental Impact Assessment

New industries are incorporating environmental management into their planning and design as a result of environmental impact assessment. One individual described EIA in Yuhang County: "The purpose of EIA is to control pollution before production and to implement protection measures that are reasonable and efficient. All projects must fit the national industrial structure and must fit Yuhang's future development plans. Development must be sustainable—environmentally, economically, and socially."

If new industries do not incorporate environmental management into their planning and design, the EPB may bring construction to a halt. If the industry is already in operation, production will be stopped. An EPB employee insisted that "pollution will be terminated."

While EIA is being implemented, it is generally in the form of a detailed environmental impact form (EIF) or a convenient environmental impact card (EIC). The EIF is a condensed version of an environmental impact statement (EIS) and can be up to 20 pages long. The EIC is a four-page summary, which lists resources, wastes, and precautionary treatment measures. In 1997, the Environmental Protection Bureau's annual report stated that there were 152 construction projects in Yuhang County (YCEPB 1997). Of these, 92 were industrial construction projects that could trigger an EIA. The report further states, however, that only 35 construction projects actually required EIA—32 of those being EIF. Only three construction projects in 1997 required thorough environmental impact statements.

Limited Time Treatment

If an industry is releasing large quantities of pollution, the EPB can demand that it build waste treatment facilities within a limited time frame. This is termed a

Table 1. Policy implementation mechanisms used in case study industries[a]

Industry type	Number of employees	Major wastes	EIA preconstruction
Dyeing	100	Air particulate, wastewater (COD)	No - built pre-EPB
Cement factory	250	Air particulate, Carbon Monoxide	No - built pre-EPB
Dyeing	30	Air particulate, wastewater (COD)	Yes - EIF in 1990
Printed circuit board	500	Heavy metals, acids, alkali	No - built pre-EPB
Food processing	1000	Organic wastewater (COD), packaging	Yes - EIF in 1993
Chemical resins	276	Air particulate, wastewater (COD)	Yes - EIS 1996 to 1998
Brick factory	104	Air particulate, Carbon Monoxide	No - built pre-EPB
Plastic molding factory	22	Sewage	No - industry too small

limited time treatment order. It is generally used as an enforcement tool to coerce older rural enterprises to build treatment facilities that comply with national environmental standards. The scope of limited time treatment can extend over a broad region or watershed (such as the Taihu Directive) or can apply to individual industries. If the industry is unable to meet the specified deadline, the law stipulates that they will be fined, have their production stopped, or be closed down.

Four rural enterprises in the case study region were subject to limited time treatment orders from either the EPB or the state council (via the Taihu Directive). Three were built before EIA was being implemented and, thus, were operating without adequate treatment facilities until they were approached by the EPB. The brick-making business was the first—they built their air treatment facility in 1985. The cement factory was asked to build facilities in 1994. Although they completed the project in 1995, the facility was unable to meet national standards until June 1998—even though they had invested over 1 million yuan. They encountered numerous problems with their technology and had to invest another 217,789 yuan before it was fully operational.

Limited time treatment orders vest the EPB with a great deal of power and authority. While the EPB may meet with some resistance, as long as they have local government support, they are capable of closing down industries that refuse to comply with their directives. Industries recognize this power and are becoming increasingly cooperative.

Table 1 depicts how the above three environmental policy mechanisms have been applied to each of the case study industries. Perhaps due to its relative ease of implementation, discharge fees were the most popular mechanism used to discourage pollution. Seven of the eight industries paid discharge fees on a regular basis. Limited time treatment and EIA were not quite as prevalent. Half the industries had undertaken EIA, while the remainder had built treatment facilities because of a limited time treatment order. Despite some success, there are still numerous problems associated with environmental policy implementation. This is evident by the poor environmental quality found in Yuhang County. The following section provides a detailed discussion regarding the main barriers and constraints to environmental policy implementation in Yuhang County.

Barriers and Constraints to Implementation

In Yuhang County, discharge fees, EIA, or limited time treatment affected almost all of the case study industries. Regardless, the EPA and EPB still face a number of barriers to implement more effectively China's environmental protection laws. While industrial compliance is increasing, the costs related to environmental protection continue to encourage industries to resist environmental laws and regulations. As stated by an EPA representative: "Because some counties have very poor economic bases and are very concerned about improving their economies, environmental protection does not always occur according to the law." An older dyeing facility in Yuhang County illustrates this situation: The dyeing factory was asked by the EPB to treat their wastewater at the beginning of 1997. Because the owner felt that the costs would be too high, he complained to the town government. The town government decided to support and protect the dyeing industry because each year, they received 60,000 yuan in rent from the industry. It was not until the beginning of 1998 that the EPB was finally able to force the industry to build a wastewater treatment facility. In this instance, the town and dyeing industry's compliance was mainly due to the Taihu Directive. Because this directive came directly from the state council, it could not be resisted.

Monetary constraints are powerful barriers to environmental policy implementation. Industries perceive discharge fees, EIA, and limited time treatments as direct infringements on profits. "If the EPB asks an industry to undertake a technological improvement to

Table 1. (Continued)

EIA postconstruction	Environmental initiatives	Reason	Discharge fees
No	Yes - built H_2O treatment facility	Limited Time Treatment	Yes
No	Yes - built air treatment facility	Limited Time Treatment	Yes
No	Yes - rebuilt H_2O treatment facility	Limited Time Treatment	Yes
Yes - EIS in 1993, EIF in 1995	N/A	N/A	Yes
Yes - EIF in 1995	N/A	N/A	Yes
No	Yes - built air treatment facility	Own initiative and public pressure	Yes
No	Yes - built air treatment facility	Limited Time Treatment	Yes
No	No	N/A	No

[a]Data derived from interview respondents.

treat its waste, the industry sees this as both problematic and costly." For smaller industries, the extra costs associated with environmental protection can force them to the verge of bankruptcy or closure. Even the EPA and the EPB are struggling financially. An EPA representative felt that "EPA business costs are very high because we often have to travel to other cities to do our work. We do not have enough money. We are especially lacking money for research in science and technology, monitoring, and publicity." Even though the EPA and EPB benefit from discharge fees, this money is not sufficient to meet their operational needs. Other individuals expressed their concern that the costs associated with environmental protection are too high, but as one individual stressed: "Environmental protection is everyone's obligation by law. Enterprises must realize that EIA is not a waste of money. Environmental protection is worthy of financial investment." Because environmental protection is expensive for industries, agencies, and the EPB, there are difficulties implementing the law. As an industry representative concluded: "No matter how high an industry's environmental awareness may be, if they lack money, they will not be able to treat their waste. Money is a crucial factor."

Reliable technology is also problematical in China. While larger industries have no problem importing specialized foreign technologies, lower-profit rural enterprises cannot afford good-quality equipment that will meet environmental standards. Many managers expressed the need for scientific technology that is both cost-efficient and effective. It took one of the region's smaller dyeing industries eight years and over 240,000 yuan before their waste treatment technology was able to meet national standards. As a result, the industry is struggling financially: "We are paying more money now to treat our waste than we used to pay in discharge fees." The EPA and EPB representatives also stressed the need for more scientific technology. Partly due to 30 years of political revolution, the country's technological capabilities are limited. One respondent stated: "The quality of China's environmental protection technology cannot compare to technology in foreign countries. We need to improve China's technology. Our technology consumes more power, its lifespan is too short, and its effectiveness is poor."

According to an EPA representative, there are currently 20,000 to 30,000 small-scale industries producing environmental technologies in China. Due to competition, the quality of this technology is improving, albeit slowly. The EPA representative felt that the increasing numbers of joint venture operations are "a good way to improve China's technological capabilities."

Human resources are limited in both the EPA and EPB. They need more staff, more skill, and more expertise to implement environmental policies. A representative from the Yuhang EPB discussed how the staff is always very busy because they have many responsibilities. "We cannot focus all of our time and energy on EIA. We often need help from other experts—such as from the Hangzhou or Zhejiang EPA." Although one respondent stated that 80% of the Yuhang EPB employees had university level training, another speculated that few had environmental science training. "Out of 20–30 EPB employees, approximately half would have environmental training. But, only one or two of those would have university level environmental training. Often the job is simply a government posting." The absolute number of staff is also limited. There are 2000 employees in the Zhejiang EPA. While the EPA would like to hire more employees to monitor industries and enforce environmental laws, they cannot because of government quotas. "The Chinese government is undergoing a structural change to decrease the number of government employees. If we hire one more employee, it will cost the EPA over 20,000 yuan. The province will not pay for this. The problem is money." The Yuhang County EPB has only 12 employees to monitor all industries in the region. This area spans over 1000 sq km. "We do not have enough people to monitor and so it is impossible to monitor factories everyday." Because

of limited staff numbers, the EPA and EPB must selectively focus their energies on industries that have the greatest environmental impact. Consequently, some smaller industries are able to operate unnoticed.

Environmental awareness needs to be improved among the public, industries, and government leaders. Because environmental awareness is relatively low, the EPB often faces resistance to environmental policy implementation. "China needs to educate the masses on environmental issues. Educators must be persistent in order to change environmental attitudes and to improve environmental management. At present, the mentality is money first and environment last." Environmental education and awareness are improving. The media have assumed the role of an environmental educator. There are frequently news reports about industries facing closure due to excess pollution. Some media representatives appear to be doing investigative work for the EPB, while others encourage the public to notify the EPB if they encounter polluting industries. While environmental education should be the EPA and EPB's responsibility, they lack funds to produce educational materials. Poor environmental awareness is a constraint to environmental policy implementation. Nevertheless, the media's decision to focus on China's environmental problems is helping to improve awareness.

The EPB employees are also concerned about the quality of EIA reports and the quality of baseline data collection. As EIA currently stands in China, it is a time-consuming, cumbersome, and expensive process. Environmental impact assessment methodology needs to be streamlined and simplified so that it can be implemented more quickly and efficiently (Bisset 1992). To some extent, EPBs in Yuhang County are doing this with the use of environmental impact cards and environmental impact forms rather than environmental impact statements. Nevertheless, EPB members did express concern regarding the length of time needed to review agency reports, problems with data collection, and the overall costs of the process. Scoping of the main issues is of critical importance to EIA. This limits the amount of data by ensuring that only information directly relevant to project impacts will be presented in the report. EPB employees felt that agencies often prepare substantial reports that contain volumes of repetitive and irrelevant information. As one EPB representative stated: "The information in EIA reports should be more specific for each project and should focus on the main sources of pollution instead of being overly general. If the agency were to write more specialized and specific reports, the process would take less time and money." Improved EIA reports and methodology would facilitate EIA implementation.

Another critical problem is organizational conflict. The EPB must respond to both the Provincial EPA and to the Yuhang County government. These two authoritative bodies often have very different agendas, which can result in conflict. While SEPA agencies try to enforce environmental policies, local governments try to protect their industries. "The shortcoming of the dual hierarchy system is that environmental policies cannot be enforced." Conflict further arises during the selection of EPB or EPA directors. While SEPA has input into the selection of the organization's directors, the national, provincial, city, and county level governments ultimately have the power to hire and fire them. This puts tremendous pressure on SEPA's directors. "They feel as though they are in the middle of two borders. They have to negotiate between environmental and economic conflicts."

Because Chinese society relies heavily upon guanxi, it can also influence environmental policy implementation. Guanxi is extremely important in social, political, and economic affairs. Personal connections have tremendous bearing upon all activities. One individual explained that guanxi has two meanings. The first pertains to cooperation and, for SEPA, refers to cooperation between departments. For example, the Hangzhou EPB has developed a cooperative relationship with the industrial and commercial department. Because the industrial and commercial department approves all industrial operation licenses, this relationship is crucial to effective policy implementation. Without this relationship, it is very difficult for the EPB to monitor industries because they remain uninformed about where they are located or what they are producing. "Although, by law, all new industries which produce pollution should be approved by the EPB, they often are not." The reason is due to poor coordination between departments. The relationship found in Hangzhou is uncommon, although an EPA representative suggested: "Cooperation between departments is improving."

The second meaning associated with guanxi has negative connotations. This would be the guanxi between industrial owners, government officials, and the EPB. An academic described it as follows: "If an industrial owner and the mayor are good friends, the mayor will want to protect that industry from any economic harm. They do not stick to the law. It is the rule of the economy." Furthermore, the distinction between industrial owners and local government members is often unclear, as industrial owners can also be government officials. In small counties, the guanxi network can be very large and corruption can be difficult to avoid. A

town representative described the situation in Tingzi: "Several years ago, the town government was more concerned about protecting rural industries because in the 1980s, the industries substantially increased rural people's incomes." Town and village governments also protected rural industries because they were guarantors for their loans. If the rural industries were to face economic losses because of environmental initiatives, the town and village governments would also face economic losses. Methods of enforcement, decision-making, and fee collection have recently been changed, partly to minimize this type of corruption. Now, discharge fees are collected directly through the banks and all important decisions must be made at meetings attended by departmental directors. "It's very hard to play favorites for personal friends when meetings are structured like this. Guanxi still may have an impact, but it's not as obvious." Furthermore, EPB officials change positions every three years. This makes guanxi networks more difficult to establish. Administrative monitoring departments have also been implemented at all SEPA levels. Their job is to monitor officials for any form of corruption. Although this department has existed for some time, they have recently gained more status. An EPA representative felt that, "this type of guanxi will not last much longer." However, because it has traditionally had such a strong role in Chinese society, guanxi may be difficult to avoid altogether.

While discharge fees are important mechanisms used to implement environmental policies, their effectiveness has also been debated. According to an EPA representative, discharge fee prices remained static at 0.05 yuan/m^3 of effluent between 1980 and 1992. In 1992, prices were increased for the first time to 0.1 and 0.2 yuan/m^3. Since 1992, no province has increased its discharge fees. The decision to increase fees must be approved by the National People's Congress, which only meets every four years. SEPA has begun trying to encourage a national increase because "discharge fees are lower than the costs of water treatment. They are too low to meet SEPA's objectives." Several individuals stressed this point. A food processing industry representative explicitly stated that until they increased production, their discharge fees were much lower than waste treatment costs. As a pilot project, SEPA has chosen three cities in which to increase discharge fees by four to eight times. This project began in Hangzhou on 1, July 1998. SEPA hopes to increase discharge fees for all of China by the year 2001, but increasing fees by four to eight times may not be enough to completely discourage industrial pollution. An academic felt that, "discharge fees should be increased to at least 2 yuan/m^3." Otherwise, he felt that it would continue to be more economical to pay low discharge fees, rather than minimize wastes or build treatment facilities.

Conclusion

The application of the Environmental Policy Model proved to be highly useful as an explanatory and heuristic tool. It is not meant to predict policy outcomes beyond the caution of noting that actual outcomes are not likely to mirror initial objectives. The model requires the consideration of a relatively broad set of indicators and situations for analyzing environmental policy, including the specific goals and priorities of local managers and decision-makers. In the case study area, there is a constant tension between local economic development and environmental protection, which has an important impact on pollution control.

The set of barriers and constraints to policy implementation, in many ways, reflect those of other regions in China and other countries. Participants in this study identified what they believed are the most significant constraints to implementation. What is reflected in our results is a set of decision-makers grappling with extremely rapid change in the landscape, the economy, and the environment. The ability to react and manage this change is a major challenge.

China's transition from a planned economy to a market economy reflects a transition between the traditional agricultural economy to a modern industrialized economy (Gao and Chi 1997). This has profoundly changed the nature of the Chinese landscape in a relatively short period of time, particularly in rural areas, where nearly 80% of the population resides. While economic prosperity has increased dramatically since 1978, the costs to the environment have also escalated. As has been and continues to be the case, there is a lag between priority given to economic growth and environmental protection.

Industrial growth in China, particularly associated with rural enterprises, has occurred outside of central environmental management systems. The regulation of these industries occurs only to the degree that local bureaus and local authorities are able to implement environmental standards and exercise authority. However, for many local governments and EPB officials, pollution from rural industries is only one of a host of factors that they must attempt to manage. Lack of sufficient funds to enforce existing laws and guidelines and to build the required infrastructure to control industrial discharges, are urgently needed. Environmental awareness among the public, government officials, and within the media, is also seen as an impediment to increased action. The Chinese media have

been allowed to present specific instances of environmental problems to the public. This has generally increased levels of environmental awareness, which can be expected to increase as income levels rise and more attention is paid to environmental and social implications of industrialization. Awareness is also increasing as environmental problems continue to affect the daily lives and health of local citizens.

Despite a variety of new laws, regulations and guidelines, enforcement in rural areas remains relatively low. The social, economic and political context of decision-making regarding environmental policy, however, is changing rapidly as China itself evolves. The external costs of industrialization are becoming harder to ignore.

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