

Did China Overcome the Giant of Water Pollution? Pollution Control Legislations in China Focusing 2008 Water Pollution Control Law

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Abstract: China is a country experiencing severe water shortages. Remarkable population growth and incredible economy makes 70 percent of Country Rivers reservoirs polluted.

The purpose of the present study is to review China's environmental laws, regulations and policies with special focus on water pollution prevention and control, and also highlight the brief legislative structure of 2008 water pollution control law. In this report, this research analyzes the evolution process of environmental laws and regulations in China with special emphasis on water pollution control. The environmental legal system and environmental management organizations are illustrated. This paper also introduced major implementation measures for the enforcement of environmental laws and regulations focusing 2008 water pollution control law and future trend of China's water pollution control.

Keywords: Water pollution, policies, laws and regulations, implementation measures, enforcement status, Achievements of 2008 WPPCL

I. INTRODUCTION

Water pollution is one of the main environmental issues which need more attention than before. The causes of water pollution have been attributed to agricultural, sewage, oil spills and municipal waste. It has been observed that industrial pollution remains one of the major causes of water pollution across the globe. Water pollution is determined where human activities continue to influence the environment which include farming, harvesting trees, constructing building and roadways, mining and disposing of liquid (Omer, 2007). China pervasive water pollution is exacerbated significantly by frequent pollution accidents. Severe water shortage and water pollution forced China to enter a new era of legal construction. The situation of water pollution in China was serious but the government has been playing a great role in reversing the situation for better (ADB, 2011).

The purpose of this paper is to provide a preliminary review on China's environmental laws, regulations and policies with special focus on water pollution prevention and control. Base on this policy review, Research will assess the effectiveness of China's water pollution control laws, legal and administrative measures for water laws enforcement and further analyze the achievements of 2008 WPPCL briefly. China's environmental statistical data, legal document and relevant internet information are used as main data resources for this study. Part 1 of the paper highlights the sources of water pollution crises in China briefly, Part 2 of the paper introduces the evolution process or history of environmental laws and regulations in China with special emphasis on water pollution control. Part 3 explains major implementation measures for the enforcement of environmental laws and regulations. Part 4 provides brief highlights of 2008 water pollution control law. Part 5 have some concluding remarks with legislative compromises and remaining enforcement challenges.

II. CHINA'S WATER POLLUTION CRISES

The remarkable growth in China's population (22 percent of world population) and economy (10 percent per year) over the past several decades has come at a tremendous cost to the country's environment.

The economic growth and the health of the country are increasingly threatened by environmental deterioration and constraints, particularly around water. According to the world water day (22nd March 2013), 320 million people in China are without access to clean drinking water. 40% surface water is polluted, 20% urban drinking water is contaminated, 10,570 the number of pigs pulled out of the Huangpu river according to official reports, 14,600+ the number of pigs pulled out of the Huangpu river according to independent media reports, 278 the number of Chinese cities without sewage treatment facilities, 200,000 Yuan the amount offered to a Zhejiang official to swim in one of the province's rivers (he didn't) 43 the percentage of Chinese rivers that are unsuitable for human contact 217 billion Yuan the estimated cost of water pollution to China's economy every year (Green Peace).

China is a country experiencing severe water shortages, only 7 percent of all freshwater runoff (Don Hinrich, 2008). This figure is likely to be pushed further to the limit by 2030 as the population climbs above 1.6 billion with an urbanization rate of about 60 percent (Liang Chao, 2005) scarce water resources are perniciously aggravated by the pervasive pollution accompanying China's incredible economic growth for over three decades. More than 70 percent of all rivers and lakes in the country have been polluted, and more than half of urban groundwater is contaminated (Ke Zhang, 2006).

Table 1: Water Quality in the Seven River Basins in 2005
(Water quality in China) Unit: %

Rivers	Class I, II	Class III	Class IV	Class V	Worse Than Class V
Yellow	7	27	34	7	25
Huai	3	14	38	13	32
Hai	17	5	18	6	54
Liao	14	16	22	8	40
Songhua	5	19	45	12	19
Yangtze	56	20	11	2	11
Zhu (Pearl)	55	21	18	0	6

Source: China Environment Bulletin 2005 (中国环境状况公报).

Available Online: <http://www.sepa.gov.cn>

The national monitoring statistics of 2005 show that among 411 state monitoring stations in seven rivers, 41% of the rivers' water was graded Class I-III, and 59% graded Class IV, V or worse. The water quality of the Hai and the Huai River Basin was recorded as particularly poor, and the parts of the lake and river basin reaching Class III or better accounted for only 20%.

Of the 20 most seriously polluted cities in the world, 16 are in China. The major watersheds of the country all suffer severe pollution. Three hundred million people lack access to safe drinking water.

Desertification, worsened by excessive withdrawals of surface and groundwater, is growing in northern China (Feng Z., 2007). In 2005, the Chinese government acknowledged that 50,000 environmentally related protests occurred that year, many of which were related to water degradation (Turner, J.L., 2006). Even the official Chinese media has reported that "The pursuit of economic growth has been the priority overshadowing the vital issues of water resources and ecological balance" (China Daily, 2007a). It is not yet clear how quickly the Chinese will get their severe water challenges under control, or at what ultimate cost to human and ecological conditions.

An estimated 20,000 chemical factories, half of which are along the Yangtze River, are dumping uncontrolled or only marginally controlled pollutants into China's rivers. According to SEPA statistics, China experienced over 1,400 environmental pollution accidents in 2005; around half of which involved water pollution (Xinhua, 2007b), and many incidents are never reported.

According to the Ministry of Environment's 2007 *Official Report on China's Environment*, all seven major rivers in China in general suffer from moderate pollution (Associated Press, 2007), and 11 out of the 28 major lakes have a water quality grade V or higher—the lowest national standard for water quality, which means the water is essentially unuseable for any purpose. The Ministry of Environmental Protection reported 1,221 environmental accidents in 2004, most of which were related to water. The 2005 Songhua River benzene spill brought China domestic pressure as well as international embarrassment, (China Daily, 2007) and became the catalyst for amending the Water Pollution Prevention and Control Law (WPPCL) again in February 2008.8

Table 2: Highlights of Water Pollution Control Laws and Regulations in China

Law and Regulations	Brief Description	Issuer	Effective
Regulations of the People's Republic of China on the Prevention of Vessel-induced Sea Pollution	Preventing sea pollution by ships to protect the marine ecological environment	The State Council	December 29, 1983
Regulation on Controlling Dumping of Wastes in the Ocean	Aims to control the dumping of wastes into the ocean; prevents damage to the marine environment	The State Council	March 6, 1985
Interim Regulations on the Management of Water Pollutant Emission permits	Strengthens the supervision and management of water pollution	SEPA	March 20, 1988
Regulations on Pollution Control in Drinking Water Source Protection Areas	Aims to prioritize the protection of drinking water sources	SPEA; Ministry of Health; Ministry of Construction; Ministry of Water Resources; Ministry of Geology and Mineral Resources	July 10, 1989
Regulation on Prevention of Pollution of Marine Environment by Land-sourced Pollutants	Strengthens the supervision and management of land-sourced pollutants	The State Council	August 1, 1990
Interim Regulations on the Prevention and Control of Water Pollution Within the Huai River Basin	Strengthens water pollution controls in the Huai River with the goal of improving water quality	The State Council	August 8, 1995
Chinese Law on the Prevention and Control of Water Pollution	Aims to prevent water pollution, and protects the environment	The Standing Committee of the National People's Congress	May 15, 1996
Regulation on Investigation and Treatment of Pollution Accidents in Fishing Areas	Aims to investigate and deal with fishing area pollution accidents	Ministry of Agriculture	March 26, 1997
Regulation on Wastes from Vessels and Solid Waste Pollution in Yangtze River	Aims to prevent solid and vessel waste from being dumped into the Yangtze River	Ministry of Communications; Ministry of Construction;	December 24, 1997

		SEPA	
Provisions for the Implementation of the Law on Prevention and Control of Water Pollution	Ensures the implementation of the Law on Prevention and Control of Water Pollution; aims to strengthen the supervision and management of water pollution control	The State Council	March 20, 2000
Marine Environment Protection Law of the People's Republic of China	Aims to protect the marine environment and resources, prevent pollution damage, maintain ecological balance, and protect human health	The Standing Committee of the National People's Congress	April 1, 2000
Regulation on the Management of Key Pollution Emission Permits in the Huai River and Tai Lake Basins	Controls the key pollutants emission in the Huai River and Tai Lake Basins; strengthens the supervision and management of water pollution control	SEPA	July 2, 2001
Water Law of the People's Republic of China (Amendment of 1988 Law)	Regulates water resources exploration, utilization, protection, and management; includes provisions strengthening power of river basin commissions	The Standing Committee of the National People's Congress	October 2, 2002

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Tables 2 highlight the water pollution control laws and regulations, aims and objectives, issuers and the due dates of their effectiveness.

III. HISTORY OF CHINA'S WATER LAWS REGULATION AND POLICIES IMPLEMENTATION

With intensive growth of heavy industries, water pollution Stockholm Conference on Human and Environment (1972) aroused the attention of Chinese government in the early 1970s. This stimulated the establishment of Leading Group on Environmental Protection of the State Council (LGEP), China's initial environmental administrative organization. By the end of 1980s, a comprehensive environmental management system had been set up consisting national, local and sectoral governmental environmental organizations. However, the level of environmental degradation due to rapid economic growth surpassed the progress made in environmental protection and environmental quality has been deteriorating. After the Rio Earth Summit on Environment and Development in 1992, China introduced the concept of sustainable development into its environmental law-making and policy-making and has gradually developed its own theory based on the Scientific Outlook on Development.

Table 3: Features of each stage of the evolution of environmental management system

	Stage 1 (1972~1983)	Stage 2 (1983~1991)	Stage 3 (1992~present)
Legislation	<ul style="list-style-type: none"> ◆ Constitution(1982) ◆ Environmental Protection Law (Trial Version)(1979) Total1: 2 laws	<ul style="list-style-type: none"> ◆ Environmental Protection Law(1989) ◆ Water Pollution Prevention and Control Law(1984) ◆ Air Pollution Prevention and Control Law(1987) Total1: 7 laws and 8 regulations	<ul style="list-style-type: none"> ◆ Solid Waste Pollution Prevention and Control Law(1995,2004) ◆ Radiation Pollution Prevention and Control Law(2003) ◆ Environmental Impact Assessment Law(2002) ◆ Cleaner Production Law(2002) Total1: 27 laws and 25 regulations
Institution Development	<ul style="list-style-type: none"> ◆ Leading Group on Environmental Protection, State Council(1972) ◆ Department of Environmental Protection, Ministry of Urban and Town Construction(1982) 	<ul style="list-style-type: none"> ◆ National Environmental Protection Agency (1988) 	<ul style="list-style-type: none"> ◆ State Environmental Protection Administration (1998) ◆ Ministry of Environmental Protection (2008)
Major Implementation Measures	<ul style="list-style-type: none"> ◆ Three Simultaneity System ◆ Pollution levy system ◆ Environmental impact assessment system 	<ul style="list-style-type: none"> ◆ Target-responsibility system for environmental protection ◆ Quantitative examination of integrated environmental management ◆ Emission permit system ◆ System of centralized control ◆ Enforcement of pollution abatement to noncompliance by designated date 	<ul style="list-style-type: none"> ◆ Total emission control ◆ Cross-century green projects ◆ Levy on centralized waste water treatment in urban area
Domestic Events	<ul style="list-style-type: none"> ◆ The First CNCEP2(1972), the starting point of environmental protection work in China 	<ul style="list-style-type: none"> ◆ The second CNCEP2(1983), setting environmental protection as a fundamental national policy 	<ul style="list-style-type: none"> ◆ “Zero point” action(1997, 1998) ◆ Environmental enforcement campaign(2003~present) ◆ The Third Session of the Sixteenth CPPCC3 National Committee (2003), Scientific Outlook on Development
International Events	<ul style="list-style-type: none"> ◆ Stockholm Conference on Human and Environment(1972), arousing environmental awareness worldwide 		<ul style="list-style-type: none"> ◆ Rio Earth Summit(1992), promoting sustainable development ◆ Kyoto Protocol, solving global warming problem
Major Pollution Accidents	<ul style="list-style-type: none"> ◆ Water Pollution in Dalian Bay (1972, big loss in aquaculture) ◆ Water Pollution in Guanting Reservoir(1972, caused sickness of local residents) 		<ul style="list-style-type: none"> ◆ Flooding of Yangtze River in 1998 (economic loss: 255 billion RMB; 1320 death) ◆ Tai lake water pollution (1990, 1995, 1998, 2007, drinking water crisis) ◆ Songhua river water pollution accident (economic loss: 69 million RMB; 8 death)

Table 3 divided Environmental Laws History of China into three periods. First is from 1972-1983, second 1983-1991, Third 1992-present.

Several environmental pollution accidents happened in 1972 (Shi, L.H., 2007) this stage is a foundation of China's environmental protection work. There are several milestones for the starting of organization construction, legislation and management framework. During first stage, (1972-1983) China's economy highly relied on heavy industries, such as iron and steel industry, chemical industry and machinery manufacturing industry. All of these heavy industries produced great amount of pollutants, especially "three wastes", i.e. waste water, waste gas and solid waste (Wu, D. and Wu, C.Y., 2006). As a result; three major implementation measures in this stage were enforced. The amended Environmental Protection Law (1989) and six environmental individual laws were enacted successively during the second stage (1983-1991). NEPA was found in 1988, and local Environmental Protection Bureaus (EPBs) were also set up nationwide. By then, basic framework of legal system and environmental institutions has been set up

(Chen, H. G. and Piao, G. Z., 1994). The Rio Earth Summit (1992) was a milestone for the beginning of considering sustainable development in policy making of China's environmental protection (Shi, L.H., 2007). In this stage, both legislation and institution construction were improved to a new level. By now, 26 environmental individual laws and more than 50 environmental protections administrative regulations in total were enacted (MOEP, 2008).

After upgraded to SEPA (1998), China's environmental administrative authority was upgraded again to MOEP in 2008. Water pollution accidents of Taihu Lake (1990, 1995, 1998, 2007) and Huai River (1989, 1994, 2004) caused water shortage to nearby factories and drinking water crisis to millions of people, with direct economic loss over 100 million RMB (Sina News, 2005). Those accidents stimulated the establishment of regulations for water pollution prevention of major river basins and the regulations for protecting safe drinking water. The revised Water Pollution Prevention and Control Law enacted in 2008 also added related content for protection of drinking water source. The "Zero point" action was implemented to strengthen environmental enforcement in both 1997 and 1998. The flooding of Yangtze River in 1998 was a serious catastrophe in China's modern history, which caused 1320 death and direct economic loss at 225 billion RMB. The Songhua River pollution accident in 2005 caused 6 deaths, 69 million RMB of direct economic loss and serious pollution of drinking water source (OECD and SEPA, 2007). In this stage, four major implementation measures were proposed: total emission control, cross-century green projects, levy on centralized waste water treatment in urban area, and emission reduction. In 1972, water pollution in Dalian Bay (city) caused more than tens of thousands of loss of marine output every year; another water pollution of Guan ting reservoir caused fish pollution. In summary, water pollution accidents impel the development of environmental protection work while water environment is the experimental field for new management measures.

IV. MAJOR LEGAL AND ADMINISTRATIVE MEASURES FOR IMPLEMENTATION OF WATER LAWS

(1) Environmental impact assessment system

The target of EIA is newly-built construction projects and purposes are preventing environmental pollution, controlling pollution source, encouraging public participation, ensuring proper development and promoting sustainability (Xiang, Z. Q., 2004). EIA system was first confirmed as legal provision in the Water Pollution Prevention and Control Law in 1984, and then the Environmental Protection Law and other pollution prevention laws also added the content of EIA. Finally, in 2003, the Environmental Impact Assessment Law was enacted. Since the establishment of this law, more than thirty construction projects with total investment up to 2000 billion RMB have been rejected due to their high environmental risks (Zhang, G.P, 2008).

(2) The "Three Simultaneity System"

EIA system focus on making pollution prevention plans, the "Three Simultaneity System" focus on the implementation of those plans (Chen, Q. W. and Liang, P., 2006). The "Three Simultaneity System" was first confirmed as legal provision in the Environmental Protection Law enacted in 1989, afterwards, major pollution prevention and control laws also add the content of "three simultaneity" System (Chen, Q. W. and Liang, P., 2006). Over the past thirty years, the "Three Simultaneity System" has made great contribution to pollution control of newly built industrial point pollution source.

(3) Pollution levy system;

There are two kinds of levy systems. The first one is punishment on pollution emission which exceeds standards, such as levy on waste water, waste gas, solid waste, noise and radioactivity. The second one is resource occupation fee, such as waste water discharge fee. Pollution levy system was first confirmed as legal provision in the Water Pollution Prevention and Control Law in 1984, and then the Environmental Protection Law and other pollution prevention laws also add the content of pollution levy. Total pollution fees grow rapidly since 2003, and reach 14 billion RMB in 2006 (MOEP, 1992-2007).

(4) System of pollution discharge reporting;

All enterprises that discharge pollutant directly or indirectly should report the type, quantity and concentration of pollutants to local environmental administrative authority and provide materials of pollution abatement (Chen, H.G and Piao, G.Z., 1994) This system also acts as the precondition of emission permit system, total emission control system and pollution levy system (Fujian Provincial Environmental Protection Bureau).

(5) Emission permits system;

All enterprises can discharge their pollutants to environment only when they have emission permit issued by environmental administrative authority (Chen, H.G and Piao, G.Z.,1994) . The main purposes of this system are to protect major river basins and seriously polluted areas. According to “report about situation of the permit system of pollutant discharge operation in six provinces and cities” made by SEPA, in most areas, the effectiveness of emission permit system is limited partly due to low environmental awareness of enterprises (Xia, G., Feng, D.F and Cheng, L.L., 2005).

(6) Total emission control system;

Chinese government started total emission control since 1996. Total emission control was proposed during the Fourth CNCEP and was first confirmed as legal provision in the Water Pollution Prevention and Control Law in 1996, and then other pollution and prevention laws also add this content.

Currently, COD, SO₂, soot, industrial smoke, oil, cyanide, arsenic, mercury, lead, cadmium, hex basic chromium, and industrial solid waste are on the list of total emission control (Xinhua Net, 2005).

(7) Enforcement of pollution abatement for noncompliance by designated date:

This system is originally created by Chinese government with the purpose to improve regional environment compulsorily.

For the procedure, first EPBs submit list of enterprises to local governments, then local governments send out notification to those enterprises. After designated period, EPBs will check the result and submit list of enterprises that should be closed according to monitoring data to local government. It was first confirmed as legal provision in the Water Pollution Prevention and Control Law in 1984, and then the Environmental Protection Law and other pollution and prevention laws also add this content (Liu, C., 2008).

(8) Enforcement of shutting down, merging and transferring:

Actually, this system is the most serious punitive measures for illegal pollution enterprises. The purpose of this system is to improve environmental quality in a short time and help to promote enterprises structure upgrade and improve resource allocation. Enforcement of shutting down, merging and transferring system was first clearly proposed in “Decision on Strengthen Environmental Protection Work of the State Council” in 1990 (General Office of the State Council, 2007), and then various regulations and local rules were enacted to support the implementation of this system (Xiao, J. 2005).

The 1984 WPPCL was China first legislation on pollution prevention; it was revised for the first time in 1996 with 62 Articles and 7 chapters. There were three major changes in 1996 WPPCL. Firstly to prevent the water pollution, make unified plans on the basis of river basin instead of administrative region. The second major change was to institute a system for control of total discharge of major pollutants for water bodies. Third major change was to require urban sewage be centrally treated and local government construct central treatment facilities.

The law was revised again in 2008 as a result of severe water pollution across China and frequent occurrences of water pollution accidents.

V. HIGHLIGHTS OF THE 2008 WATER POLLUTION CONTROL LAW

The 2008 WPPCL has altogether 8 chapters and 92 articles, which is 30 articles more than the previous version. The 2008 WPPCL contains many innovative concept and mechanisms that can be summarized in the following four aspects:

Strengthened Environmental Protection Responsibility of Local Governments:

Although the Environmental Protection Law provides that each level of local government should be responsible for the quality of environment within their area, this is more of a general and vague policy statement without applicability or deterrence mechanisms. As a result, many officials rely upon lowering environmental standards to pursue GDP growth, and sacrificing environmental quality for short-term economic benefits and advancement opportunities. The new law also requires taking the accomplishment for fulfilling the objectives of protecting water as an indicator to evaluate and assess the performance of local governments and officials in charge of them (Art.5 WPPCL, 2008) To be more specific, provincial governments are required to sign a responsibility pledge with the State Council to commit to fulfilling the environmental protection target set up in the 11th Five-Year Plan, which is to reduce chemical oxygen demand by 10 percent in the period of 2006-2010, and the State Council will see whether the target has been met or not to evaluate local officials' achievement in their posts.

Increased Opportunities for Public Participation in Environmental Protection

The 2008 WPPCL provides increasing opportunities for public participation. The first public participation aspect in the new law is the requirement to release information about national water quality in a unified way. The new law specifies that the Ministry of Environmental Protection is responsible for releasing information about the national water quality in a standardized way (Art.25 WPPCL, 2008) so as to avoid confusion and ensure that the public is provided with accurate and reliable information on water quality. During the revision process of the law, environmental public interest litigation was suggested for inclusion into the new law. However, it did not make it to the law in a clear way. Therefore, the compromising result lies in Article 88, which states that environmental protection bureaus (EPB) and social groups may legally support the parties whose legitimate rights and interests are damaged in a water pollution incident to file a lawsuit. The new law also has a specified provision related to class action in environmental compensation cases. Article 88 states that if the number of parties whose legitimate rights and interests are damaged in a water pollution incident is relatively large, which in practice means more than 10, these parties may select a representative to file a class action. This is actually the first time that Chinese laws make such explicit stipulations on when and how to use class action and this provision is expected to encourage water pollution victims to file more class actions in court.

Much Tougher Fines and Innovative Penalties

In order to deter pollution, the amount of the fines has been raised in the new law. Firstly, the limit on the maximum amount of fines on entities causing water pollution incidents has been lifted (Art.83 WPPCL, 2008). In the 2008 version of the law, fines up to 200,000 or 500,000 Yuan are quite common, a two to five times increase. In article 83, for entities violating the law and causing a water pollution incident, a fine will be imposed upon polluting entity as mentioned before. The new law also expands the enforcement measures that can be taken by EPBs. The 2008 WPPCL adds several new enforcement measures to better equip EPBs with handling violations, including both direct and indirect compulsory measures.

VI. IMPROVEMENT OF SEVERAL EXISTING SCHEMES

Control of the Total Discharge of Major Pollutants

The 2008 WPPCL specifies that provincial governments shall reduce and control the total discharge of major water pollutants in their administrative regions, and have the municipal or country governments bear the corresponding responsibility to reduce and control the total discharge of major water pollutants.

Water Pollutant Discharge Permit System

The new law formalizes the system by requiring entities directly or indirectly discharging industrial and medical waste and entities operating facilities to treat urban sewage to obtain pollution discharge permits (Art. 20 WPPCL, 2008). Currently, the State Council is drafting regulation to implement the pollutant discharge permit system, expected to be ready early next year.

Enhanced Protection of Drinking Water Sources

Provisions on protecting drinking water sources are made much more detailed in the new law, which has improved the management system for a drinking water source protection zone. The new law mandates that no pollution outlet be set up in a drinking water source protection zone (Art. 57 WPPCL, 2008).

VII. CONCLUSION

China's enactment of the amended LPCWP in June 2008 has increased its ability to protect the country's waters. However, as in the past, China face many challenges in implementation and enforcement. As the State Council develops regulations for implementation of a nationwide water pollutant discharge permitting system, consideration of mechanisms for central governmental oversight of the permit process and enforcement may be critical to the effectiveness of the amended law. Increasing opportunities for public participation and further strengthening of penalties for noncompliance might enhance effectiveness as well. Each of these areas is critically important to successfully protecting China's waters

Despite all of the improvements mentioned above, there are legislative compromises throughout the process. One example is that the "penalty per day" for continuing violations did not make it to the new law. When the draft was in the process of revision, scholars and environmental protection officials in China advocated adopting this mechanism, but it was dropped from the draft as a result of compromise with other ministries and the business community. Another disappointment is article 88, which hints at permitting environmental public interest litigation but does not formally expand the standing to sue to NGOs who usually do not have a direct interest in the case. Although the new law is a small, but solid, step forward in expanding NGOs' role in environmental litigation, much bigger steps need to be taken in future.

Though there is comprehensive improvement in water pollution control law in the books, how these improvements will actually be enforced is still uncertain, considering the poor environmental enforcement record in China. Given the fact that the law has been in effect for little time and will not be revised again for at least another eight to ten years, it will be interesting to see what is going to happen in the next few years regarding China's water pollution and control efforts.

However, there are some common problems in the implementation of these measures. Firstly, local governments often interfere in environmental pollution issues under the ideology of local protectionism. Secondly, some EPBs have corruption problems such as embezzling pollution discharge fee. Thirdly, many enterprises carry out pollution control passively partly because of low environmental awareness. Fourthly, enforcement of some measures may be lack of flexibility or long-term effectiveness. Finally, insufficiency of environmental supervision capacity limits the effectiveness of these measures.

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