

Policy changes of environmental management in China as a learning process: where should it go?

Hongyun Han, Sheng Xia

¹ *Corresponding author: Hongyun Han, 866 YuhangTang Road, Qizhen Building, ZijinGang Campus Zhejiang University, Center for Agricultural and Rural Development, Hangzhou, Zhejiang, 310058, China. Email: Hongyunhan@zju.edu.cn*

Abstract: The historical evolution of environmental institutions in China can be attributed to both endogenous factors of environmental degradation, performance deterioration, and financial non-viability, and exogenous factors of macroeconomic crisis, political reform, natural calamities, technological progress, and international pressure. Accompanying the process of institutional evolution, it is a learning process of policy making from technical learning to social learning. Although the creation of Ministry of Environmental Protection has enlarged the environmental protection apparatus' regulatory domain and has enhanced interagency coordination and its formal authority, efforts to integrate capacities for conceptual and social learning of establishing a new model of a resource saving and environmentally friendly society have had mixed success because the institutional and legal framework is still founded on technical learning. Overlapping functions of environmental agencies, poor law enforcement, lack of public participation, the inertia of regulation for agricultural NPS pollution, and the threat of nonpoint pollution from solid wastes are the fundamental cause for the ineffectiveness of environmental management. To strengthen the effectiveness and efficiency of environmental institutions and policies, it is critical to create an effective enforcement system based on an impartial judiciary, reduce the level of discretionary power of supervisors, and to provide for a greater role for civil society in environmental decision-making.

Key words: Policy changes, Environmental management; learning process

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Corresponding author: 866 YuhangTang Road, Qizhen Building, ZijinGang Campus Zhejiang University, Center for Agricultural and Rural Development, Hangzhou, Zhejiang, 310029, China. Email: Hongyunhan@zju.edu.cn

0. Introduction

Associated with massive reforms in administration, the Chinese Government has made environmental protection one of its priorities to sustain its socioeconomic development. Although concept of scientific development has been proposed as an idea of sustainable development in China with a stress on harmonious development through balancing economic and environmental goals (Harris and Udagawa, 2004), it is not questionable that the high-growth and resource-intensive development strategy has facilitated environment degradation, the reason for environmental deterioration deserves a thorough analysis because China is supposed to challenge the earth's environment limits (Brwon and Christopher, 1996; Harris and Udagawa, 2004) by deeply affecting "global patterns of resource production and consumption and their associated environmental and geographical impacts"(Grumbine, 2007 p.249). Fundamental causes for the ineffectiveness of environmental management deserve a thorough analysis, which could distill lessons for future policy formation. "While awareness of the importance of organizational adaptation has intensified, the factors that facilitate or hinder adaptation have attracted little attention"(Keister, 2002 p.459), "many of the fundamental elements of such learning remain conceptually unclear and, as a result, the entire phenomenon of experience-induced policy change remains difficult to operationalize" (Bennett and Howlett 1992 p.276).

In the course of pursuing sustainable development in China, a fairly comprehensive policy and institutional framework for environmental management have been developed based on a capacity of institutions to learn from their own and others' experience. "The need to carefully examine the often implicit theories of history behind identified patterns of policy development has only been recently recognized"(Howlett and Rayner, 2006 p.1). By identifying factors underlining institutional adaptation of environmental management in China, this paper will provide a guide to where future institutional system should go. Two main goals are pursued in this paper, one is a better understanding on the nature of institutional evolution of environmental management in China and how it comes about; the other is to review the salient features of environmental policy design. Based on a narrative analysis of administration, regulatory system and policies of environmental management, endogenous and exogenous factors underlying historical evolution of environmental management has been figured out. Section II focuses on the challenging issues facing institutional adaptation of environmental management. Section III is a conclusive implications.

1. Method adopted in this paper

1.1 Institutional arrangements and policy formation

Institutions are the interaction of laws, policies, and administration (North,1984). Administrative organizations are designed to realize the objectives of their creators, environmental administration is the result of interacted institutional constraints and objectives of given organizations. A policy instrument is the specific means designed and used to fit particular organizational and political contexts (Weimer, 1992), it is codetermined with endogenous economic variables within an integrated political-economic structure (Dolowitz and Marsh, 2000; Jordan et al., 2000). Therefore, "institutional structure and political circumstance determine policy design" (Koski, 2007 p.414). The change of a policy instrument often requires complex administrative procedures (Huppes and Simonis, 2009). Three inter-related aspects of legal framework, policy environment, and administrative arrangement should be examined carefully in an analysis of institutional adaptation (Adler, 2000).

Environmental policy making is "involving scientific, technical, legal, policy, and social issues", and policy markers are "implementers of ideas, information, and analysis that influence choices"

instead of “passive forces driven by political and interest group pressures” as a response to changes in problems, the emergence of new constituency groups, a catastrophic event, globalization of domestic issues, and budget constraints (Fiorino, 2001 p.322). Instead of focusing attention on the organizational levels between problems and decision-makers, more attention should be given to “the possibility of altering and crafting organizational forms and interrelationships”(Weimer, 1992 p.376). Such analysis of the transmission of communicable and tacit knowledge is a basis for deep understanding on where future environmental policy should go in China.

1.2 Method adopted in this paper

Generally speaking, three models of advocacy coalition framework, institutional rational choice, and politics of structural choice have been developed in the exploration of policy learning process (Sabatier, 1988). Advocacy coalition framework theory believes that a policy change is the result of varying socioeconomic conditions, systemic governing coalition, and policy changes in other subsystems, but fails to exploring “the processes that determine when policy change actually will take place”(Mintrom and Vergari, 1996 p.422). Institutional rational choice can be explained as “a family of frameworks focusing on how institutional rules alter the behavior of intendedly rational individuals motivated by self-interest” (Sabatier, 2007, p.8). The institutional rational choice approach perceives a policy to be the result of interactions between institutional rules and rational people who are guided by their self-interest, which concentrates on the manner on which institutional rules affect individual behaviour that is motivated by materialistic self-interest. Politics of structural choice argues that institutional change occurs through a political system (Dolowitz and Marsh, 1996) with a special attention to the role of operational, collective, and constitutional levels of action in policy changes(Schlager, 1988). An important determinant of instrument design is the “ideological positions and prior beliefs regarding the likely consequences of reforms”(Gilardi, 2010 p.651). Politics of structural change argues that policy process in essence is social construction, in which facts and primacy values could be best understood through an examination of narratives (Jones and McBeth, 2010 p.331).

Policy-making is “constrained by a variety of social, legal, and resource features of the society”(Sabatier, 1988 p.134), as well as “problem definition and institutional capacity”(Johns, 2001 p.2). The uncertainty of policy decisions makes it relatively simple and inexpensive for governments to gain new information simply by observing the results of particular policies in other countries (Meseguer, 2005). It is critical for policy designers “to take time to see what has and has not worked in the past”(Davies and Mazurek, p.iX 1998), history “contains many lessons that can provide useful information for contemporary policy makers”(Snowdown and Vane, 2005 p.584) because the determination of policy outcomes is contingent on structural factors such as historical timing and policy-relevant events (Howlett and Rayner, 2006). The only specific technique on the craft of policy design is to map backward from the behavioral problem of concern through the levels of organizational hierarchy to the policy designer (Weimer, 1992).

Policy narratives could be an important input in policy learning because “the power of a good story is likely to shape subsystem policy learning and outcomes”(Shanahan et al., 2011 p.549). Hence, historical policy narratives are employed in the analysis of policy changes of environmental management in China as a learning process. Special attention is given to the evolution of environmental administration because the environmental protection agency is especially important “because of its central role in the development of administrative procedures”(Kochtcheeva, 2009 p.243). The historical adaptation of environmental management in China have been roughly grouped into four

phases due to structural features of institutional arrangement, the first phase is from the 1950s to 1983; the second is from 1983 to 1989; and the third is from 1989 to 1998; the fourth is from 1998 to 2008. A detailed examination on the process of historical institutional evolution of environmental management will provide a basis for future policy design for China and other economies facing similar challenging issues.

2. Driving forces for institutional evolution of environment management in China

2.1 The emergence of environmental consciousness (from the 1950s to 1983)

After the establishment of the *People's Republic of China* in 1949, an ambitious socialist movement was launched, in which peasant life was ideologically interpreted as the central to political discourse with a strong state control over land use decisions and environmental management (Muldavin, 2000). This situation totally changed from 1966 through 1972 with a particular emphasis on industrial expansion and grain production. To fight against environmental impact of industrial expansion, important programs had been put forward, including the introduction of *A Policy for Comprehensive Utilization of Industrial Waste* in 1956, the *State Council Provisional Program on Water and Soil Protection* in 1957 to deal with soil erosion, the 1962 *State Council Directive Concerning the Active Protection and Rational Use of Wildlife and Natural Resources*, and the mid-1960s *State Council Directive on Strengthening the Work of Purchase and Utilization of Waste Products*.

“International concern for the environment has had an increasing bearing on environmental politics in China”(Jahiel, 1998 p.786).The *Environmental Protection Leading Group of the State Council* was created in 1974 mainly as a response to the first world Stockholm Conference on the Human Environment in 1972 and also a result of several serious environmental accidents of dead fish found in the polluted Guanting Reservoir, died sea life in the polluted Dalian Bay, and Minamata disease in the Songhua River. Then *Offices of Environmental Protection* were created at provinces, cities, large and medium-sized townships. Although all these organs were not members of administrative authorities, the establishment of management organs has led to some measurable successes, particularly in the control of emissions from large state-owned enterprises.

Since the beginning of the 1970s, a large number of environmental laws and regulations has been enacted or amended directing at controlling the industrial emissions of air and water pollution. *The tentative and draft of Several Rules on Protecting and Improving the Environment* in 1973 provided a basis for environmental protection, which was extended in 1974 to the maritime sphere via *the Provisional Regulations on the Prevention of Pollution of Coastal Waters*. The most important rule of *the Three Synchronizations* was put into practice in 1973, which required that pollution treatment facilities be established associated with the design, construction and operation of a project. A fee on pollution discharges was first imposed in 1978 though penalties for violating the standard were small, and effective enforcement was not possible due to the lack of bureaucratic expertise.

To legalize the environmental protection programs, the *Constitution of the People's Republic of China* was issued at the first meeting of the Fifth National People's Congress (NPC) in July of 1979 as the first constitutional regulation on environmental protection. The article 11 stated the role of Central Government was to protect the environment and natural resources, and to prevent and eliminate pollution and other hazards to the public. During the formative phase of the 1950s to 1983, the main goal of environmental administration was the protection of commercial utilization and public health. In the context of the ideology of this era, China did not have an environmental policy because pollution was

believed to be a phenomenon of the western capitalistic society. International actions as well as new environmental disasters have increasingly affected the directions of environmental protection (Davies and Mazurek, 1998).

2.2 The development of quasi-ministry SEPA and regulatory system (from 1983 to 1989)

The second phase started in 1983 at the second National Conference on Environmental Protection. During the reform of administration in 1982, the Environmental Protection Leading Group of the State Council was displaced by the Ministry of Urban and Rural Construction. Meanwhile, the State Environmental Protection Administration (SEPA) was created and worked as an independent organ of but under the leadership of Ministry of Urban and Rural Construction and of Environmental Protection (MURCEP). MURCEP was the first administrative organ of environmental management under the leadership of State Council. To enhance formal administrative authorities of environmental protection, the *State council Commission on Environmental Protection* and *Monitoring Station of Environmental Protection* were established in 1984 under the umbrella of NPC of China (See Figure 1).

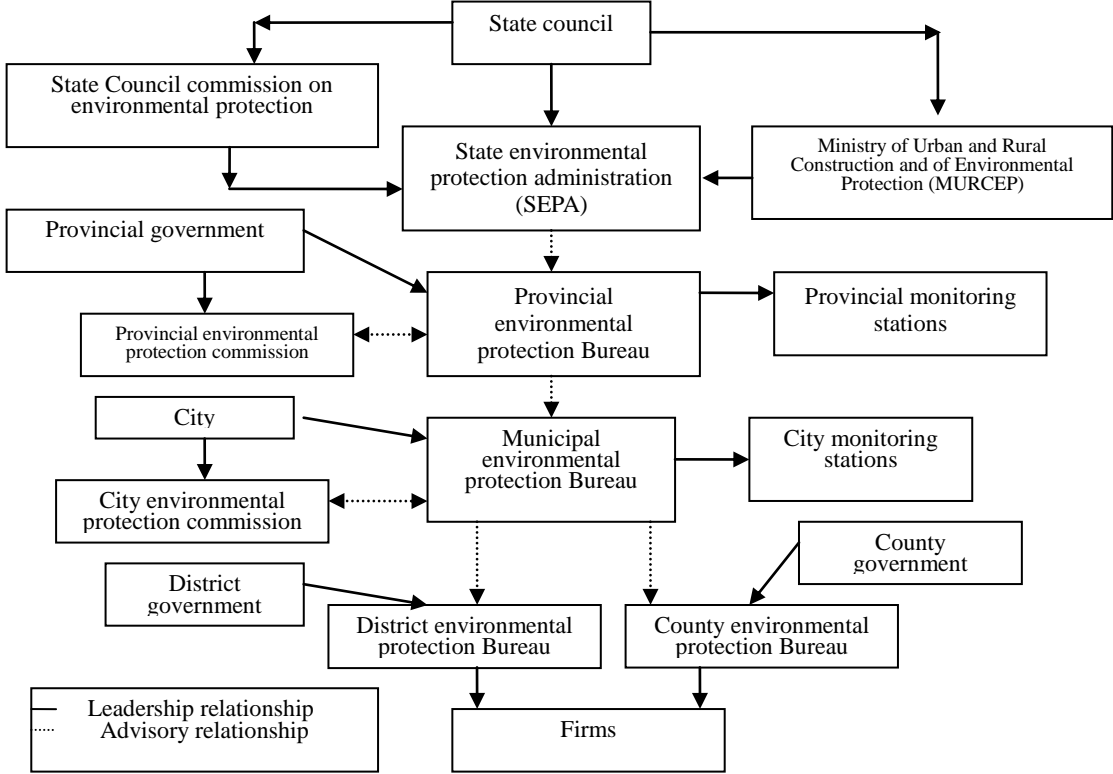


Figure 1 The Chinese environmental protection apparatus from 1983 to 1988

The SEPA was the highest administrative organ responsible for developing environmental policies, drafting environmental laws, regulations and standards, overseeing environmental management, designing and conducting environmental education and publicity programs. SEPA was replicated as *Environmental Protection Bureaus or Offices* down through successively lower levels of the administrative hierarchy at the provincial, city, district, county, and township levels. *Environmental Offices in Industrial Ministries and Factories* were technical offices which monitored industry-specific pollutants and factory wastes and helped develop industry-or factory-specific waste treatment regulations and procedures. *Environmental Monitoring Stations* were also professional units at all levels of the Chinese government, which collected technical data on

environmental quality and provided this information to environmental agencies. Provincial environmental protection Bureau and Municipal environmental protection Bureau were the primary local agencies responsible for enforcing national environmental laws and policies, setting local pollution standards, investigating environmental accidents and mediating environmental disputes. The provincial governments had a mandate to govern all aspects of social and economic affairs in their jurisdictions through subordinate branches and offices of the ministries and bureaus at the provincial level or below. Financial resources for city environmental bureaus were also provided at the local level (Tang et al., 1997).

Regulatory policy design is highly technical, requiring significant bureaucratic expertise, yielding a concomitant delegation of substantial policymaking authority to bureaucrats (Gerber and Teske, 2000 p.852). Since the late 1970s China has enacted a dozen environmental and related statutes, dozens of regulations and several hundred standards, such as *Ocean and Sea Environmental Protection law* in 1982, *Wildlife Protection law* in 1988, *Control Standards for Pollutants in Sludges from Agricultural Use* in 1984, *Grassland Law* in 1985, *Fisheries Law* in 1986, and *Mineral resources law* in 1986. All these regulatory laws focus on specific aspects of natural resources due to the constraint of existing separated institutional arrangements.

There was a transformation from an administrative instrument first to a legal system and second to the integration of economic instruments within the legal system (Jahiel, 1998). Chinese Government still gave explicit priority to economic development (Palmer, 1998), environmental protection was not a separate chapter until the Sixth Five-Year Plan from 1980 through 1985 (Ross, 1998). From 1972, China stated the need to incorporate the environment in the national planning process. However, economic instruments were only supplementary ones of direct regulative system, especially concentration-based discharge standards. Degraded environment pushed the elevation of SEPA a quasi-ministerial organization. However, the authority resided with MURCEP had resulted in scattering responsibilities among different departments. Policy makers defined problems almost entirely on the basis of the pathways in which harmful exposures occurred, authorities and organizations were created to deal separated issues of water, air, sea, fisheries, and grassland. The core strategy of policy making was to control pollution at the pipe-end with required technologies. By adopting a narrow view of environmental problems, policy makers separated environmental protection from economic development.

2.3 SEPA as an embedded component of MURCEP and integration of environmental policies into economic plans (from 1989 to 1998)

The third phase began with the third National Conference on Environmental Protection in May of 1989. The SEPA was funded by and operated under the direct leadership of the State Council as an embedded component of the MURCEP until being upgraded in March 1998. As a quasi-ministerial organization, SEPA worked to the orders of the State Council, and was primarily responsible for a process of uniting environmental protection bureau with local bureaus of Urban and Rural Construction at provincial levels and below to integrate management of urbanization and environmental conservation. "The post of Inspector of Environmental Protection, created in 1989, has responsibility for conducting independent investigations into cases of pollution, supervising compliance with environmental standards by state enterprises, issuing warnings or fines to polluters on behalf the EPBs, and bringing suits in the people's courts on behalf of the state or citizens" (Palmer, 1998 p.794).

The environmental policy problem had grown from a concern with large industrial sources of air and water pollution to a far more complex set of issues: the generation and movement of hazardous materials, the effects of agriculture and energy production and use, the long-term effects of changes in climate and losses in biodiversity, and many others. *Environmental Protection law* was for trial implementation in 1979, and formally implemented on December 26 in 1989. All units were obliged by Article 24 to incorporate environmental protection into their economic plans, the “polluter pays principle” was stressed in Articles 28, 30, 39, 31 and 41. *Law on prevention and control of water pollution* was issued in 1984, and formally implemented in 2000. This law stipulated that SEPA and the EPBs would supervise and manage the prevention and control of water pollution, dealing with qualitative aspects of water resources. In 1989, the State Council approved *Implementation Regulations for the Law of Water Pollution Prevention and Treatment*, trial period ended in 1994. To resolve issues relevant to water pollution, industry permit systems, close down policy of heavily polluted firms, and centralized wastewater treatment plants had been adopted (World Bank, 2006), *Provisions on Strengthening Environmental Protection of Township Enterprises* were issued on March 5 in 1997.

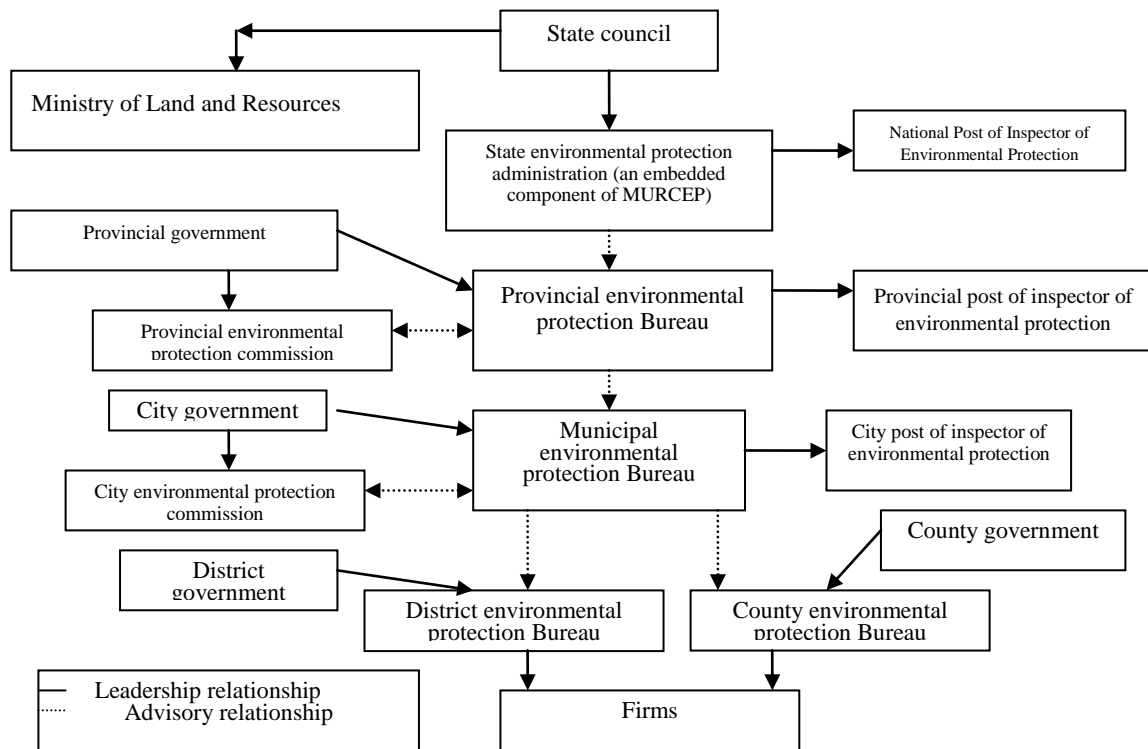


Figure 2 the Chinese environmental protection apparatus from 1989 to 1998

A series of laws had been formulated and implemented especially after the United Nations Conference on the Environment and Development in 1992 at Rio de Janeiro. *The Ambient Pollution Protection and Control Law* was issued in 1987 and amended in 1995. *Law on prevention and control of air pollution* was issued in 1987, amended in 1995, 2000 and 2002. *The Law on the Prevention and Control of Atmospheric Pollution* was formulated on August 29 of 1995; *the Law on Prevention and Control of Pollution from Environmental Noise* was enacted on October 30 of 1995. *The law on Preventing and Controlling Environmental Pollution caused by Solid Waste* took effect in April 1996 against a background of several serious incidents in which foreign hazardous wastes had been shipped to China. Since 1989 the ecological destruction compensation has been introduced in the form of product charge

(Wang, 1994). The State Council for International Cooperation on Environment and Development, established with financial support from Canada in 1992, provided a formal avenue for the communication of international advice to the Chinese Government (Ross, 1998;Palmer, 1998).

While the State Commission on Environmental Protection was abolished in March 1998, a new organ of the Ministry of Land and Resources was set up on April 8 in 1998 in the restructuring process of the State Council, which had facilitated land and natural conservation and led to proclamation of laws related to water and land management. *Law on land administration* was issued in 1987 and amended in 1990. *Law of the People's Republic of China on Water and Soil Conservation* was issued on June 29 in 1991. *Water law* was issued in 1988, amended in 2002, which “prescribes Ministry of Water Resource and Water Resource Bureaus are in charge of the administration and supervision of quantitative aspects of water resource management”(World Bank, 2006 p.24). The two fundamental laws concerned water resource management failed to resolve functional overlaps with respect management issues of water quality and quantity.

Although it was still facing the issue of staff shortages, conflicting local government priorities and rivalries with other government agencies (Ross, 1998), the elevation to ministerial rank in 1998 of SEPA had undoubtedly strengthened the national capacity for dealing with environmental issues. The main units for policy implementation were the Environmental Protection Bureaus. Those bureaus generally follow the regulations of their own ministries and committees when the ideas of the national SEPA and its own ministries differ. Little integration and cooperation among the administrative entities in the vertical hierarchy has become a great barrier for the effective implementation of environmental protection programs(Jahiel, 1998).

It is a definitive characteristic of technical learning with an emphasis on hierarchy and control, it continues with the internal allocation of responsibility, in which the agency's political leadership defines goals and decision premises for lower levels. Although a process of conceptual learning has started by the end of 1990s, environmental protection policies have moved from post-pollution treatment to a new phase of emphasizing the harmony of economic, social and environmental benefits, there was a heavy reliance on direct regulation. This phase was characterized by a high degree of technical and legal proficiency, but narrow problem definitions, institutional fragmentation, and adversarial relations among actors. The applied environmental economic policies themselves have not become a system and the contents of the policies were mainly the pollution levy system, reward and premium for comprehensive utilization of resources .Authorities and organizations at same levels were created to deal separately with air, water, waste, toxics, and land, especially water pollution. The separation of air, water, and waste strategies often shifted problems from one medium to another.

2.4 The establishment of MEP and united policies (from 1998 through 2008)

Although much advancement achieved at the third phase, several problems still existed. The great flood in 1998 and increasingly serious dust storms threatened the life and property of the Chinese people. Coincidentally, the 2008 Olympics in China had promised to hold an ecologically sound event. All these have led to the establishment of Ministry of Environmental Protection(MEP)(see Figure 3).

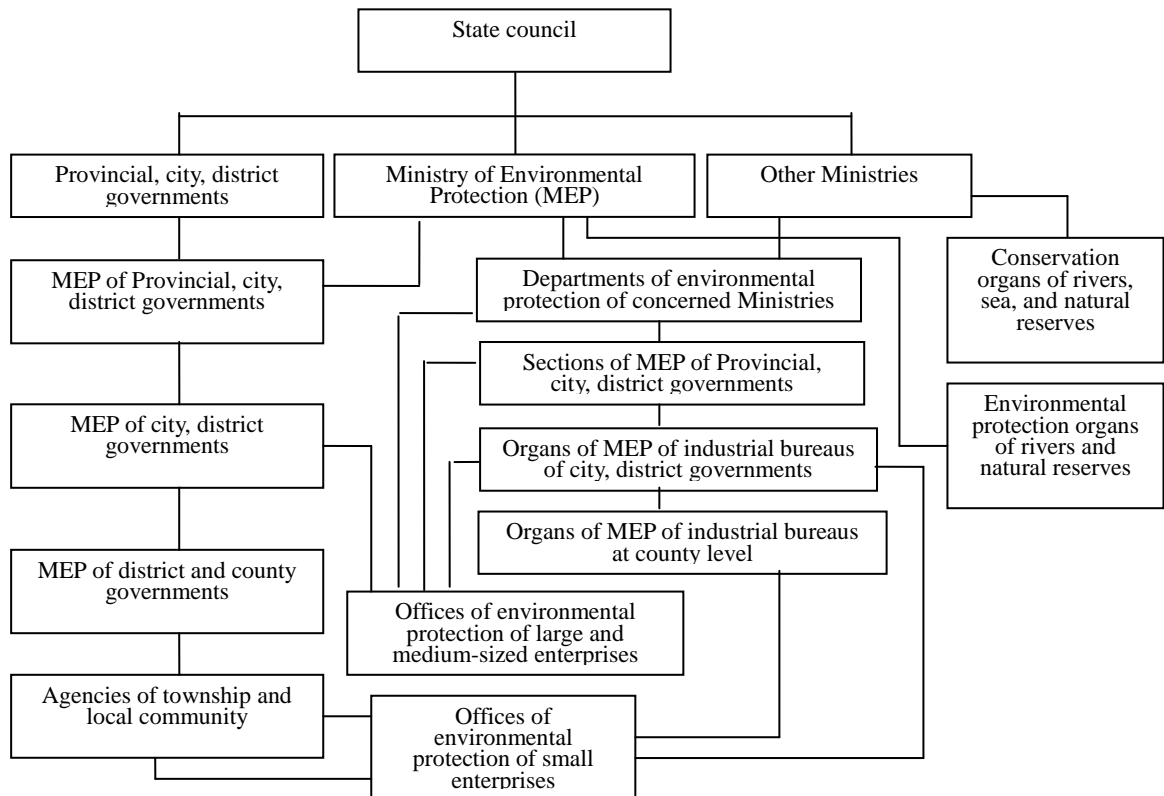


Figure 3 Chinese environmental protection apparatus since 2008

Source: http://english.mep.gov.cn/About_SEPA/Internal_Departments

“The main mission of MEP is to develop and organize the implementation of national policies and plans for environmental protection, draft laws and regulations, and formulate administrative rules and regulations for environmental protection, take charge overall coordination, supervision and management of key environmental issues, and undertake other affairs delivered by the State Council” (<http://www.zhb.gov.cn/>). The provincial governments have a mandate to govern all aspects of social and economic affairs in their jurisdictions through subordinate branches and offices of the ministries and bureaus at the provincial level or below.

In 2003, the government of China proposed a new development concept emphasizing humanism and attempting to achieve sustainable development and harmony between man and nature, as well as coordinated socio-economic progress among various regions and with foreign countries. At the international level, China has also participated in treaties such as the Convention on Biological Diversity and the UN Millennium Development Goals, which include poverty alleviation, environmental protection and sustainable development. All observers believe that the capability of the central SEPA has improved significantly since 1999, urban infrastructure for environmental protection for Three Synchronizations occupied main part of total investment. Three new policy directions were announced in April of 2006, including integrating environmental protection and economic decision-making on an equal footing, further decoupling pollutant emissions from economic growth, and applying a mix of economic and administrative instruments to resolve environmental problems. In particular, spending on environmental protection is increasing at a fast pace. In 2010, pollution abatement and control investment expenditure was up to 1.66% of GDP. The total expenditures of environmental pollution control increased from 1010.3 billion CNY in 2000 to 9575.5 billion CNY in 2014 (See Table 1).

Table 1 Selected environmental indicators in China-discharge and treatment of pollution

Items	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
1.1 Total investment of pollution abatement (100 Million Yuan)	-	-	1010.3	1106.6	1367.2	1627.7	1909.8	2388.0	2566.0	3387.3	4490.3	4525.3	6654.2	7114	8253.5	9516.5	9575.5
In which: investment in treatment of Industrial pollution sources	-	-	234.8	174.5	188.4	221.8	308.1	458.2	483.9	552.4	542.6	442.6	397.0	444.4	500.5	867.7	997.7
Investment in Environment components for Three simultaneity new construction projects	-	-	260.0	336.4	389.7	333.5	460.5	640.1	762.2	1367.4	2146.7	1570.7	2033.0	2112.4	2690.4	2964.5	3113.9
Urban infrastructure for environmental protection	-	-	515.5	595.7	789.1	1072.4	1141.2	1289.7	1314.9	1467.5	1801.0	2512.0	4224.2	4557.2	5062.7	5223	5463.9
1.2 The ratio of pollution abatement to total GDP in the year end (%)	-	-	1.02	1.01	1.14	1.20	1.19	1.30	1.22	1.36	1.49	1.33	1.66	1.5	1.59	1.67	1.51
Waste water																	
Volume of industrial waste water discharged(100 Million tons)	200	197	194.2	202.6	207.2	212.3	221.1	243.1	240.2	246.6	241.7	234.4	237.5	230.9	221.6	209.8	205.3
Percentage of industrial waste water up to the discharge standards (%)	61.4	66.7	76.9	85.2	88.3	89.2	90.7	91.2	90.7	91.7	92.4	94.2	95.3				
Volume of living waste water discharged(100 Million tons)	195	204	220.9	230.2	232.3	247.0	261.3	281.4	296.6	310.2	330.0	354.7	378.9	427.9	462.7	485.1	510.3
Waste gas																	
Volume of industrial waste gas emission(100 million cu.m)	121203	126807	138145	160863	175257	198906	237696	268988	330990	388169	403866	436064	519168	674509	635519	669361	
Volume of sulphur dioxide emission(10000 tons)	2091	1857	1995.1	1947.2	19276.6	2158.5	2254.9	2549.4	2588.8	2468.1	2321.2	2214.4	2185.1	2217.9	2117.6	2043.9	1974.7
Soot (Dust) emission(10000 tons)	2776	2334	2257.4	2060.5	1953.7	2069.8	1999.8	2093.7	1897.2	1685.3	1486.5	1371.3	1277.8	1278.8	1235.8	1278.1	1740.8
Solid waste																	
Volume of industrial solid waste produced (10000 tons)	80000	78400	81608	88840	94509	100428	120030	13449	151541	175632	190127	203943	240944	326204	332509	330859	325620
Comprehensive utilization rate of industrial solid wastes (%)	41.7	45.6	45.9	52.1	51.9	54.8	55.7	56.1	59.6	62.1	64.3	67.0	66.7	59.8	60.9	62.2	62.1

China Statistical Yearbook on environment 2011 p.14 p.55 p.83.; China Statistical Yearbook on environment 2011 p.12 p.43 p.44 p59 p.125.

BULLETINS OF ENVIRONMENTAL STATISTICS 2014. http://zls.mep.gov.cn/hjtj/qghjtjgb/201510/t20151029_315798.htm

A series of regulatory rules were issued after 1998. *The Law on the Promotion of Clean Production* was issued on June 29 in 2002 to promote cleaner production. The new pollution levy system was initiated in July 2003, including “new regulations on principles, charge basis, charge rate schedule, revenue, and use policies. The main change is the shift from a concentration-based to a total load charge system”(World Bank, 2006 p.20).The State Council distributed the 12th Five-Year (2011-015) *National Plan for Environmental Protection* on January 17 in 2012. The investment in environmental protection should prioritize eight key programs such as *The Reduction of Total Discharge of Major Pollutants*. Conceptual learning should involve a search for broader definitions of problems. MEP recognizes that cooperation across government departments and sectors is the key to the success of the new environmental framework, MEP is simply replicated down through successively lower levels of the administrative hierarchy at the provincial, city, district, county and, township levels. Most of the policies have been carried out by isolated administrative authorities, with little coordination among these bodies. “The legal system had been focused on industrial sources and has been unable to account for new water pollution problems, such as agricultural nonpoint and municipal sources”(World Bank, 2006 p.19).

3. Challenging issues over environmental management in China

3.1 Overlapping functions of environmental management

From 2008 responsibilities that had been scattered across the government were assigned to the new

MEP, the consolidation of environmental functions under one agency undoubtedly strengthened the national capacity for dealing with environmental issues. However, the various organizations responsible for implementing and supervising environmental policy have overlapping functions and unclear rights and responsibilities within the apparatus of environmental management. Economic decentralization has given officials at the provincial level and below incentives to develop their local economies and relax their environmental regulation to gain an advantage over other competitors for mobile capital competition. The promotion system based on the performance objectives of local leaders, the limited accountability to local populations have generally meant that economic priorities have over-ridden environmental concerns, the ability and effectiveness of the provincial, municipal, and county environmental protection bureaus are restricted by the commitment of the respective governments they account to. Irrespective of formal authority, powerful local actors still regards environmental interests as secondary to economic interests.

“One type of institutional weakness in the organization of environmental protection appears to be, as yet, insurmountable: the lack of coordination across jurisdictional boundaries”(Jahiel, 1998 p.779). Advances in formal authority do little to overcome structural features of the Chinese political system that tend to isolate government agencies at the same administrative level from one another. Many local authorities often lack the capacity for monitoring, inspection, and enforcement. The lack of regional institutional framework is the main hurdle to effective environmental management of transboundary issues (World Bank, 2006 p.20). The vertical hierarchy of the administrative entities results in little integration and cooperation among involved organizations. Confusion between law and local administrative regulation weakens the authority of law and aggravate the inefficiency of administrative regulation. Environmental law lacks the power of criminal punishment and its standards are seriously distorted. Ultimately, its implementation efficiency is seriously damaged.

3.2 Ineffectiveness of law enforcement resulting from unofficial activities

While MEP is the key to spearhead the implementation of national environmental protection policies and programs, the responsibility for environmental and natural resources management is shared by multiple agencies and jurisdictions. According to Jahiel (1998: 776) on this environmental bureaucracy: “the past 15 years has seen the assembly of an extensive institutional system nation-wide and the increase of its rank”. The ineffectiveness and inefficiency of environmental efforts could be attributed to a result of an implementation gap. The effectiveness of MEP to advocate and enforce policy interventions is significantly limited by its weak political power, limited human resources (See Table2), and the ineffectiveness of law enforcement resulting from unofficial activities. Institutionally, the national regulatory framework is vertically implemented through a four-tier management system of national, provincial, municipal and county levels. The latter three levels are governed directly by their corresponding authorities in terms of both finance and personnel management, while SEPA is only responsible for their substantial operation. The enactment of the various environmental laws, policy instruments and regulations was paralleled by a stepwise increase of the bureaucratic status and capacity of these environmental authorities. For instance, the NEPA was elevated via the National Environmental Protection Bureau to the National Environmental Protection Agency in 1988, and in 1998 it received ministerial status as SEPA. By 1997, the “environmental state” of China had got over 103180 employees across China and by 2014 it had grown to 215,000 employees.

Table 2 Basic statistics on environmental protection

Items	Number	of	Scientific	Monitoring	Supervising and	Total number of	Monitoring	Supervising
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	Agencies(Unit)	and research institutions	station	administrative station	staff and workers(10000 persons)	personnel	and administrative personnel
1997	9207	205	2138	2142	103180	36773	20449
1998	9167	197	1926	2003	105932	34857	22567
1999	10811	226	2203	2398	121049	40105	28039
2000	11115	240	2250	2552	131092	40674	31228
2001	11090	246	2229	2567	142766	43269	37934
2002	11798	269	2356	2693	154233	46515	41878
2003	11654	263	2305	2795	156542	45813	44250
2004	11555	266	2289	2800	160246	45849	47189
2005	11528	273	2289	2854	166774	46984	50040
2006	11321	260	2322	2803	17029	47689	52845
2007	11932	243	2399	2954	176988	49335	57427
2008	12215	244	2492	3037	183555	51573	59477
2009	12700	241	2535	3068	188991	52944	60896
2010	12849	237	2857	3068	193911	54698	62468
2011	13482	244	2703	3121	201161	56226	64426
2012	13225	326	2742	2898	205334	56640	61146
2013	14257	324	2754	2923	212000	58000	63000
2014	14694	323	2775	2943	215000	59000	63000

Source: The Ministry of Environmental Protection, a series of BULLETINS OF ENVIRONMENTAL STATISTICS from 1997 through 2014.

<http://www.zhb.gov.cn/zwgk/hjtj/qghjtjgb/>

At the center of regulatory system, it is the MEP. State Council is in charge of the resource management on behalf of its people. Local environmental protection bureaus at all levels have incomplete vertical relations with the national MEP. MEP relies on intermediate agents to seek agent-related information, which is essential to the implementation of environmental policy, local supervisors supervise units caused pollution to collect information and produce report of environmental protection. This vertical hierarchy of the administrative entities results in little integration and cooperation among involved organizations, and has become a great barrier for the effective implementation of environmental protection programs due to complicated principal-supervisor-agent hierarchical structure.

During the process of information gathering, there are two kind of unofficial activities, collusion and abuse of authority. The regulator may get some information socially useful, which “is the source of his discretionary power”(Martimort, 1999 p.930).Discretionary power provides the basis for collusion and abuse of authority, abuse of authority is “more harmful than collusion”(Vafa i 2005 p.387). A supervisor uses possible discretion power to pursue personal benefits by colluding with the regulated partners, which is termed as abuse of authority; the bribe from the agent to the supervisor is termed as collusion. The regulator often uses possible discretion power to pursue personal benefits by colluding with the regulated agent (Tirole, 1986) to promote their collective benefits (Laffont and Martimort, 1998). High tax rates, onerous official regulations, predatory behavior by government officials, criminal gangs, and the inadequacy of the institutional environment are external factors resulting in collusion (Johnson et al., 2000). The existence of collusion in hierarchies benefits the agent rather than the supervisor (Vafa i, 2002). To overcome the possibility of abuse of authority, the core of policy making is to reduce the level of discretionary power through distribution of regulatory liability and technology among supervisors (Tirole, 1986; Laffont and Martimort, 1999). The abuse of authority of the supervisor is the fundamental origin of ineffective environmental protection in China.

3.3 The lack of public participation in EIA

Although the *Environment Impact Assessment(EIA) Law* on September 1st 2003 stated that

government units should ensure experts and the public participate actively in the environmental impact assessment process, there are gaps between law and practice. EIA law does not in itself offer any decision rule about acceptance or rejection of a policy or project. To expanding its application to cover development plans, Chinese government released the 2006 *Interim Guideline on Public Participation* in EIA to explore opportunities for public participation in the EIA process. In addition to interference by local governments, weak enforcement and follow-up capacity, and the poor quality of environmental impact statements, the full potential of China's EIA system is yet to be realized because of the lack of citizen participation, enforcement and conflicts of interest for the regulatory agencies.

“Members of an industry have more incentive than dispersed consumers with a low per capita stake to organize to exercise political influence”(Laffont and Tirole, 1991).Victims affected by pollution lack the means to advocate for environmental protection due to a grave imbalance in the power between those who own or operate firms and consumers. Elsewhere in the world NGOs have often proved critical in the development of environmental awareness and the utilization of legal mechanisms for promoting environmental standards. In many Western countries, citizens and environmental groups are given institutional channels to oversee regulatory processes, participation of stakeholders has become a core component of resource management programs. In China, few such channels exist for public participation in environmental regulation enforcement; more severely, the authorities are not keen to encourage an organizational form do to worries over political dissent. The existing approach is “entirely dependent on government agencies and does not take advantage of the potential for participation from the private sector and civil society”(World Bank, 2006 p.19). Grassroots environmentalism only appeared in urban areas and peasants were hardly involved during this period (Menziez 1991; Yeh, 2000).

3.4 The inertia of regulation for agricultural NPS pollution in China

Traditionally, Chinese peasants have a nice and simple environmental protection consciousness, such as “harmony between the heavens and humankind”. During China's period of socialist agriculture (1952-78), peasants became the main force who fought against heaven and earth and tried to conquer and remake nature (Muldavin, 2000). Under Deng, peasants cultivated new value orientations that include “looking toward money in everything” (Shapiro, 2001). Agriculture has become extremely intensive by using more inputs of inorganic fertilizers and chemical pesticides (Li and Zhang, 1999). In China, about 1/3 of water pollutants are from agricultural activities due to the intensive application of inorganic fertilizers and chemical pesticides. Although there are some pilots of recycling practices, measures of point source(PS) pollution are employed to address NPS pollution issues in China (Zhang et al., 2004), technology innovation is the core of NPS policy design (Zhang and Zhu, 2006). The fact that huge amount of small farmers are not involved in environmental policy regulatory system makes the conservation of improving the rural ecological environment extremely arduous in China (Menziez, 1991; Yeh, 2000).

Since 1989, the ecological destruction compensation has been introduced in the form of product charge (Wang, 1994). China's ecological modernization is primarily limited to technical dimensions of sustainable development rather than the more political innovations, little attention has been given to equity, equality and citizen empowerment, especially the political process that enable the insertion of ecological phenomena into ecological modernization process (Yep, 2009). There is evidence that farmers have plagued with nitrate pollution due to over-applied fertilizers (Tucker and Napier, 2001), in the absence of policy frameworks and appropriate institutions, farmers are reluctant to adopt environmental conservation activities (Zhu et al., 2005). As an example of ambitious payment for environmental services programs to individual farmers in China(WWF, 2003), the Sloping Land Conversion Program

(SLCP) was initiated in 1999 to establish forests and grasslands on vulnerable croplands, especially in the Yellow and Yangtze Rivers (Hou et al. 2002). Yet little has been understood about the relationship between environmental improvement and economic situation of local farmers who were affected by the SLCP (Cao et al., 2009). It is urgent for future policies to integrate policy programs into over goals of environmental conservation and income improvement.

3.5 The threat of nonpoint pollution from solid wastes

Urbanization – in terms of both the physical expansion of cities and the growth of population living in them -- has been an important feature of China’s remarkable economic transformation. Together with a rapid increase in the number and size of towns and cities, till 2012, about 53.73 % of China’s population have urbanized, it is believed that about 100 million people will settle in towns and cities by 2020. Increasing urbanization had lead to the expansion of small towns which have been reclassified as cities, rising urbanized population and living standards have substantially accelerated the generation of municipal solid waste (MSW) (Jin et al., 2006; Zhang et al., 2010; Al-Khatib et al., 2010). As the largest developing country, China has become the world’s largest MSW generator (World Bank, 2005; Zhang et al., 2010). Solid waste is broadly classified into three types: industrial solid waste, municipal solid waste, and hazardous waste. With the continuing growth of the economy and urban population, the amount of MSW generated in China has increased rapidly in the past 30 years from 31.32 million tons in 1980 to 170.81 million tons in 2012 at a 5.7% average annual growth rate (See Figure 1). Although ratio of industrial solid wastes reutilized was increased from 41.7% in 1998 to 61.5% in 2012; by contrast, the ratio of MSW harmlessly treated had increased from 60.0% in 1998 to 84.9% in 2012. By the end of 1998, China’s accumulated volume of MSW totaled about 6 billion tons, occupying 50,000 hectares of land, and more than 200 of the 660 cities had been caught in “garbage siege” and a quarter of 660 cites has grown to no place for garbage dump (Wang, 1999).

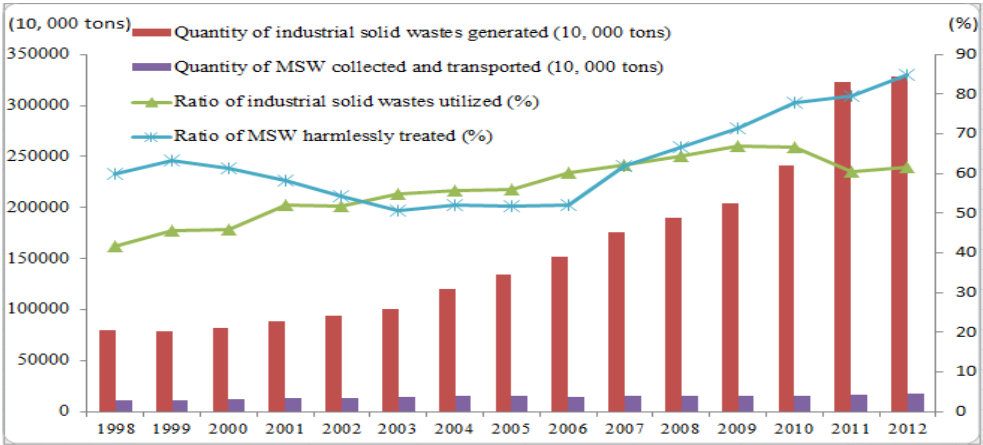


Figure 1 Present situation of solid waste recycling in China

Figure 2 plots the volume of MSW from 1980 to 2012, together with the MSW per capita, and urbanized population as well as per capita GDP for the same period. With the increase in per capita GDP, total MSW has risen as a result of rising urbanized population. However, MSW per capita peaked in 1995, and then declined as income increased over time. There is an inverse relationship between the generation of MSW per capita and GDP per capita, as stated by Kuznets rule. China is facing a big challenge of MSW management, more than one third cities in China are besieged by MSW, and this is spreading into countryside with the concentration of rural population (People’s Daily, 2013).

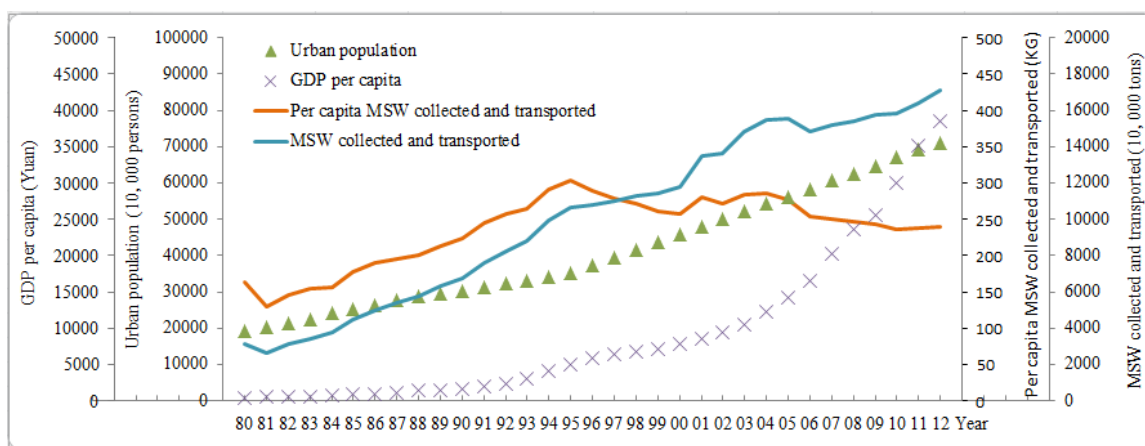


Figure 2 The trend of MSW collected and urban development in China

4. Conclusions

During the formative phase of the 1950s to 1983, the goal of environmental administration was the protection of commercial utilization and public health without any environmental policy because pollution was thought to be the result of the western capitalistic society. At the period of SEPA as an independent organ of MURCEP from 1983 to 1988, China stated the need to incorporate the environment into the national planning process. At the period of SEPA as an embedded component of MURCEP from 1989 to 1998, Chinese environmental protection policies moved from post-pollution treatment to a new phase of emphasizing the harmony of economic, social and environmental benefits. At the period from 1998 to 2008, establishing a new economic and social development model of a resource saving and environmentally friendly society was written in the 11th FYP (2006-2010). Socioeconomic factors have led to the change of environmental administration from a quasi-ministry organization to MEP in China, in particular, national conferences at which important policies and institutional arrangements took place.

As a result of historical evolution, the elevation of SEPA to the Ministry of Environmental Protection has enlarged the environmental protection apparatus regulatory domain and enhanced interagency coordination and its formal authority. However, China's environmental management efforts have not been sufficient because the implementation of environmental management has not been supported by important changes in environmental governance structures, environmental regulatory system, institutional capacity building and raising environmental awareness among society. China has established a basic regulatory framework for environmental protection. Lack of strict observation of laws, poor law enforcement and supervision, lack of public participation, the inertia of regulation for agricultural NPS pollution, and the threat of nonpoint pollution from solid wastes are the fundamental reason for enforcement ineffectiveness of environmental management. To strengthen effectiveness and efficiency of environmental institutions and policies, there is a need for much stronger monitoring, inspection and enforcement capabilities, as well as broad problem definition. Top on the priority now is the drafting of regulations enforcement.

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Table 1 Investment in environmental pollution control (unit: 100 million yuan)

Year	The environmental infrastructure construction	urban industrial pollution control investment	three simultaneous" environmental investment	Total investment of pollution abatement
2001	595.7	174.5	336.4	1106.6
2002	785.3	188.4	389.7	1363.4
2003	1072.4	221.8	333.5	1627.3
2004	1141.2	308.1	460.5	1909.8
2005	1289.7	458.2	640.1	2388.0
2006	1314.9	483.9	767.2	2566.0
2007	1467.8	552.4	1367.4	3387.6
2008	1801.0	542.6	2146.7	4490.3
2009	2512.0	442.5	1570.7	4525.2
2010	4224.2	397.0	2033.0	6654.2
2011	3469.4	444.4	2112.4	6026.2
Growth rate (%)	-17.7	11.97	3.9	9.4

China Statistical Yearbook on environment 2012 p.133. compiled by National Bureau of Statistics Ministry of environmental protection

Table 2 Components and sources of waste water in China in 2011

Source	Total	Industrial	Agricultural	Living of citizenships	Centralized pollution treatment facilities
Waste water(100 million tons)	659.2	230.9	-	427.9	0.4
COD(100 million tons)	2499.4	354.8	1186.1	938.8	20.1
Ammonia(100 million tons)	260.4	28.1	82.7	147.7	2.0

Table 3 Human resources of environmental administration

Items	Number of Agencies(Unit)	Scientific and research institutions	Monitoring station	Supervising and administrative station	Total number of staff and workers(10000 persons)	Monitoring personnel	Supervising and administrative personnel
1997	9207	205	2138	2142	103180	36773	20449
1998	9167	197	1926	2003	105932	34857	22567
1999	10811	226	2203	2398	121049	40105	28039
2000	11115	240	2250	2552	131092	40674	31228
2001	11090	246	2229	2567	142766	43269	37934
2002	11798	269	2356	2693	154233	46515	41878
2003	11654	263	2305	2795	156542	45813	44250
2004	11555	266	2289	2800	160246	45849	47189
2005	11528	273	2289	2854	166774	46984	50040
2006	11321	260	2322	2803	17029	47689	52845
2007	11932	243	2399	2954	176988	49335	57427
2008	12215	244	2492	3037	183555	51573	59477
2009	12700	241	2535	3068	188991	52944	60896
2010	12849	237	2857	3068	193911	54698	62468

Source: The Ministry of Environmental Protection, a series of BULLETINS OF ENVIRONMENTAL STATISTICS from 1997 through 2010. <http://www.mep.gov.cn/plan/hjtj/qghjtjgb/>

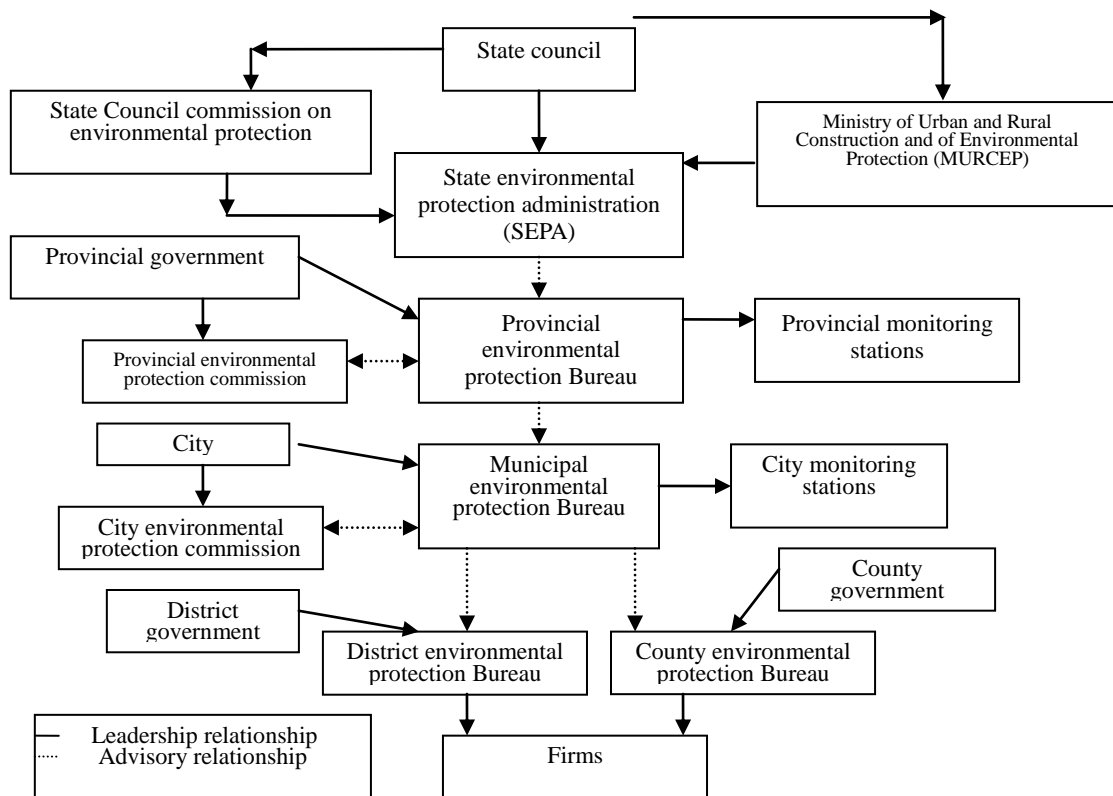


Figure 1 The Chinese environmental protection apparatus from 1983 to 1988

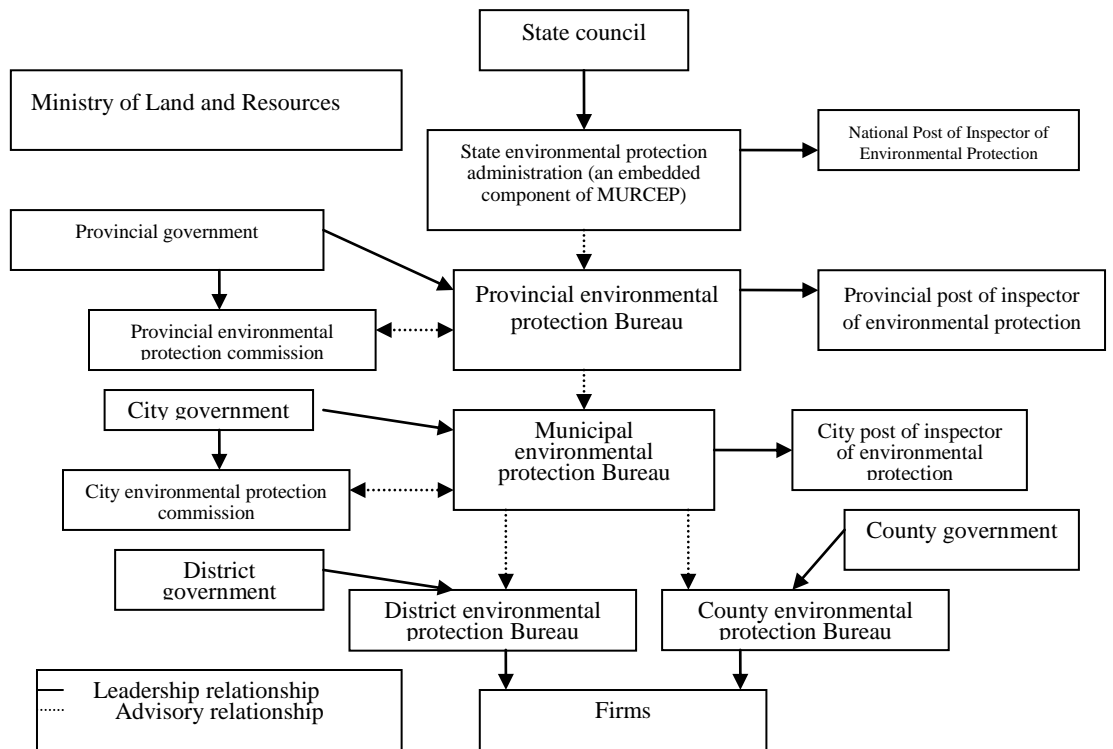


Figure 2 The Chinese environmental protection apparatus from 1989 to 1998

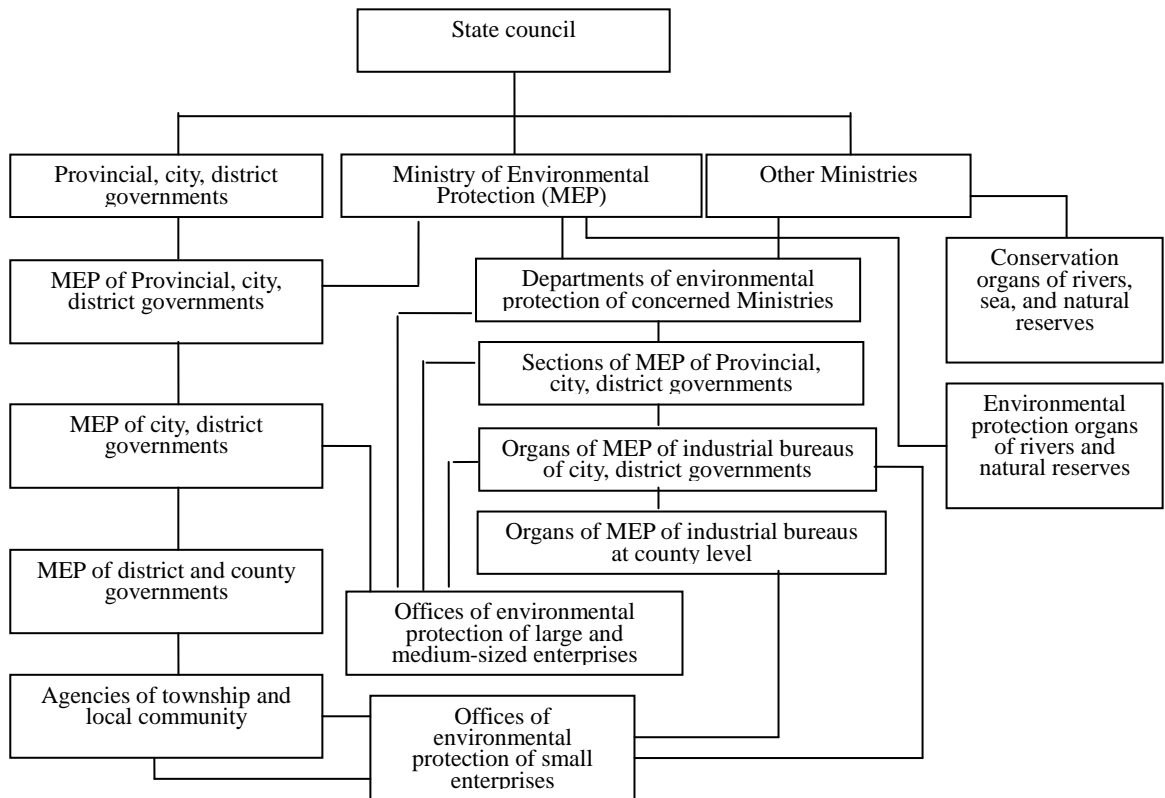


Figure 3 Chinese environmental protection apparatus from 2008