A Comparative Study: China's Water Pollutants Discharge Permit System with Reference to the National Pollutants Discharge Elimination System of the United States of America

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Abstract:

In 2008, China enacted the Water Pollution Prevention and Control Law (WPPCL) in response to the severe water quality degradation associated with the rapid economic expansion since the 1980s. Article 20 of the law stipulates the Water Pollution Discharge Permit (WPDP) institution and authorizes the State Council to draft the regulations for its implementation and enforcement. However, until today, national regulations have not been established and the permitting system has been operating according to provincial regulations. The WPPCL has used the Total Effluent Control (TEC) strategy and the discharge allocation method so far as its major instrument. In this framework, a permit serves mainly as a description of waste load allocation. With the TEC strategy, the WPDP has lost its legal deterrence due to the widespread non-compliance with the permit requirements or discharge without permit. The continued deterioration of China's water quality indicates that the WPPCL has not achieved its objectives.

The Clean Water Act (CWA) together with its National Pollutants Discharge Elimination System (NPDES) has been operating in the USA for over 40 years. Although the law has inherent problems, water quality in the USA has significantly improved since the 1970s. The CWA/NPDES employs technology-based standards to set a nationally uniform requirement for point dischargers and water-quality-based standards to ensure the protection of water integrity. Furthermore, enforcement measures are in place to ensure law compliance.

The CWA/NPDES experience offers a valuable reference for China's water permit system. This author is motivated to conduct a comparative study on CWA/NPDES and WPPCL/WPDP. Overall, this author is dedicated to identify concepts and methods that are shown to be feasible and effective in the USA for China's reconstruction of its water permit system. The differences in legislative design, administrative measures and court decisions of the water pollutants discharge permit system are studied. To understand how to install and adjust the permit system within China's legal framework is the ultimate aim of this study.

It is challenging to compare the laws of two countries as different as the USA and China. The two countries have different social and political structures and different economic priorities. Even for a specific topic, such as the water pollutants discharge permit system, this author is confronted with the difficulty of finding a good method for law comparison. In Chapter 2 of this thesis, the well-established functional method of comparative law is described, but the method used in this study is better called referential, because the functioning of the environmental law must be studied in the entire legal framework of the respective countries. Because (1) the political, social and economic factors in the two countries exert different pressures on the environment and (2) the impact of the environmental law can only be accessed long after its implementation, it is difficult to conclude whether the USA law is better than the China law by means of functional analysis.

Chapter 3 of the thesis describes the legal framework of the CWA/NPDES and Chapter 4 the legal framework of the WPPCL/WPDP. Chapter 5 compares the permit discharge standards and Total Emission Control (TEC) strategy of the WPPCL/WPDP in China with the dual standards of the CWA/NPDES in the USA, and Chapter 6 compares permit enforcement in the two countries. In Chapter 7, water pollution of the Taihu Basin and the water pollution prevention measures are analyzed to examine the effectiveness of the WPPCL/WPDP. In Chapter 8, the differences between CWA/NPDES and WPPCL/WPDP are summarized and recommendations for improving WPPCL/WPDP made.

Despite the large differences between the laws and practices regarding effluent permit, it is meaningful to use the CWA/NPDES as a reference for the improvement of the WPPCL/WPDP. Many recommendations can be made, but the most important ones are:

Ethical Premise: China should promote its traditional ethical premise of "nature-human harmony" and the modern ethical premise of clean environment. The Chinese politician Deng Xiaoping led China to a market economy, and his famous slogan was: "Poverty is not socialism; Wealth is glorious". However, the single-minded pursue of wealth does not allow China to achieve the true objectives of socialism, but stimulated the most populated country to seek economic growth at any costs, often at the expanse of the environment, in particular the water environment. While the objective of the WPPCL is to "balance" economic development and environment protection, the "balance" is tilted to economic growth. As China's water environment continues to deteriorate, the protection of water integrity should be solemnly incorporated within the legislative design and the economic indicator should no longer be the determining indicator for peoples' welfare.

Concrete Law: the WPPCL only stipulates the principles and its implementation is done through administrative regulations. An unusual outcome is that the WPPCL, enacted in 2008, is yet to be fully implemented due to the missing administrative regulations. The National People's Congress of China should legislate concrete laws that are directly implementable.

Discharge Standard: the main function of China's WPDP is to allocate the pollution load to enterprises to serve the TEC strategy. This strategy has flaws by design and large risks of failure. The dual standard system employed in the NPDES functions much more reasonably. The technology-based standard has proven to be effective, and the total maximum daily loading (TMDL) technique is necessary for the TEC strategy to function. China's WPPCL/WDPD should adopt the dual standard approach.

Enforcement: A major problem of China's WPPCL/WPDP is the weak enforcement. In theory, the enforcement of the WPPCL/WPDP employs administrative, civil and criminal measures, but in practice relies mainly on the administrative measures which bypass the others. Therefore, China should activate its entire legal system to enforce environmental laws. Citizens should be authorized to participate in the law enforcement. They should enjoy the right and have the means to access environmental data and to take legal actions against polluters and non-diligent administrative bodies. Finally, the law should promote cooperative responsibility and incentives for compliance with the law.

Zusammenfassung:

China verabschiedete im Jahr 2008 das „Wasserschutz und Verschmutzungskontroll Gesetz“ (Law of the People's Republic of China on Prevention and Control of Water Pollution - WPPCL) als Antwort auf die schwere Wasserverschmutzung während des raschen wirtschaftlichen Wachstums der Volksrepublik seit den 1980en Jahren. Artikel 20 des Gesetzes statuiert die Einrichtung der Abwassereinleitungsgenehmigung (Water Pollutants Discharge Permit - WPDP) und ermächtigt den Staatsrat Chinas, die Vorschriften für die Durchführung und Durchsetzung des Genehmigungssystems zu entwerfen. Jedoch hat der Staatsrat bisher keine nationale Regelungen erlassen und die Implementierung des Genehmigungssystems wird vor allem nach Landesvorschriften reguliert.

Das WPPCL Chinas folgt primär der Strategie der Gesamt-Emission-Kontrolle (TEC) und verwendet instrumentell hauptsächlich das Verfahren der Entladungsallokation für Wasserschutz. Daraus folgt, dass eine wasserrechtliche Genehmigung (WPDP) im Grunde betrachtet nur eine Beschreibung ist für die Aufteilung der Entladung von verschmutztem Wasser. Mit der TEC-Strategie hat die Genehmigung seine rechtliche Abschreckungswirkung verloren gegen die weitverbreitete Missachtung von Genehmigungspflichten und wasserschutzrechtlichen Verstöße durch die Industrie. Die anhaltende Verschlechterung der Wasserqualität in China deutet darauf hin, dass das Gesetz seine Ziele nicht erreicht hat.

Der Clean Water Act (CWA) zusammen mit dem National Pollutants Discharge Elimination System (NPDES) ist in den USA seit mehr als 40 Jahren im Betrieb. Obwohl das Gesetz seine eigenen Probleme hat, hat sich die Wasserqualität in den USA seit den 1970er Jahren deutlich verbessert. Das amerikanische System (CWA/NPDES) verwendet technologie-basierte Entladungsstandards, um eine national einheitliche Regelung für Punktquellen sicherzustellen, und gleichzeitig die auf der Wasser Qualität basierten Entladungsstandards, um den Schutz der Wasserintegrität zu gewährleisten. Des Weiteren gibt es effektive rechtliche Durchsetzungsmaßnahmen, um die Einhaltung der Gesetze zu sichern.

Damit bietet das amerikanische System eine wertvolle Referenz für das Genehmigungssystem Chinas. Die Autorin hat es sich zur Aufgabe gemacht, eine Vergleichsstudie über das amerikanische CWA/NPDES und das chinesische WPPCL/WPDP durchzuführen. Sie versucht die rechtlichen Instrumente, die sich in den USA bewährt haben, herauszuarbeiten, um eine Rekonstruktion des WPPCL/WPDP zu unterstützen. Dazu werden die legislativen, administrativen und justiziellen Unterschiede der beiden Länder eingehend beleuchtet. Ziel dieser Arbeit ist es herauszufinden, wie ein Genehmigungssystem im Rechtsrahmen Chinas installiert und verbessert werden kann.

Es ist eine große Herausforderung, ein Gesetz aus zwei so unterschiedlichen Ländern wie den USA und China miteinander zu vergleichen. Die beiden Länder haben andere soziale und politische Strukturen und unterschiedliche wirtschaftliche Prioritäten. Sogar für ein so spezifisches Thema wie das wasserschutzrechtliche Genehmigungssystem wurde die Autorin mit der Schwierigkeit konfrontiert, eine angemessene Methode für die Vergleichsstudie zu finden.

In Kapitel 2 wird zunächst die etablierte „funktionale Methode der Rechtsvergleichung“ zusammengefasst. Allerdings sollte die in dieser Studie verwendete

Methode besser als „referenzielle Methode der Rechtsvergleichung“ bezeichnet werden, da die Funktionen des Umweltgesetzes im gesamten rechtlichen Rahmen der jeweiligen Länder und in deren jeweiligem Kontext untersucht werden müssen. Die politischen, sozialen und wirtschaftlichen Faktoren in beiden Nationen üben unterschiedliche Umweltbelastungen aus und die Wirkungen des Umweltgesetzes lassen sich nur über eine längere Zeit beurteilen, so dass ein rein funktional-normativer Vergleich zwischen den beiden Gesetzen sich verbietet.

Kapitel 3 der Arbeit beschreibt allgemein das CWA/NPDES und Kapitel 4 das WPPCL/WPDP. Das Hauptinteresse der Autorin lag hierbei auf dem Vergleich der unterschiedlichen Ziele, Institutionen, praktischen Durchführungen und Durchsetzungsmaßnahmen dieser Gesetze in den jeweiligen Ländern.

Kapitel 5 vergleicht rechtstechnisch die beiden Genehmigungsarten: Die Entladungsstandards vom WPPCL/WPDP auf der einen und der Dual-Standard des CWA/NPDES auf der anderen Seite. In Kapitel 6 geht es sodann um die rechtstatsächliche Gesetzesdurchsetzung in beiden Ländern.

In Kapitel 7 geht die Autorin auf praktische Fälle ein und analysiert die Effektivität der jeweiligen Gesetze vor dem Hintergrund des Umweltschutzes; insbesondere die Wasserverschmutzungen im Taihu Becken in China. An Ende der Arbeit (Kapitel 8) wird versucht, im Vergleich mit dem amerikanischen CWA/NPDES-System, Empfehlungen und Verbesserungsansätze für das chinesische WPPCL/WPDP-System vorzuschlagen.

Trotz der großen Unterschiede und Gegensätze zwischen den USA und China ist es sehr sinnvoll, das amerikanische CWA/NPDES als Referenz für einen effektiven Wasserschutz in China zu nehmen. Die wichtigsten Empfehlungen und Lehren hieraus lauten thesenartig wie folgt:

Ethische Prämisse: China sollte den traditionellen Wert der "Natur-Mensch-Harmonie" und die ethischen Prämissen von sauberer Umwelt fördern. Der Chinesische Politiker Deng Xiaoping führte China zu einer Marktwirtschaft, und sein berühmter Ausspruch war: "Armut ist nicht Sozialismus und Reichtum ist herrlich". Allerdings werden die wahren Ziele des Sozialismus nicht durch das zielstrebige Streben nach Reichtum erreicht, anstatt dessen trägt diese Philosophie dazu bei, dass das bevölkerungsreichste Land das Wirtschaftswachstum auf jeden Preis erzeugt, oft auf den Kosten der Umwelt und Wasserqualität. Daraus folgt, dass das wirtschaftliche Wachstum nicht mehr als den einzigen Indikator für den Wohlstand benutzt werden sollte, und dass das Ziel des WPPCL nicht mehr die "Balance" zwischen wirtschaftlicher Entwicklung und Umweltschutz sein sollte, sondern allein der Schutz des Wassers.

Ausführliches Gesetz: Das chinesische WPPCL legt nur die Grundsätze fest und ihre Umsetzung wird durch Verwaltungsvorschriften gewährleistet. Bemerkenswert ist, dass das WPPCL, obwohl schon im Jahre 2008 verabschiedet, bis heute noch nicht vollständig umgesetzt wurde aufgrund fehlender Verwaltungsvorschriften. Der Nationale Volkskongress Chinas sollte deswegen ausführliche Gesetze erlassen, die nur mit ergänzenden Regelungen direkt umsetzbar sind.

Entlastung Standard: Die Hauptfunktion von Chinas WPDP im Rahmen der TEC-Strategie ist es, die Verschmutzung-Entlastung den entsprechenden Unternehmen zuzuweisen. Diese Strategie hat Mängel im Grundkonzept und trägt das große Risiko des Scheiterns bereits in sich. Das Dual-Standardsystem im NPDES funktioniert wesentlich besser: Die Technologie-

basierten Standards haben sich als sehr effektiv erwiesen, und die maximale Tagesbelastung (TMDL) Technik ist unverzichtbar für einen effektiven Umweltschutz. Das WPPCL/WDPD sollte deswegen das Dual-Standardsystem auch in China implementieren.

Durchsetzung: Ein großes Problem von Chinas WPPCL/WPDP ist die schwache Gesetzdurchsetzung. Von Gesetzes wegen stünden zur Durchsetzung der WPPCL/WPDP die allgemeinen verwaltungs-, zivil- und strafrechtlichen Instrumente zur Verfügung, in der Praxis jedoch bleibt es in aller Regel bei rein administrativen Maßnahmen ohne die Einbindung des Rechtssystems. Deshalb sollte China sein Rechtssystem für die Durchsetzung der Umweltgesetze aktivieren. Die Bürger sollten ermächtigt werden, in diese Durchsetzung des Wasserschutzes involviert zu sein. Sie sollten das Zugriffsrecht auf Umweltdaten haben und das Recht und die Mittel, gerichtliche Schritte gegen die Verursacher und fahrlässig handelnde Verwaltungsbehörden einleiten zu können. Schließlich sollte das Gesetz die Kooperation zwischen den einzelnen Parteien fördern und Anreize für die Industrie zur Einhaltung der Wasserschutzvorschriften bieten.

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Chapter 1: Introduction

1.1 Background

Water is essential to human existence and the natural environment. Today, water is increasingly used for industrial, agricultural, domestic and commercial purposes, and thus water quality is greatly affected by human produced pollutants discharged directly or indirectly into water bodies, such as lakes, rivers and aquifers. More than one billion people lack access to safe drinking water, and 40% lack access to basic sanitation.[1] Water pollution poses a major environmental threat to developing countries like the People's Republic of China (PRC)[2, 3], as well as developed countries such as the United States of America (USA).[4]

Law is essential for water pollution prevention and control. It is conventional that surface and ground waters, freshwater and oceans are regulated by separate policies and laws, although they are physically interrelated. The focus of this dissertation is on surface freshwater pollution prevention and control through the institutions of law.

Based on the origins of pollutants, surface water pollution is categorized into point and non-point source pollution. Point sources are discrete conveyances (e.g. discharge pipes from sewage treatment plants or city storm drains). They are largely regulated by legislations such as the Water Pollution Prevention and Control Law (WPPCL) in the PRC, and the Clean Water Act (CWA) in the USA. Although the WPPCL and the CWA differ in implementation and enforcement mechanisms, both require dischargers to obtain a permit to discharge pollutants into water bodies, and discharge without permit is unlawful.[5] Non-point sources are pollution sources which are untraceable and unidentified as a result of long-range transport or multiple sources such as polluted runoff from agricultural areas draining into a river. Studies show that non-point sources are the leading cause of water pollution in the

[1] United Nations Educational, Scientific and Cultural Organization (UNESCO, 2006): Water: a sheared responsibility. The United Nations World Water Development Report 2.
[2] China Daily (7 Jun 2005): China says water pollution so severe that cities could lack safe supplies.
[3] New York Times (26 Aug 2007): As China roars, pollution reaches deadly extremes.
[4] USA EPA (Oct 2007): National Water Quality Inventory: Report to Congress for the 2002 Reporting Cycle – A Profile. No. EPA-841-F-07-003.
[5] Drelich, D. (2009): Restoring the cornerstone of the Clean Water Act. Columbia Journal of Environmental Law 34:2, p267-328.

USA[6], and non-point sources are being gradually included in its permit program. In China, non-point source control and regulation are still at infancy.

Since the implementation of the "Reform and Opening-up" policy in 1978, China has undergone a rapid economic development over a period of nearly four decades. During this period, China's GDP has been increasing at 10% per year on average. However, this has been achieved at a cost of massive energy and natural resource consumption and environment degradation, in particular air and water pollution. Frequent environmental pollution accidents have provoked public anger and distrust towards the governments and manufacturing enterprises. Thus, China needs to establish an effective environmental legal system to protect the environment. This situation is similar to the earlier stages of development in the USA. Since the early 1970s, the USA has undergone an explosive increase in environment-related rulemaking, litigation and public actions against polluters. Among them, the most significant legislative actions and policy breakthroughs have focused on water pollution control, because in comparison to air pollution and soil contamination, water is even more essential for human existence.

The Chinese government has invested a great amount of energy to strengthen water pollution control by establishing the WPPCL in 1984[7] with subsequent revisions in 1996[8] and 2008[9]. However, the legislative efforts seem to be alive only on paper and in reality often fail to achieve their objectives. The "Water Diversion Project from Luanhe River to the Tianjin City" can be used here as an example to support this claim. The project was designed to supply drinking water from the Luanhe River to the Tianjin City. According to the CCTV (China Centre Television) "Half an Hour for Economy" program on 3 Jul 2013, the project in fact stimulated the economic development of the riverside districts. The two major reservoirs, "Daheiting" (大黑汀) and "Panjiakou" (潘家口), were intensively used for aquaculture, and located along the river are 149 industries that directly discharge highly polluted wastes into the river. As a consequence, contrary to the original purpose of the project, the Luanhe River

[6] USA EPA (Oct 2007): National Water Quality Inventory: Report to Congress for the 2002 Reporting Cycle. No. EPA-841-R-07-001.
[7] SCNPC (1984): The Law of the People's Republic of China on Prevention and Control of Water Pollution.
[8] SCNPC (1996): The Law of the People's Republic of China on Prevention and Control of Water Pollution.
[9] SCNPC (2008): The Law of the People's Republic of China on Prevention and Control of Water Pollution. Water Pollution Prevention and Control Law (WPPCL). Promulgated 11 May 1984; Amended 15 May 1996 and 28 Feb 2008; Effective 1 Jun 2008; http://www.chinaenvironmentallaw.com/wp-content/uploads/2008/03/water-pollution-prevention-and-control-law.pdf, last visit on 26 Jul 2015.

became more severely polluted. This example demonstrates that it is a great challenge in China to ensure the compliance of environmental laws.

China was preoccupied with economic development that often undermined the attempts of environmental protection until the 2nd Global Environmental Conference in 1992, also known as the Earth Summit, organized by the United Nations (UN). The Earth Summit urged all governments to rethink about economic development and to protect the environment from irreversible destruction. The concept of "sustainable development" became widely accepted with the "Rio Declaration", which was signed by 178 countries.

Since the Earth Summit, China has substantially upgraded and enriched its environmental protection legal system (Fig 1.1). All environment-related laws have been revised with new concepts and institutions. The Environmental Protection Law (EPL) was passed by the 12th National People's Congress (NPC) on 24 Apr 2014. Effective from 1 Jan 2015, this Act is the leading statute for the environmental protection legal system in China. The Civil Law, Criminal Law, Administrative Law and Civil Procedure Law have also been amended with provisions to coordinate and support the new environmental law system.

In general, China's highest law makers - the NPC and SCNPC (Standing Committee of the NPC) are diligent in drafting new statutes regarding environmental protection, but they pay little attention to the concrete clauses. For example, the EPL has only 70 articles and the WPPCL only 92 articles. It is not possible to rely on the principal laws to control pollution, and thus the implementation and explanation of the law are given to the authorized rule makers such as the State Council, the MEP (Ministry of Environmental Protection), the provincial level legislators and local governments, which have more discretion with law enforcement.

Legislation of Environmental Laws of China

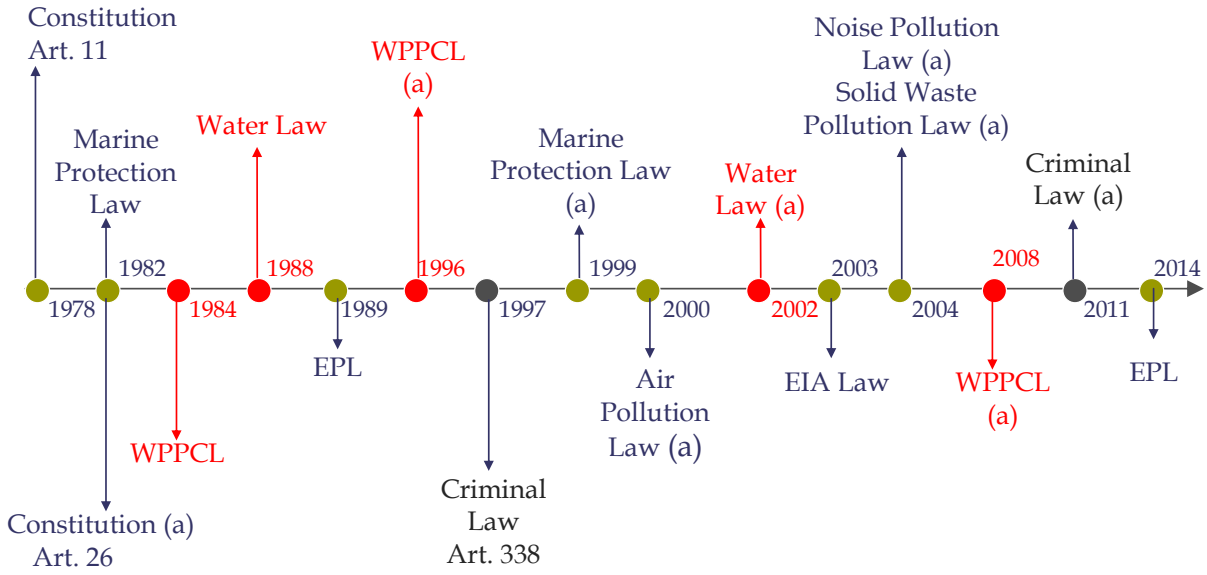

Figure 1.1: Legislation time line of environment laws in China during 1978-2014. The major environmental laws include the Constitutional Law[10], Criminal Law[11], Marine Protection Law[12], Water Pollution Prevention and Control Law (WPPCL)[13], Water Law, Environmental Protection Law (EPL)[14], Air Pollution Prevention and Control Law[15], Environmental Impact Assessment (EIA) Law[16], Noise Pollution Law[17] and Solid Waste Pollution Law[18].

[10] NPC (1954, 1975, 1978, 1982): Constitutional Law. Three early constitutional laws (1954, 1975 and 1978) were superseded in turn. Current version was adopted on 4 Dec 1982; Revisions in 1988, 1993, 1999 and 2004.
[11] NPC (1979, 1997, 2011): Criminal Law. Promulgated on 6 Jul 1979; amendments 1997, 2011.
[12] NPC (1999): The Marine Environment Protection Law of the People's Republic of China. Revised on 25 Dec 1999; Promulgated on 1 April 2000.
[13] Id, 7, 8, 9
[14] SCNPC (1989): Environmental Protection Law of the People's Republic of China. Promulgated on 26 Dec 1989.
[15] SCNPC (2000, 2002): Law on the Prevention and Control of Air Pollution of the People's Republic of China. Promulgated in 2000; Amended in 2002.
[16] SCNPC (2002): Environmental Impact Assessment Law. Promulgated on 28 Oct 2002; Effective on 1 Sep 2003.
[17] SCNPC (1996, 2004): Law of the People's Republic of China on Prevention and Control of Pollution from Environmental Noise. Promulgated on 29 Oct 1996; Effective on 1 Mar 1997; Amended in 2004.
[18] SCNPC (1995, 2004): Law of the People's Republic of China on Prevention and Control of Environmental Pollution by Solid Waste. Adopted on 30 Oct 1995; Revised and promulgated on 29 Dec 2004.

1.2 Motivation

During the last 20 years, effluent discharge has caused many notorious pollution accidents which in turn have led to social unrest and massive economic costs. According to China's Statistical Yearbooks, water pollution accidents accounted for more than a half of all environmental pollution accidents during 1995–2010 (Fig 1.2a), and the economic cost of all forms of environmental pollution was much higher than the reparation input and administrative fines (Fig 1.2b).

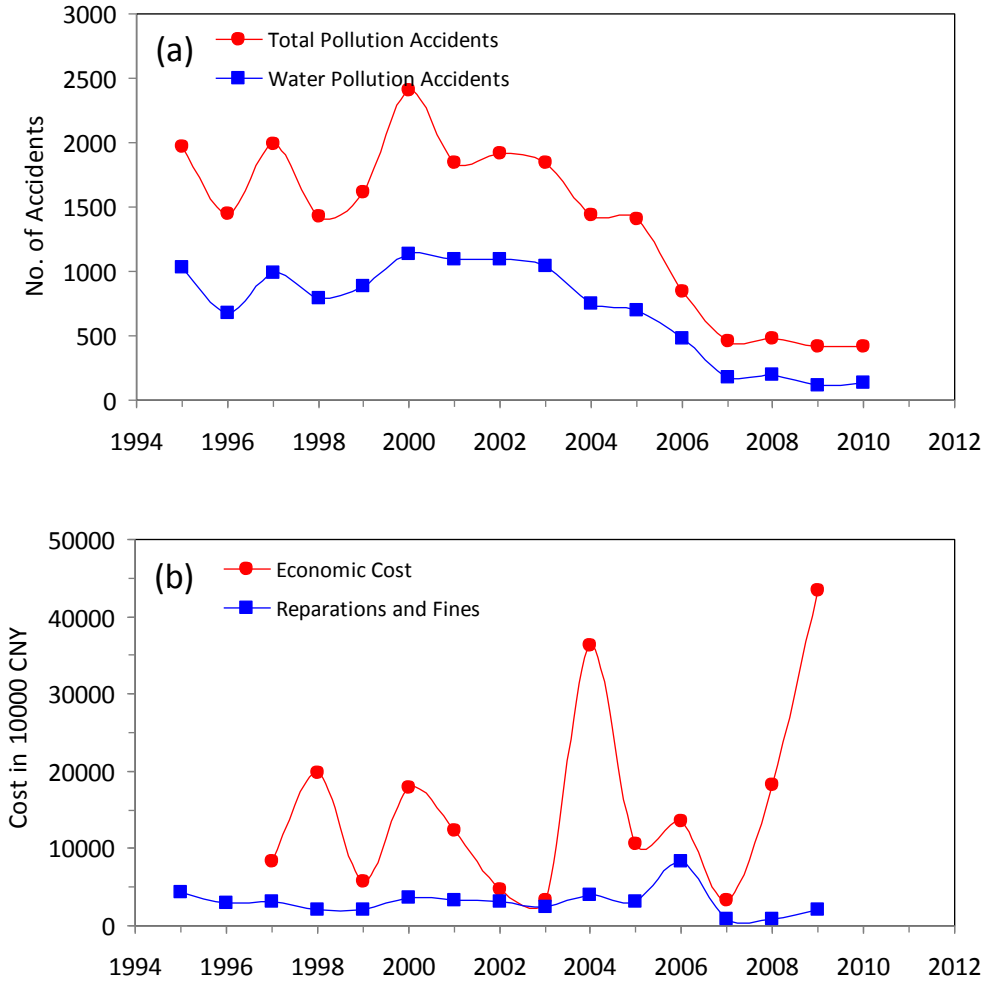

Figure 1.2: (a) Total pollution accidents and water pollution accidents (1995-2010) in China; (b) Economic cost vs. reparation and fines (1995-2010). Data are from China Statistical Yearbook of 1995 to 2010.[19]

[19] National Bureau of Statistics of China (1995-2010): "China Statistical Yearbook 1995". Id. for 1996, …, 2010. http://www.stats.gov.cn/tjsj/ndsj/, last visit on Apr 26, 2012. Data of economic cost, reparation and fines up 2010 are not available.

Consequently, the NPC approved the revised WPPCL in Feb 2008 to strengthen pollution permit system as a major measure to control point source effluents. Article 20 of this law stipulates that:

"The State implements water pollutants discharge permit system.

Any enterprise and public institution which discharges industrial effluents or medical sewages or any other pollutants into the water bodies directly or indirectly shall obtain a permit; the operator in charge of facilities for central treatment of urban sewages shall obtain a permit. The specific measures and implementation procedures for permitting are to be stipulated by the State Council.

Enterprises and public institutions are forbidden by law to discharge above effluents and sewage without permits, neither are they allowed by law to violate the requirements of permits."[20]

In 2011, the State Council published "Guidelines for Strengthening the Key Tasks in Environmental Protection"[21]. Article 13 of the document requires the provincial governments to implement the water permit system and to carry out the permits trading program (a technique[22] also practiced in the USA), both highlighted as the key measures in the new water pollution control era. Since then, more than 20 provinces and municipal cities have passed their own provisional permit regulations based on their understanding of the permit system such as, for example, the "Provisional Measures for Pollutants Discharge Permit System in Zhejiang Province" in 2010, "Management Measures for Water Pollutants Discharge Permit in Jiangsu Province" in 2011 and "Management Measures for Pollutants Discharge Permit in Gansu Province" in 2013.[23] However, until 2014, the State Council had not yet completed nationwide permit implementation regulations.

[20] Translated by the author.
[21] State Council of China (2011): "State Council's Guidelines for Strengthening the Key Tasks in Environmental Protection" 国务院关于加强环境保护重点工作的意见, 国发〔2011〕35 号. http://www.gov.cn/zwgk/2011-10/20/content_1974306.htm
[22] King, D. M. and P. J. Kuch (2003): Will nutrient credit trading ever work? An assessment of supply and demand problems and institutional obstacles. Environmental Law Reporter, News & Analysis, 33 ELR 10352-10368.
[23] Office of Major Science and Technology Program for Water Pollution Control and Treatment of the MEP (27 Mar 2014): Recommendations for the thorough enforcement of water pollutants discharge permit system in China. http://nwpcp.mep.gov.cn/zxjz/201403/t20140331_269884.html

The water pollution permit system is not a new concept and has been practiced for more than 20 years in China. In 1988, the former State Environmental Protection Administration (SEPA) published "Provisional Measures for Management of the Water Pollutants Discharge Permit". A pilot program for permit implementation was then carried out by the Chinese government, with the participation of 18 cities, including Beijing and Shanghai. In 1994, SEPA declared that the permit system shall be applied across the country.[24] However, taking Wenzhou city (温州) as an example, during 1997-1999, there were only 316 permits issued, and permit holders accounted for 20% of the total point source dischargers. Rui'an city (瑞安) issued 40 permits in 1996, while during 1997-2000, no permits were issued.[25] Obviously, the first round of permit issuance since 1994 did not achieve its goal of wastewater discharge control. On the other hand, the permit system did promote changes in industrial structure and environmental thresholds of enterprises. It is therefore often called "chicken rips".

Yet, a water pollutant permit system is a key component of environmental management practices widely accepted in the world. China's WPPCL (2008) and EPL (2015) used only several principle sentences to describe it. How to understand the permit system and to make it effective requires legislative review and analysis.

The USA permit practice of the past 40 years offers China a relatively successful model for guidance. The author is thus motivated to carry out a comparison study on water permit systems in the USA, the country of its origin, and in China, the country of its transplantation, in order to identify the major pillars of the permit system and to examine the feasibility of developing an effective water permit system within China's legal framework.

1.3 Thesis Structure

The thesis consists of eight Chapters. Chapter 2 discusses the functional and referential approaches to comparative law, as well as the comparability of the PRC and USA water pollution control laws. In Chapter 3, the author examines the legal characteristics of the USA CWA/NPDES (National Pollutants Discharge Elimination System), and in Chapter 4 the PRC WPPCL/WPDP system. Chapter 5 compares the core requirements of water pollution

[24] Id, 23, Office of Major Science and Technology Program

[25] Xu, J. L. (徐家良) and X. X. Fan (范笑仙) (2002): Institutional arrangement, institutional change and limits of governmental control - analysis of development of the effluents permit system. Quarterly Journal of the Shanghai Academy of Social Sciences, 2002-01, 13 - 20. In Chinese: "制度安排、制度变迁与政府管制限度——对排污许可证制度演变过程的分析", 上海社会科学院学术季刊 2002 年第 1 期, p13-20.

discharge permit systems in both countries, focusing on the discharge standards, while Chapter 6 the environmental law enforcement. In Chapter 7, the water pollution prevention practice in China is examined, using the Taihu Lake as an example. Chapter 8 summarizes the findings of this study and outlines the needs for future research. Also in Chapter 8, recommendations for implementation of the water permit system in China are discussed. The necessity of independent and sufficient judicial protection of public participation in permit issuance, implementation and enforcement are discussed. It is argued that public participation is a key component to combat the widespread unpermitted discharge of pollutants and to increase the incentives for the administrators to seriously enforce permit requirements.

Overall, the author is dedicated to recommending theoretical and practical conceptions which have been verified to be feasible and effective by the USA Environmental Protection Agency (EPA) for China's reconstruction of the water permit system. The differences of administrative, legislative and court's judgments, even the different economic and social development status between the two countries are taken into consideration. Simply speaking, to understand how to install and adjust the permit system within China's legal framework is the ultimate aim of this study. While China has a strong desire and need for a better environment, it remains questionable whether the Chinese society would fully accept and embrace the water pollution permit system and the associated consequences. History, e.g. the failure of colonialism in Africa and elsewhere, has taught us that one cannot simply impose a foreign legal system or tool on unwilling people. Without the acceptance of the people, and in case of China, of the political system, the legal tool will not work.[26] It is particularly important to identify the aspects of the USA CWA/NPDES, which can be used as references of the PRC WPPCL/WPDP system.

[26] Junker, K. W., communicated to the author on 28 Jul 2014

Chapter 2: Methods

This thesis is devoted to discuss China's environmental legal problems with reference to the USA/CWA legal practice. A comparative legal study method needs to be applied for illustrating the similarities as well as the differences between the two countries. A functional approach to the comparative study is first considered, but found to be inadequate in the context of environmental law issues, because the functionality of the environmental law is strongly subject to the political, social-economic and cultural structures of the respective countries and the impact of the law on the environment can only be evaluated over a very long period of time. For the purpose of this study, it appears more appropriate to adopt a "referential approach" (an expression this author invented), as it is more valuable to use the 40-year long history of the USA CWA/NPES legal practice as a reference for China's WPPCL/WPDP system, and to offer the Chinese law-makers, governments, NGOs and citizens the experiences and inspirations. Despite their political differences, the USA and PRC have decided to collaborate in combating environmental problems and in 2003 the USA EPA and China SEPA signed the "Memorandum of Understanding on Scientific and Technical Cooperation".[27] This collaboration initiated a series of cooperative environmental protection projects, including the "China Environmental Law Initiative" in September 2007.[28] However, from the view point of legal research, it is difficult to compare environmental laws of two entities with such profound contrasts in political systems, cultural backgrounds, governmental structures, economic developments and technological expertise. Therefore, methods must be developed to carry out a comparative study. While the functional approach, which is widely practiced in the legal research community, provides a good starting point, it is not necessarily the most suitable method for the present work. In this chapter, the functional approach is first discussed and then followed by an introduction to the referential approach. Furthermore, a comparative environmental law study should also incorporate evidence from the physical environment. The data collection and analysis of this study aims to identify where problems exist and to evaluate the functioning of the permit system. In essence, this author considers that environmental law must be a combination of law, politics, social-economics, science and technology.

[27] USA EPA and China SEPA (8 Dec 2003): Memorandum of Understanding on Scientific and Technical Cooperation 中美环境领域科学技术合作谅解备忘录.

[28] USA EPA (2007): EPA – China Environmental Law Initiative. 美国环保局-中国环境法合作项目

2.1 General Principles of the Functional Approach and Critics

At the 1900 Paris Congress, Salleiles described the subject of comparative law as the discovery of concept and principles common to all civilized legal systems.[29] This idea was later replaced by the "functional approach", introduced by Rabel in the 1920s, which considers the entire legal milieu[30]. The starting-point of a comparative analysis is not the rules themselves, but the concrete social problems the rules help to solve. This approach became widely adopted, and is today a leading theory of comparative law.

On the one hand, comparisons must not be based on the legal rules, concepts or institutions, but on the functions they fulfill. This places the emphasis on the comparison of law in practice and, when one looks at how courts apply a norm, one should understand the purpose for which they employ the norm.[31] As the western legal norms are usually regarded as extra-legal or simple matters of fact, the traditional norms of a country cannot be disregarded.[32] This means that when a country transplants western rules into its own traditional legal system, indigenous norms usually continue to function in practice. Thus, according to the functional method, comparison must extend to those indigenous norms. This is called "pluralistic".

Zweigert and Koetz (1998) postulated a methodological monopoly: "the basic methodological principle of all comparative law is that of functionality."[33] This approach focuses not on rules, but on their effects, and laws must be understood in the light of their functional relation to society. This approach considers that institutions are comparable if they fulfill similar functions in different legal systems. In the end, comparative law becomes a "better-law comparison" — the better of several laws is that which fulfills its function better than the others.

To carry out law comparison using the functionalist methodology, one normally follows a procedure as outlined below:

- To identify the social problems which the legal systems intend to solve;

[29] Fauvarque-Cosson, B. (2008): "Comparative Law in France." The Oxford Handbook of Comparative Law. Eds. M. Reimann & R. Zimmerman. Oxford University Press. p37.
[30] Reimann, M. and R. Zimmermann (2008): "The Oxford Handbook of Comparative Law, Part I: the development of comparative law in the world". Oxford University Press, p246.
[31] Id, 30, Reimann, M. and R. Zimmermann (2008), p245.
[32] Id, 30, Reimann, M. and R. Zimmermann (2008), p245.
[33] Konrad Zweigert and Hein Koetz (1971): "An Introduction to Comparative Law" (Translation by T. Weir, 3 ed., 1998), p34, first published in "Einfuhrung in die Rechtsvergleichung". Vol I, p27-48.

- To study the legal resolutions applicable to the social problems, including rules, procedures and institutions; and
- To analyse the reasons for the settlements.

Also functional comparatists agree on some important elements:

- Factual elements: functional comparison of law is meaningless if the factual situations in question are not identical, at least in their relevant respects;
- Logical elements: one must take into account that legal concepts, institutions, and constructions are shaped by history of each country so that they acquire distinctive characteristics; thus, identical constructions may have different legal significance so that their functions are not necessarily identical. Therefore, seeking similarities or differences between legal constructions is merely preparatory work for functional comparison and it does not itself lead to functional analysis; and
- Normative elements: there are certain legal principles which constitute the basis for evaluation; we may call them "law formation principles". When we have identical facts and the law formation principles applicable to them are identical as well, then similar legal constructions can also be considered functionally equivalent. Thus, the equivalence of these law formation principles is the fundamental subject of comparison.[34]

It is claimed that

Identical facts + Identical law formation principles = Equivalent function of legal constructions

In many areas of law, this formula may be applicable, but it is not the case for environmental law. The function of an environmental law that one country makes evolves over a long period, during which natural transition, policy changes, scientific and technological advances, people's lifestyle and many other factors contribute to a variable effect of the legal construction. Even if the target environmental problems are identical, and the laws of different counties share the same legal formation principles, the function of the environmental legal constructions may still be very different from each other. Thus, for environmental comparative law studies, it is difficult to employ the functional method.

[34] Id, 30, Reimann, M. and R. Zimmermann (2008), p246-247.

Both the USA and PRC are confronted with the problem of industrial effluent discharge and both countries use the permitting system as a temporary measure to force the industries to be clearer step by step,[35] although they are in quite different social fabric and legal systems. The USA is commonly considered to be a democratic country with a legal system as the core of its function, while the PRC an authoritarian country with a legal system that functions parallel to political decrees. In China, legal systems and political decrees often interfere with each other, but they also compensate each other on many other occasions.

Environmental laws are unique in their broadness and their far reaching consequences on the social-economic activities of a nation, as they attempt to rule on human behavior with respect to nature. Consequently, the functions of the law are difficult to evaluate, as long-term and large-scale scientific evidence is necessary for the functional assessment. The tasks of function evaluation become practically impossible, if the laws are entangled with policies, administrative measures and a wide range of issues, e.g. law implementation, enforcement, governmental support, public education etc. The environmental legal system is such a complex system and the laws are intertwined with a large body of political and social-economic elements, the function of the law no longer serves as the common basis for law comparison, even in a pragmatic sense.

The functional approach for a comparison of the USA and PRC environmental laws is particularly difficult, because the environmental laws, at least in the case of the PRC, are continuously evolving. The USA and PRC find themselves in different stages of environmental law development and it is not reasonable to compare the functions of an evolving law with a well-established law.

2.2 Referential Analysis

The comparison of the USA and PRC environmental laws to be conducted in this study is not a "better-law comparison". Instead, the USA environmental law is used as a reference to examine how the PRC environmental law can be further developed within China's existing legal framework. The referential method proposed here is a pragmatic method and is not yet systematically developed and tested, but it differs from the functional method in the following important aspects:

[35] Junker, K. W., 28 Jul 2014, letter to the author.

- Nature of the Law: the laws to be compared are complex in that they not only regulate the behavior of the individuals but also the behavior of the entities which play major roles in the society, and thus the functionalities of the laws are strongly affected by factors which are beyond their constitutions. Environmental laws are such laws, because while they deal with specific environmental problems, their functionalities depend on the social-economic conditions of the countries in which they are implemented. In the case of China, the functionality of the environmental laws is also strongly affected by government policies and national development goals;
- Stage of Law Development: the laws to be compared are at different stages of development, and the fabric and completeness of the laws differ to such a large degree that their functionalities cannot be used to define comparability. Specific to this study, for example, the USA CWA/NPDES is a fully developed law, while the PRC WPPCL/WPDP is a developing law in its early stages and is rapidly evolving. One cannot be sure, in the case of China, that the observed environmental changes (improvement or deterioration) can be attributed or not to the functionality of a specific environmental law;
- Evidence of Law Functionality: the assessment of the impact of the laws, a key measure of their functionality, requires data which cover over a large area and a long period of time, but are however incomplete or have large uncertainties, such that the comparison of the laws based on functionality becomes unfeasible. Environmental laws do not work over night and long-term (e.g. 10 years) environmental monitoring is necessary to conclude whether the laws have worked. In the case of China's WPPCL/WPDP, the data required for its assessment are rather incomplete and the water quality data which can be found are difficult to use, because the change of water quality in China is largely determined by the forces beyond the power of this particular law.

While the functional approach uses law functionality to define law comparability, the referential approach does not place its emphasis on this "norm". Instead, it is taken to analyze the histories of a developed and a developing law and the political and social-economic conditions under which the laws are implemented and to identify the verified strengths and weaknesses of the respective laws, in order to improve the developing law. Griggs et al. (2009)

conducted a comparative study on water law and management in the USA and China. [36] The latter authors did not explicitly explain what method they employed for the comparison, but it appears essentially to a referential comparative law study.

This author considers the USA CWA/NPDES as a valuable guide for the establishment and improvement of the PRC WPPCL/WPDP. Both the USA and the PRC have water pollution problems, but the USA began dealing with the issues 40 years earlier than the PRC. Both countries now employ a permit system for the realization of the laws, in particular for the control of point source water pollution. In the implementation of this measure, the PRC has encountered problems of permit requirement design, insufficient citizen input and law enforcement. On the other hand, the USA has already gathered experience of 40 years of the CWA/NPDES enforcement. For example, the legislators of the USA resort to governmental, as well as citizen enforcement, while the PRC relies heavily on governmental tools to correct permit non-compliances with little public participation in law enforcement, because public participation is perceived to be a threat to social stability which has been the highest priority in the PRC in recent years. It is now useful to examine how the CWA/NPDES and the WPPCL/WPDPS are enforced in the USA and PRC, whether law enforcement in the PRC can be strengthened and whether the USA experience provides a meaningful reference.

2.3 Comparability and Incomparability of the CWA/NPDES and WPPCL/WPDPS

Due to the recent industrialization and urbanization, China has been confronted with water pollution problems similar to the USA in the 1960-1970s. However, the degree of water pollution in China is much more severe than in the then USA, because China has a population four times that of the USA but the total amount of available water similar to that of the USA. China also has the problem that its water distribution is substantially imbalanced between Southeast and Northwest.

To combat the water pollution problems, the USA has undertaken earlier actions, achieved success and acquired experience. In addition to technological improvements and management-conceptual progress, the USA relies heavily on the CWA to limit water pollutant discharge into its national waters.[37] The CWA introduced the NPDES[38],[39] in 1972 to regulate

[36] Griggs, B. W., J. C. Peck and Y. P. Xu (2009): Comparative water law and management: the Yellow River Basin in western China and the State of Kansas in the western United States. Kansas J. of Law & Public Policy XVIII:3, p431-461.
[37] 33 U.S.C. §§1251-1387.

and control point sources, to "restore and maintain the chemical, physical, and biological integrity of the Nation's waters", and to establish a goal of providing swimmable and fishable waters and protecting the safety of the sources of drinking waters. Zero effluent discharge was a goal to be met by 1985. Although it is until today not yet achieved, national water quality has been improved enormously since the implementation of the CWA/NPDES. In 1972, the Potomac River was considered too dirty for swimming, Lake Erie was dying and the Cuyahoga River was so polluted that it burst into flames. Since the enactment of the CWA, the USA has made significant strides in the rehabilitation of their rivers, lakes and coastal waters: doubling the number of waterways safe for fishing and swimming; reducing industrial discharges by billions of pounds a year; more than doubling the number of American citizens served by adequate sewage treatment; reducing annual wetland losses by 75%; and reducing soil erosion from cropland by more than 1/3.[40]

However, it has also been revealed in recent studies that the CWA has not worked well[41] and has fallen into a dilemma[42]. The New York Times wrote that "the Act has grown old and fallen well short of its goal, crippled by uneven and sometimes nonexistent enforcement by state and federal agencies…".[43] It has been said that the number of facilities violating the CWA increased by more than 16% between 2004 and 2007, and 60% of the violations posted the highest public health or environmental risk.[44] The report also concluded that the states lacked the ability to levy fines large enough to deter polluters, and the federal EPA hesitated to pressure the states enforcement officials to do better. Furthermore, the testimony of the USA General Accountability Office (GAO) given before the USA Congress noted that despite the increased funding for enforcement by the EPA and the states authorized to issue and enforce the permits, they still felt overwhelmed by increased enforcement responsibilities, so actions are needed to strengthen the enforcement program.[45]

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[38] U.S. Environmental Protection Agency (EPA). "National Pollutant Discharge Elimination System." http://cfpub.epa.gov/npdes/, last visit on 25 Jul 2015.
[39] Gaba, M. J. (2007): Generally illegal: NPDES general permits under the Clean Water Act. Harvard Environmental Law Review, Vol. 31, p409-473.
[40] http://www2.epa.gov/compliance/clean-water-act-cwa-action-plan, last visit on 25 Jul 2015.
[41] Benson, R. D. (2005): Pollution without solution: Flow impairment problems under the Clean Water Act Sec 303. Standfort Environmental Law Journal 24, p199-267.
[42] Boudreax, P. (2007): A new Clean Water Act. Environmental Law Reporter, News & Analysis, 37 ELR, 10171-10196.
[43] New York Times, Editorial (Oct 21, 2009): Clean Water: Still Elusive.
[44] Glicksman, R. L. and D. H. Earnhart (2011): Pollution Limits and Polluters' Efforts to Comply: The Role of Government Monitoring and Enforcement. Chapter 1 by D. H. Earnhart and R. L. Glicksman, Pollution limits and polluters' efforts to comply: the role of government monitoring and enforcement, p2. Stanford Uni. Press.
[45] Id, 44, Glicksman, R. L. and D. H. Earnhart (2011), p3.

In Oct 2009, the EPA issued the "Clean Water Act Action Plan"[46]. The goals of the plan are to "target enforcement to the most significant pollution problems, improve transparency and accountability by providing the public with access to better data on the water quality in their communities, and strengthen enforcement performance at the state and federal levels."[47] By 2011, the EPA and state co-regulators have collaboratively researched a new retooled system for fundamentally revamping the NPDES permitting, compliance, and enforcement program.

Since 2008, permit issuance in China became more popular. For example, Gansu province initiated permitting programs in the 1990s. By 2012, there were only 2806 permits issued in eight major regions across the province. After thoroughly revising the permit implementation measures with references to other 13 provinces, Gansu province began a new round of permit issuance, and issued 907 permits in 2013.[48] The Inner Mongolia Autonomous Region has also been issuing permits since 2008. However, despite of the progress in permit issuance, industrial effluent discharge without permits remains widespread in China. The recently revealed incident of pollution discharge in the Tengger Desert is just one example.[49]

Due to the reluctant involvement of industrial enterprises with permit compliance, the local governments have little motivation to enforce the permit system, because it has been so far a political priority to promote economic growth by minimizing environmental requirements, and for many Chinese officials, environmental protection is at conflict with economical development. It has been said that a clean environment is affordable only as a luxury. While this is probably 20th century thinking, it remains inherent among many policy makers. While the government can make laws that fine polluters, a more direct economic argument is necessary and industry participation in pollution prevention is essential.[50]

The USA experience with the CWA/NPDES is particularly valuable to China for the following reasons. First, a long-term China-USA technical and legal cooperation platform for

[46] USA EPA (2009): http://www.epa.gov/compliance/resources/policies/civil/cwa/actionplan101409.pdf, last visit on 5 Jun 2012.
[47] http://www2.epa.gov/compliance/clean-water-act-cwa-action-plan, last visit on 25 Jul 2015.
[48] Wu, Y. P. (吴玉萍) and L. L. Bai (白刘黎) (2013): Gansu comprehensively promotes pollution permits management. 甘肃全面推进污染许可管理,
http://www.hprc.org.cn/leidaxinxi/jjst/201305/t20130531_221708.html, last visit on 25 Jul 2015.
[49] Legal Daily (2014): Chemical enterprises discharge wastewater without any treatment directly into the desert. http://epaper.legaldaily.com.cn/fzrb/content/20140909/Articel07002GN.htm, last visit on 25 Jul 2015.
[50] Junker, K. W., communicated to the author on 28 Jul 2014

water pollution prevention and control exists at the governmental level.[51] The "Ten-Year Framework for Energy and Environmental Cooperation - Clean Water Action" focuses on strengthening permit system, researching water quality standards, and developing the total maximum daily loading (TMDL) plan.[52] From 2015, the USA and PRC commenced collaboration on air pollution control with more technical and economic exchange. China borrowed the water permit concept from the USA in the 1980s and has tried for more than 20 years to transplant it into its own legal system. However, China's water permit system has been so far not successful in achieving its goals: pollution discharge without permit and violation of permit requirements are wide spread. Some Chinese cities, e.g. Jinhua and Jiaxing in Zhejiang Province gave up permits institution in the 1990s.[53] Thus, despite the fact that the PRC and the USA are at different stages of utilizing the water permit system, both countries share the same problem, i.e., how a permit system can be effectively implemented and enforced.

Second, water permit rules will survive by providing citizens with "access rights", including access to environmental information, participation in the governmental decisions and the legal process. These access rights are embodied by Section 505 of the USA CWA, allowing citizens the ability to enforce the laws when the government was unwilling or unable to do so.[54] These so-called "citizen suit" provisions, included in every major environmental law of the USA, allow citizens to sue violators in federal court. Congress intended citizen suits to supplement government action, when underfunded or overworked agencies could not ensure that all laws are complied with.[55] As government enforcement becomes increasingly difficult due to reduced budget and governmental oversight, citizen enforcement of environmental law is more necessary than ever. More details of the USA citizen suit against polluters are given in Chapter 6.

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[51] USA EPA: EPA Collaboration with China. http://www2.epa.gov/international-cooperation/epa-collaboration-china#agreements, last visit on 25 Jul 2015.

[52] U.S. Department of States (2008): The U.S.-China Strategic Economic Dialogue (SED): the Ten Year Framework for Energy and Environment Cooperation (TYF) – Clean Water Action Plan. http://www.state.gov/e/oes/eqt/tenyearframework/141878.htm, last visit on 25 Jul 2015.

[53] Xu, J. L. (徐家良) and X. X. Fan (范笑仙) (2002): Institutional arrangement, institutional change and limits of governmental control - analysis of development of the effluents permit system. Quarterly J. Shanghai Academy of Social Sciences, 2002-01, 13 - 20. In Chinese: "制度安排、制度变迁与政府管制限度——对排污许可证制度演变过程的分析", 上海社会科学院学术季刊 2002 年第 1 期, p13-20.

[54] North & South Rivers Watershed Ass'n v. Scituate, 949 F.2d 552, 555 (1st Cir. 1991) (stating, "The primary function of the provision for citizen suits is to enable private parties to assist in enforcement efforts where Federal and State authorities appear unwilling to act.")

[55] Ohio Environmental Council (2012): A Citizen's Guide to Clean Water Act Enforcement.

The "access rights" have become more meaningful for resolving China's increasing environmental incidents which have triggered social instability (see Chapter 6). In China, the decision-making progress is still non transparent such that the public has no or few channels to obtain information about administrators' decisions, although there is a hearing process during the administrative permitting process.[56] In this, the participants have to agree with the governmental decisions by raising their hands during the hearing, and in most cases, it is difficult for the victims affected by the decisions to make a change. Furthermore, conflicts between rapidly degrading water quality and booming public appeals for safe water are ever growing and causing social unrest in some regions. Thus, to endow the public the possibility to endeavor their environmental rights is a new challenge.

Third, different from the USA, the PRC has established 134 environmental and resources protection courts and tribunals to resolve environmental disputes. But interestingly, these environmental courts have been rather idle. For example, the First Environment Tribunal in Guiyang (贵阳) of Guizhou Province tried 624 cases since 2007, 10 cases of which involved public interests, while the Environmental Tribunal in Kunming (昆明) of Yunnan Province only dealt with 6 cases regarding public interests since its establishment in 2008.[57] At the same time, China's environmental disputes have been escalating. Since 1998, the number of environment disputes increased by more than 20% p.a. and since 2005 by 30% p.a.[58]

Fourthly, in comparison with the USA EPA, China's environmental protection authorities are limited in resources and political power to contest against local governments because they are attached to the local governments and are hesitant to challenge the dischargers which are economically important for the local economic development. Thus, courts and citizens become the only channel to challenge the polluters. But due to the lack of citizen access to the pollutant discharge information of enterprises, and government's reluctance to offer discharge monitoring reports to the public, the chance to raise lawsuits against polluters with credible evidence of pollution is small. Furthermore, the monitoring results carried out by citizens are often regarded as unlawful. It is thus difficult for the public to resort to the legal process. Also the court is short of professional judges to deal with water pollution issues.

[56] Article 46 and 47 of the Administrative Permission Law of the PRC
[57] Kunming City Intermediate People's Court (Oct 2013): Environmental Judicial Protection Green Book, 环境司法保护状况绿皮书.
[58] Gao, Y. (高原) (2012): Awkwardness of 77 Environmental Courts. Law Weekly, 13 Jun 2012. 77 个环保法庭的尴尬,法治周末. http://huanbao.gongyi.ifeng.com/detail_2012_06/13/15256042_0.shtml, last visit on 25 Jul 2015.

Fifthly, in the earlier years (1948-1970), the USA federal government relied on the states to control water pollution by themselves. But this self-control arrangement was not effective in improving the water quality. Some states reduced their own environment standards, including water-quality standards, to attract investment, increase employment and raise tax revenues. This is now happening in the PRC. In the 1970s, the USA Congress made federal environmental laws which were mainly implemented by the federal EPA, and the states became cooperative partners for the implementation of the federal laws under the supervision of the EPA. In other words, the USA environment legal system transformed from "state self-control" to "cooperation under federalism". In China, environmental laws are promulgated by the Standing Committee of the National People's Congress of China (SCNPC). The Ministry of Environmental Protection (MEP) is then authorized to explain how to implement the law in the form of regulations. Further, the governments and the People's Congresses at the provincial level have the right to interpret and supplement the provisions of the laws and the regulations, in the form of "implementation rules" or "measures". This legislative process depends on the interpretation of the local governments and legislative bodies, which often result in an altered version of the original law and non-uniform implementation across the country.

In summary, the USA experience in the implementation of the water permit system provides the PRC with abundant conceptual sources to work out the regulatory design and enforcement strategies, and deserves to be carefully examined as a reference for China to revamp the water permit system in a new water pollution control law era.

Chapter 3: The USA CWA/NPDES Permit Program

3.1 Historical Review of the Clean Water Act

The USA Constitution makes no express grant of power to regulate the nation's waters.[59] However, the Commerce Clause[60], which authorizes the Congress to manage the interstate commercial activities, has served as the basis for nearly every major environmental and public health law passed by Congress, including the CWA. Because the Supreme Court has made clear that Congress is free under the Commerce Clause to legislate not only against economic problems, but also against public health problems and moral and social problems, so long as those problems are a burden on interstate commerce.[61] And the Necessary and Proper Clause[62] gives Congress great flexibility to legislate the means needed to exercise its commerce power effectively.

In 1972, the USA Congress enacted the Amendments of Federal Water Pollution Control Act (FWPCA), i.e., the CWA, as a significant expansion of the FWPCA of 1948, to control the national water pollution with the combined efforts of federal and states governments. At the federal level, Congress authorizes the EPA to write regulations that explain the critical details necessary to implement environmental laws. At the states level, taking the NPDES permit program as an example, at least 70% or 80% of the permitting workload imposed by federal statutes is now done by the states. The precondition of the delegation is that the state legislature must have passed authorizing legislation that is at least as stringent as the federal standard while demonstrating the State has adequate resources to run the program.

The objective of the CWA is "to restore and maintain the chemical, physical, and biological integrity of the Nation's waters"[63], and "there was a new ethical premise that the water should simply be clean. There was a political view, that pollution was a national problem and

[59] Austin, J. E. and D. B. Myers Jr. (2007): Anchoring the Clean Water Act: Congress's Constitutional Sources of Power to Protect the Nation's Waters, American Constitution Society for Law and Policy, p1.
[60] The Congress shall have the power to regulate Commerce with foreign Nations, and among the several States, and with the Indian Tribes. Article I, Section 8, Clause 3, USA Constitution.
[61] Id, 59, Austin, J. E. and D. B. Myers Jr. (2007), p3.
[62] Congress has the power "to make all Laws which shall be necessary and proper for carrying into Execution the foregoing Powers, and all other Powers vested by this Constitution in the Government of the United States, or any Department or Officer thereof. Article I, Section 8. Clause 18, USA Constitution.
[63] 33 U.S.C. § 1251(a)

required federal intervention."[64] The enforcement of the CWA has contributed much to the cleanup of the waterways in the USA: the amount of point source pollutants discharge has decreased substantially, and the rate of wetland loss has decreased, and many waterways are cleaner than before.[65] The law is a milestone marking the greater responsibility of the nation towards the environment.

Table 3.1: History of the USA Clean Water Act and Major Amendments (codified generally as 33 U.S.C. §§1251 – 1387)[66]

Year	Act	Public Law
1948	Federal Water Pollution Control Act	P.L.80–845 (Act of Jun 30, 1948)
1956	Water Pollution Control Act of 1956	P.L.84–660 (Act of Jul 9, 1956)
1961	Federal Water Pollution Control Act Amendments	P.L.87–88
1965	Water Quality Act of 1965	P.L.89–234
1970	Water Quality Improvement Act of 1970	P.L.89–753
1972	Federal Water Pollution Control Act Amendments	P.L.91–224, Part I
1977	Clean Water Act of 1977	P.L.95–217
1981	Municipal Wastewater Treatment Construction Grants Amendments	P.L.97–117
1987	Water Quality Act of 1987	P.L.100-4

The first USA legislative effort for water pollution control is traceable to "The River and Harbors Act of 1899"[67]. Section 10 of that act prohibited any obstruction to the navigable capacity of any of the waters, as well as the excavation or filling of a lake or stream of the USA. Section 13 further prohibited the discharge or deposit of any refuse into navigable national waters. This act provided the legal basis for deposit prohibition until the Supreme Court's decision in *USA versus Standard Oil*, 384 USA 224 (1966),[68] construed to apply it to water pollution control issues. The issue in this case was the meaning and intent of the Congress with regard to the term "refuse" in the Act. The Court made clear that it viewed the Act as applying equally to pollution and obstructions.[69] Also in the 2006 *Rapanos v. United States*[70] case, the U.S. Supreme Court confined the reach of the CWA's term "navigable

[64] Houck, O.A. (2002): "The Clean Water Act TMDL Program", Environmental Law Institute; 2 ed. p11.
[65] Andreen, W. L. and S. C. Jones (2008): The Clean Water Act: A Blue Print for Reform, Center for Progressive Reform White Paper 802.
[66] Copeland, C. (2010): Clean Water Act: A Summary of the Law. Congressional Research Service, 7-5700, RL30030.
[67] 33 U.S.C. § 407: The River and Harbors Act of 1899. Mar 3, 1899, Ch. 425, Sec. 9, 30 Stat. 1151.
[68] http://scholar.google.com/scholar_case?case=14285088702155293794&hl=en&as_sdt=6&as_vis=1&oi=scholarr, last visit on 25 Jul 2015.
[69] Schoenbaum, T. J. and R. H. Rosenberg (1996): Environmental Policy Law, 3rd ed., University Casebook Series. p1129.
[70] 126 S. Ct. 2208, 36 ELR 20116 (2006).

waters" that might prevent the protection of law of many wetland and other small water bodies.[71]

The evolution of the CWA is outlined in Table 3.1. The most significant water pollution control law in the USA was the FWPCA[72] of 1948, which provided the foundation for the existing framework of water pollution control laws. At that time, it depended primarily on the states to enact and enforce the law, with the focus to require the states to establish their own water quality standards according to the water utility goals. A major flaw of the Act was that the free use of the waters was presumed. The Act stated that the environmental protection agencies must prove the harms caused by the specific sources of pollution. This flaw hampered the motivation of the states to trace the sources of pollution and to enforce the law. Thus, industrial effluents continued to be discharged freely into rivers and lakes throughout the country. For example, Lake Erie was declared "dead" in the 1960s as most living species had ceased to exist in the lake due to water pollution, and it remains quick sick even today.[73]

In 1965, the Congress adopted the Water Quality Act[74], an amendment to the FWPCA of 1948, and required all states to establish their own water quality standard and implementation plan to achieve the standard. In spite of the great efforts by the federal and state governments, the water pollution control had little success.[75]

The water pollution crisis in the USA reached epic proportions by the early 1970s. Some 70% of the annual industrial wastewater (~ 53 Gt) was discharged without treatment, and the rest only with rudimentary treatment. The discharge of organic sewage pollutants dramatically increased. 63 types of recorded fishes were killed and almost 1/3 of drinking water contained chemicals exceeding Public Health Service limits.[76] Confronted with the water pollution crisis,

[71] Boudreax, P. (2007): A new Clean Water Act. Environmental Law Reporter, News & Analysis, 37 ELR 10171-10196.
[72] 33 U.S.C. §§1251 - 1376: The Federal Water Pollution Control Act of 1948. 30 Jun 1948; Ch. 758; P.L. 845, 62 Stat. 1155.
[73] New York Times (Mar 14, 2013): Spring Rain, "Then Foul Algae in Ailing Lake Erie".
[74] U.S.C. (1965) The Water Quality Act.
[75] Andreen, W. L. (2003): "The Evolution of Water Pollution Control in the United States – State, Local, and Federal Efforts, 1789-1972: Part II", 22 Stan. Envtl. L.J. 215, p240-55.
[76] Andreen, W. L. (2008): Delegated Federalism versus Devolution: Some Insights from the History of Water Pollution Control in, Preemption Choice: The Theory, Law, and Reality of Federalism Core Questions 13, in William W. Buzbee, ed., Cambridge Uni. Press.

the USA Congress responded in 1972 with the CWA[77] "*to restore and maintain the chemical, physical, and biological integrity of the Nation's waters*"[78].

3.2 Revolutionary Legal Characteristics of the CWA

The CWA has several revolutionary characteristics. Most significantly, it converted the conception of the 1948 FWPCA from the presumption of free discharge of water pollutants into the national waters to discharge with permission. This represents a federal regulatory change to water pollutants discharge behavior and simplifies the definition of water pollution as "the man-made or man-induced alteration of the chemical, physical, biological, and radiological integrity of water".[79] Section 301 of the law prohibits the illegal discharge of pollutants without permit. The law also states that violation of the permit conditions is illegal,[80] no matter whether the discharge causes harm.

For a long period, environmental legislation in the USA was a matter for the states and local governments. However, state environmental laws are not applicable to trans-boundary water pollution problems. The CWA was revolutionary also because it made a cooperative institutional arrangement under federalism, and within this arrangement, the federal government was the primary authority over the water pollution control affairs and the states, delegated with limited powers under the supervision of the federal government, were the secondary authority.

The CWA not only created broad federal jurisdiction over the waters of the USA, but also the basic structure for regulating pollutants discharged into its waters and for regulating the surface water quality standards. A comprehensive strategy was developed to achieve the objectives of the law, namely, the "National Pollutants Discharge Elimination System" (NPDES)[81]. The NPDES makes concrete the requirements for the limitation of wastewater discharge using the following three key components: Effluent water discharge standard; Water quality based standard, and total maximum daily loads; Enforcement of the law.

[77] 33 U.S.C. §§1251-1387, CWA Sec.101-607.
[78] 33 U.S.C. §1251(a), CWA Sec. 101 (a).
[79] 33 U.S.C. §1362 (19), Section 502 (19).
[80] 33 U.S.C. §§1311(a), 1342, 1344. CWA Sec. 301(a), Sec.402 and Sec. 404.
[81] 33 U.S.C. §1342(a), Sec. 402 CWA.

(The CWA made provisions for federal law enforcement in Section 309.[82] Other components of the NPDES include: mechanism for funding the building and upgrading of sewage treatment plants; voluntary planning system to address nonpoint source pollution; and wetlands permitting program. These components are not considered in this thesis.)

The CWA is also featured with a citizen suit provision (Section 505 of the CWA) in the statutory enforcement scheme allowing private citizens to act like a private attorney general against persons who are alleged to violate permit requirements or against the administrators for failure to enforce the law. The citizen suit is realized by making a calculation between the permittee-made Discharge Monitoring Reports (DMRs) and the officially- required discharge limitation. Permittees must submit a DMR for each numbered outfall and each measured pollutant to the state, and all of those must be available to the public for review. Due to the USA Freedom of Information Act, explicitly applying only to executive branch government agencies, these USA agencies make all bureaucratic and technical procedures accessible for the public's application for the document from that agency. Agencies are also subject to penalties for hindering the process of a petition for information. The USA federal and state EPAs have developed various databases and tools to safeguard the citizens' "right to know" about the food safety, air pollution, water quality, toxic substances, hazardous wastes etc. They have designed the web-based DMR Pollutant Loading Tool to help the public determine who is discharging, what pollutants they are discharging and how much, and where they are discharging. The tool calculates pollutant loadings from permit and DMR data from the EPA's Integrated Compliance Information System for the National Pollutant Discharge Elimination System (ICIS-NPDES). Data are available from the year 2007 to the present.[83] On the report, the limit for the pollutant is listed beside the measurement from the sample. If the sample exceeds the limit, the sampler must make an "x" in a column called "violation." The member of the public can then demand that the state take enforcement action within 30 days. If the state does not, the public can enforce the law. This process is extremely powerful and makes

[82] Any person who violates section 301, 302, 306, 307, 308, 311(b)(3), 318 or 405 of this Act, or any permit condition or limitation implementing any of such sections in a permit issued under section 402 of this Act by the Administrator, or by a State, or in a permit issued under section 404 of this Act by a State, or any requirement imposed in a pretreatment program approved under section 402(a)(3) or 402(b)(8) of this Act, and any person who violates any order issued by the Administrator under subsection (a) of this section, shall be subject to a civil penalty not to exceed $25,000 per day for each violation. In determining the amount of a civil penalty the court shall consider the seriousness of the violation or violations, the economic benefit (if any) resulting from the violation, any history of such violations, any good-faith efforts to comply with the applicable requirements, the economic impact of the penalty on the violator, and such other matters as justice may require. For purposes of this subsection, a single operational upset which leads to simultaneous violations of more than one pollutant parameter shall be treated as a single violation.

[83] http://cfpub.epa.gov/dmr/, last visit on 25 Jul 2015.

the CWA, in practice, very different from China.[84] More detailed discussions on these issues are given in Chapter 6.

3.3 The NPDES Permit Program

When the CWA was passed, it was hoped that discharges would be eliminated by 1985. This goal was not achieved, but with improved technology the discharge standard will be tightened over time until pollution discharge is eliminated. Permit limitations are set either according to technology-based effluent limits or water-quality-based standards, whichever is more stringent. Technology-based limits are set for those types of dischargers such as mining industries, taking into account what level of pollution control is economically and technologically feasible for all dischargers of each type, as the minimum requirements for the permittees, technology-based limits are sometimes not sufficient to protect receiving waters from pollution, so the water quality based standards must be complied with. The NPDES permit carries source-specific regulations and, once issued, the performance obligations. Significant penalties may result from violations of the regulations and obligations.[85]

Unlike uniform technology-based effluents limits, water quality based standards are tailored to the use designations and values of specific water bodies, made by states and approved by the federal EPA; the states must then set technical criteria, narrative description or numeric, in general, the use designation will dictate the criteria that will be applied, for example, if a water is designated for general use, which includes swimming use, there will be criteria for pathogens that will be applicable.[86]

3.3.1 Technology-based Standard

The basic philosophy of the CWA/NPDES is to prevent water pollution through technological innovation and advancement. Thus, as the USA Congress enacted the law, priority was set to the technology-based controls at the point source discharges, i.e., each point source discharger must obtain a permit and comply with the relevant limitations the permit requires. Noncompliance with the permit requirements results in administrative, civil or criminal penalties. The technology-based standard limits the effluent discharge at its source and

[84] Junker, K. W., letter to the author on 28 Jul 2014.
[85] Schoenbaum, T. J. and R. H. Rosenberg (1996): Environmental Policy Law. 3rd ed., Westbury, N.Y.: Foundation Press, p1245.
[86] Illinois Water Quality and the Clean Water Act: A Report of the Environmental Law & Policy Center. Oct 2003, p7, http://elpc.org/wp-content/uploads/2008/06/ilwaterquality1.pdf

demands basic wastewater treatment before it enters the surface waters of the US. This standard requires the same level of technological treatment for a particular industry and prevents the dischargers from escaping from the states with stricter legal requirements to the states that are more lenient.

The technology-based standards are determined on the basis of a number of factors, including the available technology of different industries, the type of pollutants, the amount of pollutant production, the techniques for wastewater treatment etc. Three categories of standards have been developed for (1) industrial sources; (2) public-owned treatment water facilities (POTWs); and (3) indirect discharge sources (with the exception of urban water treatment facilities).[87]

This technology-based standard requires the EPA, authorized by the law, to consider what pollution reduction controls are available to best meet the congressional goals, and requires the industry to select the technology that best satisfies the controls. The EPA has thus established more than 50 sets of standards for a wide spectrum of industries, including coal mining, chemical manufacturing, iron and steel, etc.[88] These standards are then incorporated into the NPDES as criteria for permits issuance for specific facilities. With this approach, the NPDES sets concrete and measurable limits on the amount of pollutants discharged.

To establish the technology-based standard, pollutants discharged from industrial sources are classified into the types of conventional, toxic, non-toxic, or nonconventional. As detailed in Table 3.2, industrial dischargers must comply with the Best Practicable Control Technology Currently Available (BPT), Best Conventional Pollutant Control Technology (BCT), and Best Available Technology (BAT). New sources are required to follow the Best Available Demonstrated Control Technology (BADT).

The standards for POTWs (Public Owned Treatment Works) differ somewhat from those for industrial sources. POTWs are required to implement “secondary treatment” to reduce the oxygen demand of organic waste and total suspended solids by 85%. For industries discharging toxic pollutants into a POTW system, “pretreatment standards” apply. The EPA promulgated the “general pretreatment requirements” which require the elimination or drastic

[87] Id, 86, Illinois Water Quality and the Clean Water Act.
[88] McGaffey, K. M. (2003): Water Pollution Control Under the National Pollutant Discharge Elimination System. In “The Clean Water Act Handbook”, 2nd ed. By Mark Ryan. Chicago, Ill.: Section of Environment, Energy, and Resources, American Bar Association.

reduction of wastes that would interfere with the POTW operation or leak through the POTWs to the receiving water. The EPA also promulgates "categorical pretreatment standards" which limit the amount of pollutants that facilities within particular industries are allowed to discharge.[89] Separate standards are promulgated for existing sources and new sources, and POTWs have the power to impose additional requirements.[90] The CWA rules that the public treatment facilities must reach the second class water treatment standard by Jul 1, 1977, designed the USA EPA for the public treatment facilities.

Technology-based regulation is even-handed in that all members of the same industry are treated equally. Because technology-based standards set minimal levels of control with which all states must comply, these standards take away incentives that industry might have to relocate in states with less severe environmental problems or to states with less stringent standards.[91] Furthermore, as the standards are incorporated into the NPDES, the permit compliance and enforcement are significantly simplified. The permittee knows exactly what is expected and regulators, what is required of the various sources. The determination of violations becomes relatively simple, because each permittee must periodically file "discharge monitoring report" which allows a comparison of the discharger's actual performance with the permit requirements. Because of this regulatory scheme, dischargers have to monitor their discharges and report the results to the regulators, as the EPA may conduct compliance inspections and the CWA imposes penalties on false reporting.

Much of the recent water quality improvement in the USA owes to the technology-based standards. It is believed to be responsible for the dramatic reduction of industrial and urban effluent discharges. It has been reported that, from 1973 to 1995, the amount of BOD discharges from industrial point sources fell by 40%.[92] This represented a decline from 5406 tons/day to 3243 tons/day (for USA national statistics, see Chapter 6). In 1998, the EPA estimated that discharges of toxic pollutants had been reduced by almost 10.8 million kg (24

[89] This is a useful measure for China. For example, the Jiangsu permit regulation does not set categorical pretreatment standards. Consequently, industries transfer polluted waters to the POTWs, increasing the treatment cost and often making POTWs the secondary polluters.
[90] Percival, R.V., C. H. Schroeder, A. S. Miller and J. P. Leape (2009): "Environmental Regulation: Law Science & Policy", p696. Aspen Publishers.
[91] Glicksman, R. L. (2009): The Advantages of Technology-Based Standards in Protecting Health, Safety, and the Environment. http://www.progressivereform.org/perspstatutory.cfm
[92] Stoddard, A., J. B. Harcum, J. T. Simpson, J. R. Pagenkopf and R. K. Bastian (2002): "Municipal Wastewater Treatment: Evaluating Improvements in National Water Quality". Wiley, pp672.

million pounds) annually, much of which was attributed to the significant declines in toxic discharges from the pulp and paper, aluminum, iron, steel, and leather industries.[93,94]

Table 3.2: Technology-based pollutants discharge standards.[95]

Technology-Based Standards			
Pollutant	Standard	How Set	Level of Protection
Conventional Pollutants. Biological oxygen demanding material (BOD), total suspended solids, fecal coliform, pH, oil and grease.	**Best Practicable Control Technology Currently Available (BPT).** The original 1977 deadline requirement. (Originally used to regulate conventional pollutants and non-conventional, non-toxic pollutants.)	**Reasonable efforts**. Based on the "average of the best" by well-operating plants in an industrial category. Subject to some cost-benefit balancing.	Baseline.
	Best Conventional Pollutant Control Technology (BCT).BCT was to be implemented between 1983 and 1989.	**Between reasonable efforts and best efforts**. May be required if deemed to be cost-effective under two cost-benefit tests. Subject to stringent marginal cost analysis.	Although envisioned as often more stringent than BPT, almost always the same as BPT.
Toxic and Nonconventional, Non-toxic pollutants. EPA currently lists 126 priority toxic pollutants, including mercury, lead and arsenic. Pollutants that fall into the nonconventional category, which includes, among others, heat, chlorine, and ammonia.	**Best Available Technology Economically Achievable** (BAT). BAT was to be implemented between 1983 and 1989.	**Best Efforts.** Based on the nest of the best performance within an industrial category. Consideration of cost, but no requirement that cost be compared to benefit.	**Most stringent**
New sources of toxic, conventional and non-toxic, nonconventional pollutants.	**Best Available Demonstrated Control Technology** (BADT). All new sources must incorporate the most technologically advanced discharge treatment processes.		At least as stringent as BAT for toxics and non-conventional, non-toxic pollutants. Conventional pollutants are also encompassed within the standard.

In addition to the technology-based standards for point source controls, the USA federal EPA and the states also issue "general permits" to regulate facilities that have similar operations

[93] Andreen, W. L. (2003–2004): Water Quality Today - Has the Clean Water Act been a Success? 55 Ala. L. Rev. 537 n. 268.
[94] Schroeder, C.H. and R. Steinzor (2004): A New Progressive Agenda for Public Health and the Environment: A Project of the Center for Progressive Regulation. Carolina Academic Press, pp268.
[95] Andreen, W. L. and S. C. Jones (2008): The Clean Water Act: A Blue Print for Reform, Center for Progressive Reform White Paper 802, Table 3.

and type of discharge. In many cases, identical effluent limitations and requirements have been compiled into one permit that can be applied to certain categories of discharges.[96] General permits are used to cover discharges that have a minimal affect on the environment. They simplify the permit application form, and reduce the states' issuance processing time, allowing quicker review time. In practice, storm waters associated with the construction or industrial activities, or small municipal storm waters tend to be subject to general permits. But general permits cannot replace individual permits, as the authorities retain the right to require dischargers to apply for individual permits. General permits issued by the states rely on self-regulation. This practice is believed to be ineffective. It has been reported that "Polluted storm water runoff is the leading cause of impairment to 40% of surveyed USA water bodies which do not meet water quality standards."[97, 98]

3.3.2 Water Quality Standard (WQS)

While effluent limitations focus on the waste stream as it flows out of a pipe, water quality standards focus on the overall quality of the receiving water. This is a vital aspect of the Act's comprehensive regulatory strategy because compliance with effluent limitations alone does not necessarily result in good, or even adequate, stream quality. For waters that are unable to meet water quality standards after the application of effluent limitations, the states are to establish TMDL and allocate the pollutant loading among the responsible sources. [99]

Three considerations are taken in the WQS:

(1) Designations of the water's beneficial uses;

(2) Water quality criteria necessary to protect the beneficial uses. The criteria are established by the states and reviewed by the federal EPA. The basic criteria is that substances must not be discharged into the USA waters whenever and wherever, which threaten human and aquatic lives;

(3) Anti-degradation policy including preventive measures, implementation strategy, enforcement, supervision and inspection.

States are also responsible for setting the interstate WQS.

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[96] http://www.epa.ohio.gov/dsw/permits/gpfact.aspx

[97] NPDES Regulation and Effluent Limitation Guidelines and Standards for CAFOs, 68 Fed. Reg. 7176 (12 Feb 2003)

[98] Thorne, J. H. (2004): NPDES Permits Have Come to the Animal Feeding Industry. 19 Nat. Res. & Env't 76, 77.

[99] Andreen, W. L. (2007): Motivating Enforcement: Institutional Culture and the Clean Water Act. Pace Environmental Law Review (PELR), Volum 24, 67. U of Alabama Public Law Research Paper No. 985121.

The purpose of the WQS is to allow the states to assess whether the technology-based standard is adequate to protect the water quality. The WQS allows states

(1) to identify waters which fail to meet the water quality standards despite the application of the technology-based standards;
(2) to target these waters by taking into account the severity of the pollution; and
(3) to determine the "total maximum daily loads" (TMDLs) so that these waters meet the applicable water quality standards. A TMDL sets the total loading for each of the relevant pollutants, which is then divided into a loading to be allocated to the contributing point sources (Waste Load Allocation) and a loading allocated to non-point and natural sources (Load Allocation).

If the TMDL sets much stricter requirements than the technology-based standards on the point sources, then the states must work to reduce point and nonpoint sources of pollution so that the water quality standards can be met, as the CWA Section 303 rules the NPDES permits must include more stringent limitations necessary to meet the WQS. Accordingly, when the TMDLs are established, dischargers must comply with the more stringent permit limitations to meet the waste load allocation under the TMDLs.

3.3.3 Institutional Arrangement: Cooperation between EPA and States

The dual-standard strategy created a mechanism for the federation and the states to cooperate on water quality issues. The NPDES permit system is administrated by the federal EPA and the authorized states (now 46 states and 1 territory)[100] in the form of "cooperative federalism". Cooperative federalism is a congressional or administrative effort[101] to induce states to participate in a coordinated federal program.[102] In the case of environmental protection, it focuses on federal EPA's pollution control laws where states participate in the implementation of federal standards.[103] The USA federal government in some cases (*California v. U.S.*[104], *Schaffer v. Weast*[105]), provides financial support to the state for its own programs, if it is not in compliance with federal conditions, the state will lose significant federal funding; in other cases (*Hodel v. Virginia Surface Mining & Reclamation*

[100] http://water.epa.gov/action/cleanwater40/cwa101.cfm, last visit on 25 Jul 2015.
[101] Fischman, R., (2005): Cooperative Federalism and Natural Resources Law. NYU Environmental Law Journal 14, p179, p189
[102] Id, 101, Fischman, R., (2005), p184.
[103] Id, 101, Fischman, R., (2005), p189.
[104] 438 U.S. 645 (1978)
[105] 546 U.S.49 (2005)

Association[106]，*FERC v. Mississippi*[107]，*Arkansas v. Oklahoma*[108]), the Congress states that it will take over the regulation of an activity at the national level, unless the State's implementation of its own regulation meets minimum federal standards.

Overall, cooperative federalism is a concept of federalism in which national, state, and local governments interact cooperatively and collectively to solve common problems, and it is a method to encourage the states to implement the federal programs. For example, under the CWA, the federal EPA decides the national policy and technology-based standards, the states tailor the standards and if the technology-based standards do not secure the water quality in the relevant states, then the water quality standard prevails over the technology-based standard for permit issuance. States also implement the NPDES permit schemes and enforce laws (states administrative and judicial procedures).

By now, 46 states have been delegated with permit administration authority in different scopes.[109] The states, however, must comply with the federal requirements and are subject to the EPA's supervision. The EPA is entitled to veto the decisions of states. If a state fails to administer its NPDES authority, then the EPA has a mandatory duty to initiate proceedings under the CWA Section 402[110] to withdraw delegated NPDES permitting authority when it has the factual knowledge of shortfalls in the program of the state, as for the case of *Save the Valley, Inc. v. USA EPA*[111]. But the EPA has used its veto power only 13 times since 1972, with the most recent being the Spruce No. 1 Mine case on 13 Jan 2011.[112] The federal EPA is typically seen as the "dominant partner" in the federal-state collaboration, but the USA Constitution reserved to states all powers that were not explicitly allocated to the federal government, and the federal resources are limited, the federal government often relies heavily on state cooperation and involvement to achieve national environmental goals.[113]

[106] 452 U.S. 264 (1981)
[107] 456 U.S. 742 (1982)
[108] 503 U.S. 91 (1992)
[109] Another important permit system is the "dredge and fill" permit program, under which the USA Army Corps of Engineers issues these permits to allow the removal (dredging) and addition (fill) of materials from or to navigable waters. The Corps has delegated dredge and fill permitting to only several states. The CWA Section 404, 33 U.S.C. §1344. This study only considers the NPDES water permit system.
[110] 33 U.S.C. §1342(c)(3).
[111] 223F. Supreme Court 2d 997.
[112] USA EPA (2011): The Clean Water Act Section 404(c) "Veto Authority". http://water.epa.gov/lawsregs/guidance/cwa/dredgdis/upload/404c.pdf, last visit on 25 Jul 2015.
[113] Sweeney, K. M. and S. A. Armstrong (2013): Cooperative Federalism in Environmental Law: A Growing Role for Industry, 21st Section Fall Meeting Baltimore, MD October 9-12, p2.

An essential advantageous effect of the cooperative federalism[114] is that it could avoid the pollution facilities moving from the states with more stringent mechanisms imposed on the states with less stringent water quality standards, because the technology-based standards are nationally equally applicable and the water quality standards are also subject to the guidance of the federal EPA. At the same time, it is an incentive for the states to establish their own rules for permit compliance and law enforcement. This is particularly relevant for China. To prevent water pollution of the Taihu Lake in the late 2000s to early 2010s, polluting chemical plants were transferred out of Zhoutie Town and sold to less developed regions, resulting in water pollution in these regions (see Chapter 7).

3.4 An Appraisal of NPDES: Successes and Problems

The primary goal of water quality protection in the USA is to achieve clean and safe water required by the CWA and the SDWA (Safe Drinking Water Act). Studies show that the NPDES has been remarkably successful in achieving these goals. Much of this success is attributed to the implementation of the technology-based standards and the enforcement of the law. In 1998, the USA federal EPA estimated that the implementation of the technology-based standards resulted in a reduction of conventional pollutants discharge by 49 kt and toxic pollutants discharge by 10.8 kt per year.[115]

The use of the technology-based standards is a "do-your-best" approach. However, the EPA has made no major updates to the standards since their establishment in 1982, although the technology has significantly advanced. The lack of upgrading of the technology-based standards means that they no longer represent the "do-your-best" philosophy. Recent USA EPA reports indicate that newer technology-based standards will be developed, aiming at reducing the discharge even further.

The absolute level of pollutant discharge in the USA remains high. According to the USA EPA[116], more than 100 kt of toxic chemicals were discharged into the waters in 2011. This level of toxic discharge has hardly changed over the years. About 1/5 of this amount was released from indirect industrial dischargers subject to the pretreatment program. Many facilities fail to meet pretreatment standards, but as a customer of the POTW, an indirect

[114] Id, 101, Fischman, R. (2005), pp183, 187-188.
[115] Schroeder, C. and R. I. Steinzor (2005): A New Progressive Agenda for Public Health and the Environment. Durham, NC: Carolina Academic Press, pp228.
[116] USA EPA (2013): 2011 Toxic Release Inventory National Analysis Overview

discharger generally "can expect more sympathetic monitoring and enforcement from the POTW than would a direct discharger from a state or federal permitting agency."[117]

Although the NPDES takes the dual-standard approach, its success mostly owes to the technology-based standard. In recent years, the WQS has been increasingly used to help prevent water pollution. According to the federal EPA statistics, since Oct 1995, the states have reported 41,567 water bodies as impaired to the federal EPA (CWA §305b and §303d) and 72,305 causes of impairment. In terms of the federal cumulative total, 51,699 TMDLs have been implemented and 54,715 causes of impairment addressed.

Table 3.3: The USA national number of TMDLs implemented and the number of causes of impairments addressed since Oct 1995.[118] The EPA Fiscal Year starts Oct 1 and ends Sep 30.

Fiscal Year	Number of TMDLs	No. of Causes of Impairment Addressed
1996	122	123
1997	337	351
1998	402	408
1999	330	373
2000	1,557	1,583
2001	2,580	2,616
2002	2,743	2,823
2003	2,999	3,272
2004	3,378	3,636
2005	4,317	4,632
2006	4,210	4,563
2007	4,321	4,651
2008	9,262	9,545
2009	4,402	4,628
2010	2,567	2,703
2011	2,830	3,113
2012	2,885	3,154
2013	2,359	2,442
2014	98	99
Total	**51,699**	**54,715**

Table 3.3 shows that the number of TMDLs implementation increased from 122 in 1996 to 9262 in 2008, and since then has been declining. This shows that while the NPDES takes a dual-standard strategy, it has taken more than a decade for the strategy of the WQS to reveal

[117] Goldfarb, W., U. Krogmann and C. Hopkins (1999): Unsafe Sewage Sludge or Beneficial Biosolids?: Liability, Planning, and Management Issues Regarding the Land Application of Sewage Treatment Residuals, 26 B.C. Envtl. Aff. L. Rev. pp687, 697-698.
[118] USA EPA, http://iaspub.epa.gov/waters10/attains_nation_cy.control?p_report_type=T, last visit on 25 Jul 2015

its true potential. This is because the federal EPA was initially primarily occupied with establishing and implementing the technology-based standards.[119] In addition, the WQS are in practice difficult to implement, as it must be based on extensive water quality monitoring and sophisticated decision supporting system, such as the Geographic Information System and water quality models. Even today, more than four decades since the CWA was implemented, the USA only monitors 31.3% of rivers and stream sections (miles), 44.4% lakes, reservoirs and ponds (acres), 40.0% bays and estuaries (miles^2), 14.0% coastal shorelines (miles), 3.1% ocean and near coastal waters (miles^2) and only 1.1% wetlands (acres). The best monitored water bodies are the Great Lakes shoreline (85.2%, miles) and waters (88.1%, miles^2). [120]

The USA experience shows that for developing countries such as China, where a rigorous water monitoring system and decision supporting tools are yet to be developed, it would not function to use the WQS as the primary tool for water pollution prevention and control. Even with political willingness, action cannot be taken in the absence of scientific data.

In addition to the technical feasibility, the success of the NPDES depends critically on the following five factors:

(1) a new ethical premise that the water should simply be clean;
(2) the sound design of discharge limitations for permit holders;
(3) the enforcement of the law;
(4) the close cooperation between the federal EPA and the states; and
(5) public input.

The NPDES was designed to prevent water pollution from point sources. It has become increasingly clear that non-point sources (e.g. agriculture, atmospheric deposition etc.) of water pollution must also be considered. However, for the state to assign pollution reductions to nonpoint sources and to enforce their assignment are more difficult than to control point sources.

[119] Houck, O. A. (2002): The Clean Water Act TMDL Program: law, Policy, and Implementation. Environmental Law Institute, pp362.
[120] USA EPA, National Summary of State Information, Assessed Waters of United States, https://ofmpub.epa.gov/waters10/attains_nation_cy.control, last visit 18 Apr 2016.

Chapter 4: China's Water Pollutants Discharge Permit System

For years, uncontrolled discharge of industrial and domestic wastewater as a result of industrialization and urbanization and the widespread use of pesticides and fertilizers for farming have caused severe degradation of water quality in China. China's legal system is forced into action to develop water protection laws in response to the pressing problem of water pollution. At the time when the USA Congress enacted the CWA in 1972, an environmental legal framework was non-existent in China. This Chapter describes the statutes and regulations for China's water pollutants discharge permit system, with reference to the USA CWA/NPDES described in Chapter 3, with full awareness that the political, social-economic and cultural backgrounds for the environmental legal frameworks of the two countries are profoundly different.

4.1 Water Pollution in China

China comprises 20% of the world's population but only 7% of global water resources. While the country has 2400 ~ 2800 billion m^3 available in total per year[121], the amount of available water per capita is only 2093 m^3 (northern China 750 m^3), 1/3 of the world average and ¼ of the USA average of 9044 m^3. By 2030, if China's population increases to 1500 million, then the water availability per capita is expected to decrease to 1500 ~ 1760 m^3/year (northern China 250 m^3), which is at the water scarcity threshold of 1700 m^3/year.

Water resource distribution in China, due to the monsoon climate and topography, is highly variable in space and time. The major rivers in China together with their annual runoffs are shown in Appendix A1. The basic facts are that Southeast China has abundant water and frequent floods, while Northwest China has water shortages and frequent droughts. Large uncertainties exist for the future water resources in China, in part, as consequence of climate change. Over the past half century, North China has become drier and warmer, but South China, wetter[122]. In general, China has been experiencing more frequent severe floods and droughts.[123]

[121] World Bank (2013): 2013 Environment. World Development Indicators: Freshwater. Data for 2011 are used, http://wdi.worldbank.org/table/3.5

[122] Ye, J. S., W. H. Li, L. F. Li and F. Zhang (2013): North drying and south wetting summer precipitation trend over China and its potential linkage with aerosol loading. Atmos. Res. 125-126, p12–19.

[123] Yu, M. X., Q. F. Li, M. J. Hayes, M. D. Svoboda and R. R. Heim (2013): Are droughts becoming more frequent or severe in China based on the Standardized Precipitation Evapotranspiration Index: 1951–2010? Int. J. Clim. DOI: 10.1002/joc.3701.

China's modernization has been accompanied by the rapid increase of industrial water usage, massive urbanization and urban domestic water use. By 2008, China had 190 cities with populations exceeding 300,000, 60 exceeding 1 million, and 10 exceeding 5 million and one over 10 million.[124] In 2012, the Ministry of Water Resources (MWR) announced that out of the 663 cities in China, more than 400 were suffering from water shortages, with 110 classified as "severe".[125]

China's wastewater is divided into three main categories:

(1) domestic sewage;

(2) industrial wastewater with high concentrations of conventional (e.g. oil and grease), toxic (e.g. heavy metals, volatile organic compounds) or other nonconventional pollutants (e.g. ammonia); and

(3) agricultural wastewater with sediment, nutrients of fertilizers and pesticides.

Among these categories, domestic sewage and industrial wastewater are subject to more strict regulations, while agricultural wastewater flows more or less freely. According to the MEP, by 2012, China had 8173 surface-water quality cross-section monitoring stations in its main water systems and 2995 drinking water quality monitoring stations[126]. Measurements of water quality include water temperature, pH, turbidity, electrical conductivity, BOD_5 and COD Mn (高锰酸盐指数), volatile Phenol (挥发酚类), Ammonia-Nitrogen (NH_3-N) (氨氮) and total organic carbon (总有机碳). Using these measurements, the water quality is classified into 5 grades as following:

- Grade I: unpolluted water;
- Grade II: safe for rare and valuable aquatic species;
- Grade III: can be used for swimming and aqua farm, as well as sanctuary for common fish species;
- Grade IV: can be used for industrial and recreational activities, pending no direct contact with human bodies;
- Grade V: only acceptable for agricultural uses and landscape design;
- Grade V+: not suitable for any use.

[124] China City Statistical Yearbook 2008. China Statistics Press, p480.
[125] Ministry of Water Resources: http://www.mwr.gov.cn/english/cpws.html, last visit on 25 Jul 2015
[126] MEP (11 Apr 2013): Report on the State of the Environment in China 2012. **全国环境统计公报(2012 年)**

According to the MEP[127], in 2009, the seven major rivers of China: Changjiang, Yellow, Pearl, Songhuajiang, Huaihe and Liaohe rivers were already polluted. Among the 408 sections of 203 rivers monitored, sections with water quality Grade I to III, Grade IV to V, and Grade V+, accounted respectively for 57.3%, 24.3% and 18.4%. The major three lakes, Taihu, Dianchi and Chaohu Lake were severely polluted with high Total Nitrogen (TN) and Total Phosphorus (TP) contents. This lead to large scaled algae disasters, e.g., in Taihu in 1996, 2003 and 2007.

China's water resources have also been threatened by pollution incidents. In 2009, for example, the MEP dealt with 171 environmental incidents, 80 of which were water pollution accidents.[128] These pollution events caused great damage to public welfare and resulted in heavy economic losses, which were eventually cleaned up by the government. In 2012, the MEP reported[129] that 73% of China's surface waters has water quality Grade I-III, 11.3% Grade IV, 6.1% Grade V and 8.7% Grade V+.

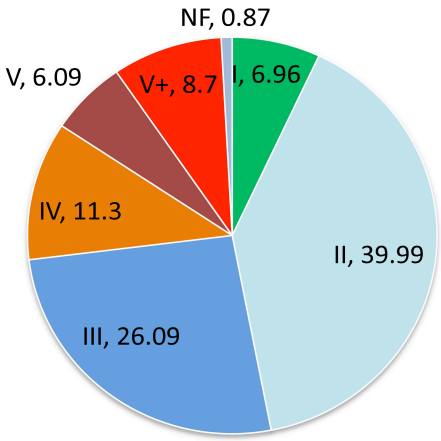

Figure 4.1: Area fraction of China's water quality grades for April 2012.[130]

International researchers provided a more grim assessment of China's water pollution problem. For instance, Gleik et al. (2009)[131] pointed out that "*China's water resources are over allocated, inefficiently used, and grossly polluted by human and industrial wastes, to the point that vast stretches of rivers are dead and dying, lakes are cesspools of waste, groundwater aquifers are over-pumped and unsustainably consumed, uncounted species of*

[127] MEP (2010): Report on the State of the Environment in China 2009, http://english.mep.gov.cn/
[128] Id, 127, MEP (2010)
[129] MEP (2012): Report on the State of the Environment in China 2011, http://english.mep.gov.cn
[130] Id, 129, MEP (2012)
[131] Gleik, P. H., H. Cooley, M. J. Cohen, M. Morikawa, J. Morrison and M. Palaniappan (2009): The World's Water 2008-2009: The Biennial Report of freshwater Resources. Islandpress, pp423.

aquatic life have been driven to extinction, and direct adverse impacts on both human and ecosystem health are widespread and growing".

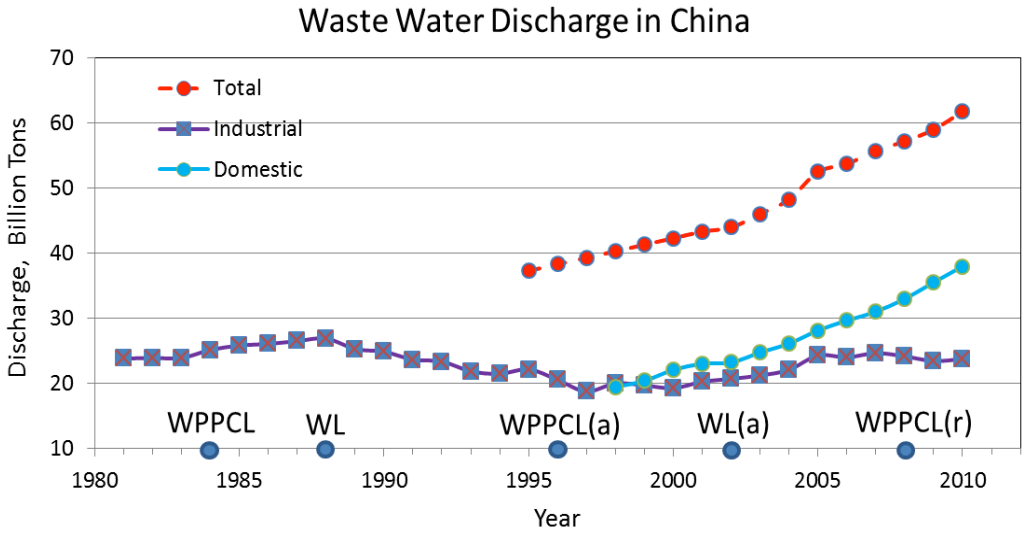

Figure 4.2: Discharge of wastewater in China since 1981. Industrial wastewater discharge, domestic wastewater discharge and total wastewater discharge are shown in billions of tons. Data for domestic wastewater discharge and total wastewater discharge prior to 2000 are not available. Data for the period 2001 – 2012 are obtained from the Report on the State of Environment of China for 2001 - 2012[132], which are available from the data center of the MEP, and the data for the period prior to 2001 are obtained from the National Bureau of Statistics of China[133].

The trend of total wastewater discharge in China has been on the increase (Fig 4.2). While the industrial wastewater discharge has been limited to the levels of the 1980s, the domestic wastewater discharge has been sharply increasing since the record began in 2001 due to an increased middle class in China with more disposable income, and correspondingly more use of resources. Controlling the general population's domestic use of water is far more difficult than controlling the dirty industries.[134]

From 2001 to 2012, the annual total COD emissions decreased from 14.05 to 12.70 Mt, and the annual total ammonia emissions increased from 1.25 to 1.73 Mt. These numbers did not include the agricultural sources. Since 2011, the MEP has included the COD and ammonia emissions from the agricultural sources. The annual total COD emission amounts to 24.24 Mt for 2012 and the annual total ammonia emission amounts to 2.54 Mt.

[132] MEP, Report on the State of Environment for 2001 – 2012. Data from the Waste Water Section in Chinese (not in English version) at http://www.mep.gov.cn/zwgk/hjtj/.
[133] Vennemo, H., K. Aunan, H. Lindhjem and H. M. Seip (2009): Environmental Pollution in China: Status and Trends. Rev Environ Econ Policy 3(2): 209-230.doi: 10.1093/reep/rep009
[134] Junker, K. W., letter to the author on 28 Jul 2014.

Water pollution leads to water-related diseases, especially among children. For instance, intestinal worms associated with lack of safe water and adequate sanitation is a serious problem in rural China since the 1990s. The Organization for Economic Cooperation and Development (OECD) Environmental Indicators issued in 2007 estimated that 30,000 rural children in China died each year from diarrhea caused by polluted water.[135] The World Health Organization reported an incidence of 108.4 mortalities per 100,000 persons from diarrhea-related illness in China in 2002.[136]

The emphasis of China's social economic development over the past few decades has been strongly tilted towards economic growth to create opportunities for employment and income increase. In today's China, there is no doubt that these are the foremost factors which determine social stability, although people's satisfaction can be measured in various ways[137]. The impressive economic growth has been accompanied by the neglect of environmental protection. In the context of this thesis, the prevention of water pollution is thus hampered by the passive attitude of the local governments which prefer to protect local industries and economic opportunities. Corruption and the desire for rapid economic growth are crippling China's environmental agencies at provincial levels.[138] At the same time, water pollution also threatens social stability, because significant outbreaks of water pollution related illnesses, including cancers in heavily polluted areas, drive up health care costs and trigger social unrest. There is a growing internal dissent and conflict over both water allocation and water quality, raising new political pressures on the government to more seriously address the nation's water problems. In 2005, the Chinese government acknowledged that 50,000 environment-related protests occurred that year, many of which were related to water pollution.[139]

4.2 Legal Characteristics of Water Pollution Prevention and Control Law 2008

In the USA, the Supreme Court has the authority to invalidate legislation or executive actions which, in the Court's judgment, conflicts with the Constitution. This power of "judicial

[135] OECD (2007). "OECD Environmental Performance Review of China". Paris, Organization for Economic Cooperation and Development.
[136] World Health Organization (2003): "Children's Mortality Rates 2003".
[137] Easterlin, R. A., R. Morgan, M. Switek and F. Wang (2012): China's life satisfaction, 1990 – 2010. Proceedings of the National Academy of Sciences of the United States of America, 109, 9775 – 9780, doi:10.1073/pnas.1205672109.
[138] Turner, J. L. (2006): New Ripples and Responses to China's Water Woes. Woodrow Wilson International Center for Scholars, China Brief, Vol 6, Issue 25.
[139] Id, 138, Turner, J. L. (2006).

review" [140] gives the Court a crucial responsibility in assuring individual rights, as well as in maintaining a "living Constitution". China's Constitution also enjoys the highest status. However, it plays only a symbolic role as directives for legislature, governmental action and citizens, but no institution could rely on it to decide the case of controversy which may be unconstitutional.

China's Constitution (1982) has explicitly stipulated in the General Principles (Chapter I) that all natural resources including waters are owned by the state, that is, by all people… The state ensures the rational use of natural resources… Appropriation or damaging of natural resources by any organization or individual by whatever means is prohibited (Article 9); the state protects and improves the environment in which people live and the ecological environment. It prevents and controls pollution and other public hazards (Article 26). These two articles establish the "obligation of the state" to protect environment and control pollution. However, this "obligation of the state" could not be applied as a constitutional basis for institutions, NGOs, or citizens to a lawsuit against the national or local governments. Neither such cases related with natural resources and environmental having ever been heard in a legal process.

The Constitution authorizes the SCNPC to enact and amend laws, with the exception of those which should be enacted by the NPC (Article 67, Sentence 2) such as criminal law, civil law and administrative law. In practice, the environment related laws including the EPL and WPPCL, are written by the SCNPC. The State Council is the highest administration organisation of China. It is authorized by the Constitution to adopt administrative measures, enact administrative rules and regulations and issue decisions and orders in accordance with the Constitution and the law (Article 89, Sentence 1); the MEP is a department of the State Council and it is in charge of implementing the environmental laws and drafting the national effluent discharge standards.

Correspondingly, the local environmental regulations are provided by the Local People's Congress of provinces and municipalities (directly under the Central Government) and their standing committees, which must not contravene the Constitution and the law and

[140] The power of "judicial review" of the Supreme Court deprives not directly from the expression of the Constitution, but was confirmed by Chief Justice John Marshall in Marbury v. Madison. In this decision, the Chief Justice asserted that the Supreme Court's responsibility to overturn unconstitutional legislation was a necessary consequence of its sworn duty to uphold the Constitution. That oath could not be fulfilled any other way. "It is emphatically the province of the judicial department to say what the law is," he declared. Chief Justice Charles Evans Hughes: "The republic endures and this is the symbol of its faith." http://www.supremecourt.gov/about/constitutional.aspx

administrative rules and regulations, and Local People's Congress should report such local regulations to the SCNPC for the record (Article 100, Constitution). Local EPAs also have the power to manage local environmental affairs, and the power to enact local standards, which could be stricter than the national standards.

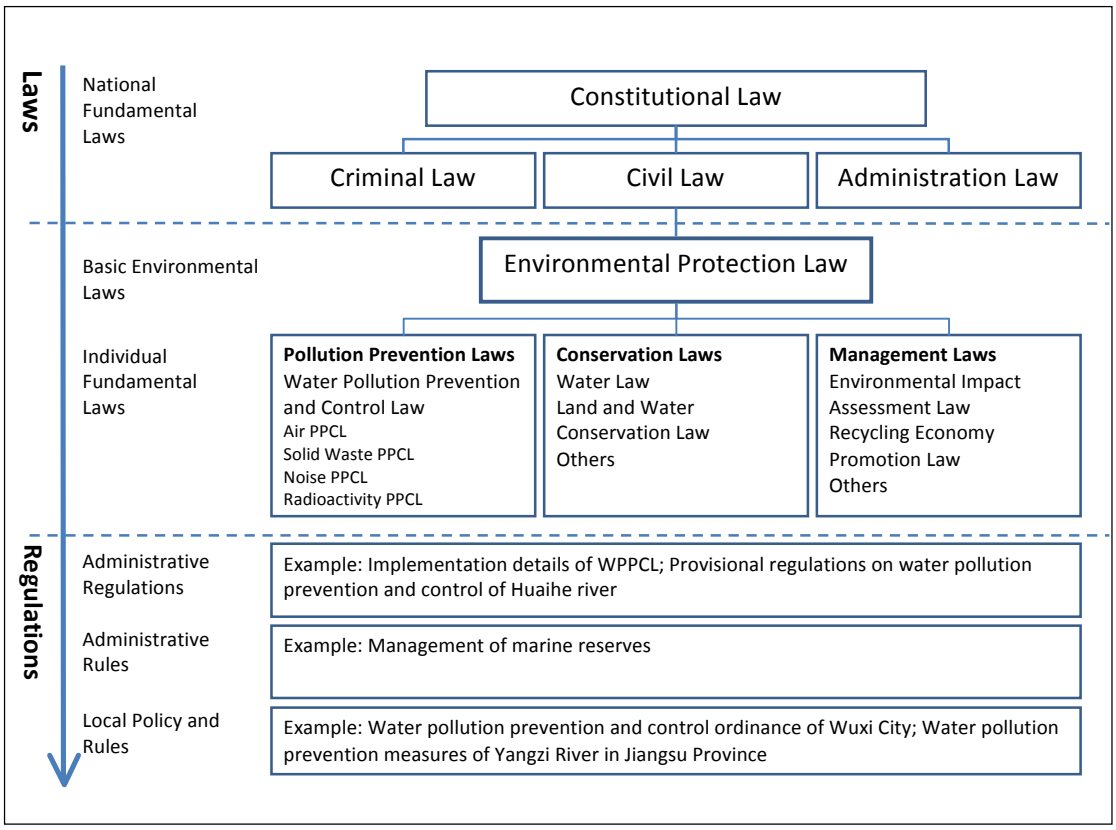

Figure 4.2: Environmental legal framework of China, which consists of national fundamental laws, the basic environmental law and individual environmental laws. The laws are implemented through administrative regulations, rules and policies. The diagram is drawn with reference to Qi and Zhou (2009)[141] and Chen and Piao (1994).[142]

4.2.1 Overview of Environmental Legal Framework of China

China's fundamental Environmental Protection Law (EPL), passed in 1989, could not keep in steps with the recent social and economic evolution. In 2011, the NPC started to revise the EPL. After four reviews by the SCNPC and twice public comments, it was passed on 24 Apr 2014 to be effective from 1 Jan 2015. The EPL contains 70 Articles in total and is now the leading statute for the environmental protection legal system. Article 45 of the EPL stipulates

[141] Qi, Y. and X. Zhou (2009): Water Pollution Control in China: Review of laws, regulations and policies and their implementation. Economic Analysis Team Institute for Global Environmental Strategies (IGES).
[142] Chen, H. G. and G. Z. Piao (1994): Foundation of Environmental Law. China Environmental Science Press, Beijing.

that the states should adopt the pollution permit system, that producers should discharge pollutants in accordance with the permit requirements, and that it is unlawful to discharge without a permit.[143] The permit system, in theory, crystallizes the requirements for pollutant discharge application, standards, monitoring, etc. Hence, for the discharger, the permit system is a law-abiding basis: a legal enforcement ground for the environment protection agency, and a source of pollutant discharge information for the public.

The WPPCL is a pioneering environmental law in the legislation history of the PRC, as the CWA is in the USA. The WPPCL was enacted in 1984, five years ahead of the EPL and other environment laws. It has served as a model for other environment laws which followed. The entire Chinese environmental legal framework has evolved over the years and is now at the stage as illustrated in Fig 4.2. In China's legal system, the constitutional law, criminal law, civil law and administration law are national laws fundamental to environmental laws and all other laws. The Constitution (1982) explicitly stipulated in Articles 9, 10, 22 and 26 that "The country protects proper use of natural resources, precious animals and plants. The country protects living environment and ecology, prevents and controls environmental pollution". The Criminal Law (1997) explicitly stipulated in Chapter 6 that "Damaging environment is a specific crime and have to commit criminal responsibility" and the Civil Law (1986) explicitly stipulates in Chapter 6 that "Anyone who damages the environment should commit civil responsibility". The EPL was first enacted in 1979 and officially issued in 1989. It rules on the principles, objectives, policies, key measures, management systems, organizational structures and legal responsibilities of environmental protection. The EPL enjoys high statutes in the legal system and acts as the basis for all other specific environmental laws, including pollution prevention and control laws, conservations laws and environmental management laws. The WPPCL is now a specific pollution prevention and control law dedicated to water.

For law implementation, the State Council and the relevant national administrative authorities (MEP, MWR etc.) establish regulations and rules which include operational plans, technical standards, enforcement measures etc. Over the years, China has established a large quantity (c.a. 2000) of administrative regulations, rules, policies and decrees. This vast amount of rules

[143]Article 45: the State shall adopt pollution administrative permit system in accordance with the law. Enterprises, public institutions and other producers and business operators pursuant to pollution permit system shall discharge pollutants in accordance with the requirements of their permits; No pollutant discharge is allowed without a pollutant discharge permit. China Daily, http://www.chinadaily.com.cn/language_tips/trans/2014-05/20/content_17522868_4.htm, last visit on 25 Jul 2015

partly reflects the urgency of the pollution problem and partly implies that many of these rules are to date, not successful.

Since the level of social-economic development in China is heterogeneous, the regulations and rules embody the spirit of "adaptation to local conditions". Local People's Congresses are responsible for interpreting the national laws and making correspondingly the local level statutes, while local governments are responsible for making local regulations and rules.

For major river basins, the regulations and rules (e.g. the Provisional Regulations on Water Pollution Prevention and Control of Huaihe River Basin) are made jointly by the State Council and the relevant administrative authorities, the MEP and MWR in particular, local governments and relevant local administrative authorities, and river-basin management committees. Further, local governments can make regulations and rules for their administration jurisdictions, such as the "Taihu Lake Water Pollution Prevention and Control Ordinance of Jiangsu Province" [144].

The WPPCL and related regulations have evolved considerably over time, with underlining philosophy and strategy that has evolved from "long-term concentration control" and "end of pipe cleaning up" to "total emission control" and "pollution prevention", from administrative "region-based pollution control" to "river-basin-based management", from "point-source control" to "all sources control" and from "single administrative mandatory orders" to "economic and legal tools". The WPPCL is however by no means completely and successfully implemented, and the environmental legal framework is still being tested and effective water pollution prevention and control measures to cope with the demand for pollutants discharge are yet to be found.

4.2.2 Revolutionary Amendments to WPPCL in 2008

With this background, the SCNPC substantially revised the WPPCL in 2008. The amendments have the following new features:

(1) Increased responsibility of the local governments (at or above the country level) for water protection and enhanced supervision of the performance of the local governments by means of the "target responsibility system" and "evaluation system" (Article 5).

[144] Standing Committee of the People's Congress of Jiangsu Province, China: 江苏省太湖水污染防治条例. Passed on 14 Jun 1996; Amended on 27 Sep 2007, 29 Sep 2010, 12 Jan 2012; Effective on 1 Feb 2012.

(2) More stringent liability for water polluters by increasing amount of administrative penalties (Chapter 7). Article 83 stipulates that in the event of most severe pollution accidents, the penalty shall amount to 30% of the total economic damage and therefore should there be no upper limit of the penalty.

(3) Adoption of the "Total Effluent Control on Major Water Pollutants" strategy. Article 18 stipulates that the governments at the provincial level should establish and control the total amount of key water pollutants allowed to be discharged, and allocate the total amount to local governments at the city and county level. These local governments should then distribute their allocations to the enterprises in the relevant administrative territories. In the process of TEC implementation, governments have wide discretionary power to distribute the allocation among the lower-level local governments and among the enterprises. Therefore, the abuse of this discretion and unfair distribution may be an inherent risk of the TEC strategy.

(4) The water pollutants discharge permit system (Article 20) is written into the law. In fact, a permit program already existed in China since 1988. But over the 20-year period (1988 – 2008), this program was largely ignored and rarely enforced and thus, it only existed in name. Although the WPDP system has been written into the WPPCL 2008, matching regulations for its operation is until today not in place.

(5) Article 88 of this law made significant progress in facilitating the environmental damage litigation. Not only that the large number of victims could elect a representative for initiating a joint litigation (S.1) and the local EPA and social organizations could support the victims to raise a lawsuit (S.2), but also law firms and lawyers are encouraged to provide them with legal assistance (S.3). Article 88 guarantees only the victims with more opportunities to protect their interests through legal action. Also, NGOs have no standing to raise a lawsuit against polluters, because they are not "directly injured persons". Moreover, according to Article74 of the "Opinions of the Supreme Court on the Application of Civil Procedure Law of People's Republic of China"[145], and Article 4 of the "Several Provisions on the Evidence of the Civil Procedure"[146], the plaintiff should prove that "the fact of damages" exists, and the defendant should prove for the "iusta causa excusationis" (exemptions to the provisions of law) or no causality between the behavior and the damage results. The defendant otherwise loses the lawsuit, for that the reversal of the burden of proof applies. Although the burden of proof has been reversed from the plaintiff to the defendant, the plaintiff still has to prove: (1) the existence of the illegal behavior of the defendant, and (2) the existence of the consequent

[145]《关于适用〈中华人民共和国民事诉讼法〉若干问题的意见》, 第七十四条, in Chinese.
[146] 《关于民事诉讼证据的若干规定》, 第四条, in Chinese.

damages. It is extremely difficulty for the plaintiff to single out the responsible polluter among a large number of polluters, as this requires sophisticated technical and scientific methods to prove that the damages are the consequences of a particular pollutant. How can poor and ill villagers afford this? For this question, the USA tort law may offer a solution. In the latter law, individuals and groups can sue manufacturers and polluters who contribute a share of harm to the environment, and then it is up to the defendants to fight among themselves to see who pays and how much each pays. The justification is that if a defendant enjoys the benefits of the industrial economy and the industrial market, then the same defendant must bear the costs of demonstrating it has little or no liability. This is an economic way of shifting burdens of proof, not one based upon theories of liability or fault.[147]

4.3 The Role of Permit

Over the past years, China has changed her "pollutant concentration control" strategy to total emission control (TEC) strategy which is the current leading strategy. This concept was incorporated as a legal provision in the WPPCL in 1996. The total amount of permissible emission of certain pollutant, for example, COD is determined and the central government allocates the emission targets to each province, and then local governments allocate the amount of emissions among industries by use of a permit system. The TEC strategy proved to be useful to allow the government to make macroscopic adjustment to meet certain target, for example, the reduction of CO_2 emission through promoting energy efficiency or closure of emission producers.

However, the TEC strategy is prone to failure in water quality protection. The total permissible pollution emission depends on the pollution carrying capacity and pollution purification capacity of the water bodies. It is difficult to estimate these capacities, so that the total permissible pollution emission cannot be reliably determined. The process of emission allocation is complicated to the extreme and is vulnerable to manipulation. The continued deterioration of China's water environment has demonstrated that the TEC strategy failed to achieve the objectives of the WPPCL.

With this background, it is seen that the role of the WPDP is on the one hand, similar to the NPDES of the USA, a legal institution which raises the requirements for dischargers, and on the other hand, is used as an instrument to support the TEC strategy. In the CWA of the USA,

[147] Junker, K. W., communicated to the author on 28 Jul 2014.

the final elimination goal of water pollutants discharge depends on the success of the permit system, in contrast to China where the use of the WPDP depends on the TEC institution, for which permits serve to resolve the total amount of pollutant.

4.4 Regulations

A common feature of China's environmental laws is that they only state the general principles but their implementation relies on administrative regulations made by the State Council/MEP. Local governments and Environmental Protection Bureaus (EPBs) are also authorized to issue detailed regulations within their administrative jurisdiction. The administrative regulations differ from statutes, as they are frequently changed in accordance with policy priorities. These regulations are either made by the ministerial administrative agencies or by the provincial People's Congress and enforced by local EPBs. Over the past few decades, China's legislators have rapidly passed laws for environment and resource protection, but few of these laws seem to have achieved their objectives in practice. The WPPCL rules to employ innovative institutions such as an effluent permit program to control water pollutants discharge with strict provisions, but it has so far failed to reverse China's trend of increased water pollution. The reasons for the lack of success can be multiple, including judicial, economic, technological and implementation-and-enforcement related problems.

In 1988, the SEPA established the "Interim Regulations for Water Pollutants Discharge Permit Management".[148] These regulations became invalid in 2007. In fact, they were in 2000 replaced by the "Detailed Rules for Implementation of the Water Pollution Prevention and Control Law (1996)" (known as "Detailed Rules 2000") that were enacted by the State Council.[149] Legally, the 1996 WPPCL has been replaced by the 2008 amendments, but a new set of regulations for the implementation of the 2008 WPPCL is until today not finalized.[150] By 2014, 23 provinces/municipalities[151]have developed their own permit regulations[152], but in practice "Detailed Rules 2000" still serve as the legal basis for manufacturer.

4.4.1 Permit Issuance and Management

[148] Interim regulations for Water Pollutants Discharge Permit Management (1988). In Chinese: 水污染物排放许可证管理暂行办法.
[149] State Council of the PRC, Decree No. 284 (Mar 20, 2000): Detailed Rules for Implementation of the Water Pollution Prevention and Control Law. In Chinese: 中华人民共和国水污染防治法实施细则.
[150] MEP (2008): Protocol on Regulations for Management of Pollutants Discharge Permit. In Chinese: 关于征求对《排污许可证管理条例》（征求意见稿）意见的函；环办函 [2008]16 号
[151] In China, Beijing, Shanghai, Tianjin and Chongqing, are directly governed by the central government.
[152] Fujian, Guangdong, Zhejiang, Jiangsu, Yunnan, Hubei, Hunan, Sichuan, Gansu, Shanghai, Anhui, Shan'xi, Qinghai, Jilin, Heilongjiang, Shanxi, Hebei, Henan, Beijing, Tianjin, Jiangxi, Chongqing and Inner Mongolia.

Under the federal system, the USA federal EPA has the leading authority for issuance and management of pollution discharge permit. In practice, this authority is delegated to the state EPAs. In the case of inappropriate permit issuance, the federal EPA has the veto power. In this way, the federal and state EPAs cooperate to control the permit related issues. In some cases, this federal and state cooperative arrangement, i.e., centralized standard setting and decentralized implementation and enforcement, is believed to have weaknesses (e.g. in wetlands protection) and it has been argued that supplementing federal regulations to retain flexibility for the state to assume permitting authority may be desirable.[153]

In contrast, China has a "top to bottom" administrative system. The MEP supervises the national permit issuance and answers the questions from local EPBs. The provincial EPBs determine the executive power of the lower-level (city-county level) EPBs for issuing permit, and the city-county level EPBs estimate the total emission of pollutants for their administrative regions. For certain areas and certain types of pollutants which belong to the national TEC program, the local EPBs estimate the total emission based on the water quality standard, which is subject to the approval of the MEP. The discharge permits are then issued by the local EPBs, if the applicants satisfy certain conditions, primarily if the wastewater to be discharged satisfies the discharge standard. If discharge is expected to exceed 500 tons/day and COD to exceed 0.5 tons/day, the permit needs to be issued by a provincial EPB. For smaller discharges, the local EPB has the authority to issue the discharge permit.

China's water pollutants permit depends on the characteristics of the wastewater chemistry and the amount being discharged. Chinese National Standard GB 8978-1996[154] describes wastewater chemistry using 56 parameters, including COD, BOD, PH, oil, Ammonia Nitrogen etc. If wastewater is pretreated at the factory for disposal to a city water treatment center, level 3 is generally sufficient. If discharge is sent to a fresh water body (i.e. lake, river, pond, or stream), level 2 or 1 is needed. Local regulations and standards may be, but not must be, stricter than the national GB level. In that case, the factory's EIA specifies the tighter of the two.[155] If local governments have none of their own standards, then the national standards apply. The local government must not enact a lower standard than the corresponding national

[153] Sakyi, A. M. (2010): Mitigation banking: Is state assumption of permitting authority more effective? 34 Wm. & Mary Envtl. L. & Pol'y Rev. 1027 (2010), http://scholarship.law.wm.edu/wmelpr/vol34/ iss3/8:p1027-1052.
[154] English version of the Chinese National Standard GB 8978-1996: http://chinawaterrisk.org/wp-content/uploads/2011/05/Maximum-Allowable-Discharge-Concentrations-For-Other-Pollutants-in-China.pdf
[155] Seidelson, C. (2012): Commissioning an Industrial Wastewater Treatment System in China. International Journal of Latest Research in Science and Technology, Vol. 1, Issue 2, p76-79

standard, and the State Council has the power to veto the lower standard (Article 89, Sentence 14 of the Constitution).

Thus, China's WPDP management system employs a mixture of "different levels" and "different categories". While the MEP is legally responsible for the permit issuance, it does not have the administrative capability to manage all discharge permits. Therefore, the discharge permits for major industrial and urban pollution sources are issued by the local EPBs at the provincial level on behalf of the MEP, and the "simple" discharge permits for minor pollution sources are issued by the local EPBs at the city-county level.

In practice, the construction of an enterprise is subject to an environmental impact assessment (EIA) by the local EPB. The EIA includes a statement on the enterprise's potential impact on the water environment. To discharge wastewater the enterprise must have a permit. The type of permit depends on the type of pollutants and the quantity of the discharge. China National Standard GB describes wastewater bio-chemical characters using 56 parameters (further discussions in Chapter 5).

4.4.2 Monitoring and Inspection

The permit system is supported through monitoring and inspection procedures. The local EPB measures the levels of pollution of the discharged water and examines whether the discharge behavior of the permit-holder complies with the permit standards. Such checks are either done by the local EPB or contracted external laboratories. If the discharge is found to be in non-compliance with the permit requirements, the local EPB has the authority to impose administrative fines and request on site monitoring. On site monitoring is requested if [156]

- Discharge is more than 100 tons/day or COD more than 30kg/day;
- Discharge is found to have exceeded by 2 times the allowable limits;
- The enterprise is directed by the government to reduce pollutant discharge.

Further, the monitoring must be carried out with equipment (a) approved by the local EPB, (b) regularly calibrated by the Quality Assurance Bureau, and (c) linked with the local EPB automatic data collection. The government regulates the monitoring procedure by issuing an Environmental Pollution Control license to the designers of water treatment facilities. For instance, if the facility's discharge exceeds 500 tons/day and COD 0.5 tons/day, then the

[156] Id, 155, Seidelson, C. (2012)

designer must hold a Class A or B license issued by the Provincial Construction Bureau. Otherwise, a Class C license issued by the local Construction Bureau is required. A further regulation is used to control waste pollutants discharge. Major water treatment facilities (discharge exceeds 50 kt/day) must hold a Class A permit issued by the MEP, while minor facilities must have a Class B permit issued by the provincial EPB.

In this system, it is often economically disadvantageous for EPB to enforce the law, because EPB is subordinate to the local government and the welfare of the EPB officials depend on the local economy. The highest priority of the EPB is thus to act in line with the local economic interests rather than the enforcement of the law. As the local EPB officials are also responsible for environmental monitoring, it has happened that local EPB officers are charged with of duty negligence in the case of major environmental disasters, such as the 13 Nov 2005 Songhuajiang water pollution.

4.5 Pilot Projects of China's Water Pollutants Discharge Permit System

The efficiency of the permit system has been tested in pilot programs. The first pilot study was carried out in Shanghai in 1985 along the Huangpu River, and later in several large cities (e.g. Shenzhen and Chongqing). The SEPA issued in 1988 the Interim Regulations for Water Pollutants Discharge Permit Management (Ref. 135) and extended the system nationwide in 1989-1991. In the "Detailed Rules for the Implementation of the Water Pollution Prevention and Control Law"[157], the legal liability of the water pollutants discharge was first defined, as Article 44 of the rules states that non-compliance with the WPDP must be rectified within given time and may be subject to a fine up to 50000 CNY. For serious offenders, the discharge permits could be canceled. In Nov 2011, the State Council issued a policy paper on WPDP trading,[158] urging the implementation of a permit system and water pollutants emission trading. Unfortunately, the proposition of the policy paper is rather unrealistic because the China's WPDP is not mature and has numerous flaws.[159, 160, 161]

[157] 水污染防治法实施细则 in Chinese
[158] 国务院关于加强环境保护重点工作的意见, 国发〔2011〕35 号 in Chinese
[159] Qi, Y. and X. Zhou (2009): Water Pollution Control in China: Review of laws, regulations and policies and their implementation. Economic Analysis Team Institute for Global Environmental Strategies (IGES).
[160] Zhao, C.赵晨 and Y. Tie 铁燕 (2005): 中美水环境标准法律制度比较研究 对我国水污染防治法律的修订启示 in 水污染防治立法和循环经济立法研究—2005 年全国环境资源法学研讨会论文集（第一册）.
[161] Seidelson, C. (2012): Commissioning an Industrial Waste Water Treatment System in China. International Journal of Latest Research in Science and Technology, Vol 1, Issue 2, p76-79.

TEC was adopted in "the 9th Five-Year Plan [162] of National Economic and Social Development & the Outline of 2010 Long-Term Plan Targets" of the Chinese government as a leading strategy for environmental protection. In 1996, it became a part of the WPPCL.[163] The "Implementation Rules on the Law of the People's Republic of China on Prevention and Control of Water Pollution" proposed by the State Council in 2000 provided some practical guidelines for implementing the system, including:

- water pollutant report and registration;
- establishment of targets for the total pollution load control in a specific area and the distribution of pollutant reduction quotas among pollutant dischargers in the area;
- issuance of pollutant discharge permits;
- supervision and regulation of permits.

Local EPBs were authorized to monitor the behavior of the permit-holder and impose fines on those who violated the permit conditions.

The success of the system implemented in China so far has been questioned by experts. The existing problems are listed below:

- Low implementation rate: Only about 10-20% of the enterprises registered for water pollutant discharge actually receive permits.[164] The actual rate is even lower if all discharging enterprises (registered and unregistered) are taken into consideration. In less developed areas, the system has not been implemented at all. By 2006, the ratio was less than 35% [165] (520,000 registered enterprises and 180,000 permitted enterprises).
- Lack of stability and continuity: China lacks an executable legislation on pollutant discharge permits, and the implementation of the permit system relies on government regulations which differ for different regions and can easily change according to the overall policy priorities of the governments.
- Lack of authority: The permit system is poorly managed due to the lack of expertise and administrative bureaucracy causing delays in permit issuance and insufficient

[162] China makes "Five-Year Plans" as a political instrument for social-economic development, but they are also directive for legislature actions.
[163] WPPCL Article 16.
[164] Li, Z. P. (2005): The Challenges of China's Discharge Permit System and Effective Solutions. Temple Journal of Sci. Tech & Envtl. Law, Vol. XXIV, p375-395.
[165] Qi, Y. and X. Zhou (2009): Water Pollution Control in China: Review of laws, regulations and policies and their implementation. Economic Analysis Team Institute for Global Environmental Strategies (IGES). Figure 9 and 10 therein.

supervision, monitoring and enforcement. Consequently, the permit system lacks the necessary authority.

- Distortion and corruption: It is stated in the regulation that applications for permits must be examined before permits can be granted. In practice, applications are a formality and rarely rejected as a consequence of distortion and corruption. The most recent case occurred in Guangxi Province, where the official of Hezhou city's EPB received money from the mining company. The official granted a discharge permit to this company that did not satisfy the requirements of permit issuance. The company then discharged its wastewaters to the Hejiang River, causing the death of large quantities of fish due to heavy metals.[166]

4.6 Summary

Based on the past experience, and with referral to the NPDES, several reasons for the lack of success of the permit system can be identified, including:

- Legislative Support: Although the TEC strategy and the permit system are stated in the law, their legal mandate is limited, because they are subject to interpretation by the administrative bodies at several levels.
- National Priority: The Chinese governments at all levels were, until very recently, preoccupied with economic development and social stability. The implementation and enforcement of the permit system has been so far of low priority.
- Resources: In addition to laws and regulations, the implementation of the permit system requires water management expertise, staff, infrastructures, financial resources and technological support. China has been building up these capacities over the years and has recently significantly increased the investment for environmental protection. In 2007, the total investment on environmental protection reached 338.76 billion CNY (1.36% GDP),[167] while by 2012 the investment reached 825.36 billion CNY (1.59% GDP).[168]
- Information: The lack of access for the public to environmental data has a strong negative impact on the effectiveness of the permit system. It is a major challenge to achieve information transparency in an authoritarian system with a complex administrative structure. Environmental information disclosure ends up being the

[166] China Daily (2014): http://www.chinadaily.com.cn/hqgj/jryw/2014-03-19/content_11429918.html, last visit on 25 Jul 2015
[167] MEP (24 Sep 2008): 全国环境状态公报(2007 年); Report on the State of Environment for 2007.
[168] MEP (11Apr 2013): 全国环境状态公报(2013 年); Report on the State of Environment for 2013.

weakest in the most polluted cities. The Institute of Public and Environmental affairs (IPE) led by Ma Jun, is the most well-known NGO in China, which compiled the first Water Pollution Map of China in 2006. This map combines official-published and self-collected data, providing the public a free entrance to the effluent discharge data from enterprises, sewage treatment works and on-line monitoring operators. Local environmental statues is also monitored by the map.[169] The pollution map is a great progress made by a NGO. Multinational companies such as Nike and Walmart have been using the online databases of the IPE to monitor Chinese suppliers, exerting pressure through the international supply chain to improve the environmental practices of local enterprises.[170]

In 2008, the MEP brought the "Measures for Open Environmental Information" into effect, requiring governments to disclose information on: (1) environmental laws, regulations, and standards; (2) allocation of emissions quotas and permits; (3) pollution fees and penalties collected; (4) exemptions, reductions, or postponements granted; (5) outcomes of investigations into public complaints; and (6) lists of violators of environmental regulations. However, these measures place only the burden of disclosure on government rather than industry. Only enterprises that have exceeded pollution standards are required to disclose their emissions, a pathway for the public to obtain information about routine emission statistics is absent. The measures from the MEP have lower-level legal effects than laws such as the State Secrets Law, which are enacted by the NPC. Accordingly, the government can refuse to disclose the required information for state secret reasons. Measures are designed to improve the governance outcomes rather than to protect any individual rights. This is in contrast to the USA Freedom of Information Act.[171] The major platforms for making environment information available are websites of central and local governments, "China Environment News", and the "Bulletin of Environmental Protection Ministry".[172]

[169] Institute of Public and Environmental Affairs: http://www.ipe.org.cn/pollution/index.aspx, last visit on 25 Jul 2015

[170] Tan, Y. L. (2012): Transparency without Democracy: The Unexpected Effects of China's Environmental Disclosure Policy. Governance: An International Journal of Policy, Administration, and Institutions, Vol. 27, p37–62, doi:10.1111/gove.12018

[171] Id, 170, Tan, Y. L. (2012).

[172] Annual Report 2013 about the Government Information Opening of Environmental Protection Ministry. www.mep.gov.cn, last visit on 12 May 2015.

Chapter 5: Comparison of Permit Requirements in USA and China

The US permit requirements consist of three components, including effluent limits, self monitoring schedule and reporting schedule. Effluent limits serve as the primary mechanism in NPDES permits for controlling discharges of pollutants to receiving waters, and the other two components are for safeguarding the effluent limits to be complied with. The USA EPA and the delegated states use a variety of techniques to monitor permittees' compliance, including on-site inspections and review of data submitted by the permittees. Technical assistance is also available to facilities struggling with the NPDES compliance. This chapter examines the core requirements of the USA effluent discharge permit, which can be used as reference for improvement of China's WPPCL/WPDP system.

5.1 Comparison of Effluent Limits Mechanisms

5.1.1 USA technology-based standard vs. China's effluent standard

The USA technology-based controls use the national effluent guidelines (EGs) established by the EPA to produce an environmental outcome by having requirements of the EGs factored into individual facilities' discharge permits when they are renewed. Today, the EPA has developed EGs for 58 categories of industries. The EGs require a minimum level of treatment for industrial/municipal point sources based on the currently available treatment technologies while allowing the discharger to use any available control technique to meet the limitations.[173]. Concretely, when establishing the EGs, the EPA assesses certain factors such as age of the equipment and facilities, manufacturing and engineering processes, energy requirements, and economic cost.[174] According to the EPA, EGs are responsible for preventing the discharge of almost 700 billion pounds of pollutants each year,[175] but the USA Office of Inspector General questioned the effectiveness of the EGs. In 2004, they concluded that the impact of the EGs

[173] EPA NPDES Permit Writers' Manual, p49, http://water.epa.gov/polwaste/npdes/basics/upload/chapt_05.pdf
[174] Id, 173, EPA NPDES Permit Writers' Manual, p55.
[175] USA Office of Inspector General (24 Aug 2004): Effectiveness of Effluent Guidelines Program for Reducing Pollutant Discharges Uncertainty. Report No. 2004-P-00025.
http://www.epa.gov/oig/reports/2004/20040824-2004-P-00025.pdf, last visit on 12 May 2015

remained uncertain, due to the lack of pollutant discharge data from the EPA.[176] This author attempted to obtain more recent reports on the effectiveness of the EGs, but without success.

China's MEP has also made technology-based effluent standards, covering 64 categories of industries, municipal sewage treatment plants and animal feeding plants. These standards are made in accordance with the national water quality standard and may take into consideration the national economic and technical conditions (S.1 Article 13 of the WPPCL).

The SEPA of China published the first Environmental Quality Standard for Surface Water in 1983, which was subsequently revised in 1988, 1999 and 2001. For waters of different grades, different water quality standards were specified using 24 basic pollutant concentrations and 85 other drinking-water specific items. Table 5.1 shows a sub-section of the basic pollutants concentrations for the different water quality standards.

Table 5.1: Basic pollutant concentrations of water quality grades I to V in mg/l except for temperature and pH values.[177] Only the first 9 types are listed for example, and the rest of the 54 types are omitted from the table.

No.	Type	I	II	III	IV	V
1	Temp	Man-made temperature change (-2^{o}C, 1^{o}C)				
2	pH	6-9				
3	COD Mn >	7.5	6	5	3	2
4	volatile Phenol index <	2	4	6	10	10
5	COD <	15	15	20	30	40
6	BOD_5 <	3	3	4	6	10
7	NH_3-N <	0.15	0.5	1.0	1.5	2.0
8	Total P <	0.02	0.1	0.2	0.3	0.4
9	Total N <	0.2	0.5	1.0	1.5	2.0
… rest omitted …						

To design the discharge standards, wastewaters are first divided into 8 major categories, including industrial, agricultural, domestic, transport-related, service-related (e.g. medical), water-treatment-related, surface-runoff related, and the remainder wastewaters. For each category, sub-categories are defined and for each sub-category, the MEP establishes detailed discharge standards for a wide variety of pollutants. The standards for the different categories further differ for existing and new sources. The MEP has already developed a large number of water pollutant discharge standards for the 8 major categories and numerous sub-categories of

[176] Id, 175, USA Office of Inspector General (24 Aug 2004).
[177] National Standard of the People's Republic of China, GB3838-2002, Environmental Quality Standards for Surface Water, 2002, published by National Environmental Protection Administration.

wastewaters.[178] Despite these recent improvements, the discharge standards are by no means complete. It has been reported that the MEP plans to establish 25 more discharge limitation standards in 2014.

In practice, the discharge standards are commonly established by the MEP and the administrative authority responsible for given industries. For example, China Steel Ltd (via Wuhan Safety Research Institute), in consultation with the MEP, established the Discharge Standard of Water Pollutants for Iron Steel Industry (Table 5.2).

Table 5.2: Section of the Discharge Standard of Water Pollutants for the Iron and Steel Industry. The limits are given in mg/l except for pH values.[179]

No.	Pollutants	Industry Limits for Direct Discharge			Industry Limits for Indirect Discharge			Monitor Location
		Steel	-	Iron	-	Steel	Iron	Pipe end
1	pH	6 – 9						
2	Suspended martial	50			100			
3	COD_{cr}	60			200			
4	NH_3-N	8	-	8	-	8	15	
5	Total N	20	-	20	-	20	35	
6	Total P	1.0	-	-	-	1.0	2.0	
… rest omitted …								

In contrast to the USA, China's provincial governments also have the power to make their own effluent standards in absence of the corresponding national standards or to make stricter standards than the national ones (S.2 Article13 of the WPPCL). Whether a discharger has complied with the standards depends mainly on the statistics of its discharge outlet or of the outlet of processing workshop.[180] Moreover, China's effluent standards do not distinguish between pollutants such as the USA's BPT, BCT and BAT (Chapter 3), but make different requirements for the existing and new sources. New sources have stricter standards than the existing ones. The reason is that (as in the USA) new sources have normally greater chances of utilizing advanced manufacturing processes and equipments. In practice, local standards are playing a leading role in effluent discharge permit issuance, and prevail over the national standards. If local and national standards are in conflicts, e.g. in a water pollution dispute, the

[178] There are 64 sets of effluent standards, made by the Department of Science, Technology, and Standard. http://kjs.mep.gov.cn/hjbhbz/bzwb/shjbh/swrwpfbz/index.htm, last visit on 12 Mai 2015.
[179] National Standard of the People's Republic of China, GB13456-2012, Discharge Standard of Water Pollutants for Iron and Steel Industry, published by National Environmental Protection Administration.
[180] Id, 179, GB13456-2012.

local standards apply.[181] In view of this, industrial enterprises prefer to be located in provinces with more relaxed standards. In the 1970s, the USA EPA realized this legislature flaw and thus set up national effluent guidelines to avoid its occurrence.

On the other hand, stricter local effluent standards will compel industrial entities to make more costly internal changes in manufacturing and engineering processes rendering them less competitive. The case of Shandong Province is a good example. In Mar 2003, Shandong Province issued its "Discharge Standard of Water Pollutants for Pulp and Paper Industry in Shandong Province", which was implemented in 3 phases over 8 years. Pollutant-concentration based requirements were tightened, phase by phase. Since then, the number of paper manufacturing enterprises has reduced from more than 200 to no more than 20. Most of them were weeded out due to the stricter standards, but those survived are now front runners of the paper manufacturing industry of China. In view of this successful transition, the MEP issued the national "Discharge Standard of Water Pollutants for Pulp and Paper Industry" in 2008, drafted in collaboration with the Shandong EPB, Shandong Environment Design Institute, State MEP Standard Research Institute, and Shandong Environmental Protection Science and Research Institute. [182]

5.1.2 USA Water-Quality-Based Standard vs. China's Total Effluent Control

In contrast to the NPDES which depends either on the technology-based standards or water-quality-based standards (in fact, the technology-based standards are most widely applied, as required by S.301(b) and S.306 of the CWA; only in some cases, enforceable requirements beyond technology-based standards are in place, when a valuable water resource need be protected by more stringent permit limitations[183]), the fundamental provisional measure for China's permit program is the TEC. The 1988 "Interim Regulations for WPDP Management" claims the TEC to be the core of the permit program. This basic strategy remains valid until today. In practice, permit holders should not only comply with the requirement of effluent standards, but also satisfy the allocated responsibilities of effluent reduction based on the TEC strategy.

[181] How to make water pollutants discharge standards? In Chinese: 水污染的排放标准是如何制定的？ http://www.npc.gov.cn/npc/flsyywd/flwd/2002-04/17/content_292246.htm, last visit on 12 May 2015

[182] Discharge standard of water pollutants for pulp and paper industry. http://kjs.mep.gov.cn/hjbhbz/bzwb/shjbh/swrwpfbz/200807/W020120105578237397478.pdf, last visit on 12 May 2015

[183] http://water.epa.gov/scitech/swguidance/standards/handbook/chapter07.cfm, last visit on 12 May 2015.

China's TEC is similarly designed as the NPDES WQS being exercised in the USA. Both of them provide the "pollutants reduction load allocation mechanism" through which the amount of pollution entering the water bodies is controlled. Under Section 303(d) of the USA CWA, states, territories, and authorized tribes are required to identify lists of impaired waters which do not meet WQS even after the implementation of pollution control technology. The law requires that these jurisdictions establish TMDLs for impaired waters. A TMDL is a calculation of the maximum amount of a pollutant that a water body can receive and still meet the WQS. An allocation of that load among the various sources of that pollutant is written into permit requirements, forming the water quality-based discharge limits. Actually, the TMDL is a corrective measure for the impaired water bodies. Once the TMDL is developed, the permit holders must accept the adjusted limits in accordance with the allocated reduction loads. Under Section 303(d), the EPA is required to review and approve a state's list of impaired waters and TMDLs. If a state fails to do so, the CWA requires the EPA to develop an impaired waters list for the state and make its own TMDL determination. The EPA is not authorized to implement a TMDL, but leaves this to the states. However, states' strategies for implementation vary widely. Only a few have laws requiring implementation plans, while many others rely on less structured policies. Until 2011, there have been over 46,000 TMDLs developed, and the most recent information indicates there are over 41,000 water bodies which still require a TMDL to initiate corrective measures.[184] Much staff and funding resources are therefore needed. But the CWA provides no dedicated funding for TMDL development and/or implementation.[185] Meanwhile, the active involvement of the public is an important supportive factor to provide more resources for TMDL. Between 1992 and 2004, citizens filed nearly 40 suits in 38 states to force EPA to implement the TMDL program. [186] The CWA requires public involvement in developing TMDLs, but the level of citizen involvement varies from state to state. Typically, states will circulate a draft of threatened and impaired waters list and a draft TMDLs and allow 30 to 60 days for public comment. In some cases, hearings are also held. The public often contributes useful data and information about impaired water bodies, and offers insights about their community that may ensure the success of one pollutant reduction strategy over another. Citizen information and participation can

[184] Rosaura Conde, Watershed Branch of EPA's Assessment and Watershed Protection Division: Addressing 303 (d) listed waters through Total Maximum Daily Load (TMDLs). http://water.epa.gov/learn/training/standardsacademy/upload/module_tmdl.pdf, last visit on 12 May 2015

[185] Copeland, C. (21 Sep 2012): Clean Water Act and Pollutant Total Maximum Daily Loads (TMDLs), p17. Congressional Research Service, 7-5700, R42752.

[186] May, J. R. (2004): The rise and repose of assimilation-based water quality, Part I: TMDL litigation. Environmental Law Reporter, News & Analysis, 34 ELR, 10247-10260.

improve the quality of TMDLs and speed up the cleanup of impaired waters or secure protection of threatened waters.[187]

China's TEC strategy aims at establishing the total allowed discharge amount of pollutants within a limited region or watershed and during a limited period, taking into consideration the water quality goal and pollution assimilating capacity of the water body. It is finalized by the allocation of pollutants reduction loads among dischargers. Today, it is a leading pollution control approach regulated by Article 20 of the WPPCL. It is hoped that the TEC can overcome the flaws of effluent standard, but in reality it contains inherently numerous problems. In the following, the differences between the USA's TMDL and China's TEC are discussed.

1. Preconditions for a total pollution control plan: In the USA, only when the water body is identified as impaired, can TMDL be initiated by the states. It is not a nationwide TEC plan, but a corrective approach to restore the quality of some waters. China's TEC is developed every five years in the national Five-Year-Plan (since 1995) by the MEP as a political goal of the nation. It is effective for and implemented by all provinces which develop their own Five-Year-Plans and write the allocated reduction loads into their plans. The MEP examines the implementation result of each province on a half-yearly basis.[188]

2. Control scopes: The USA TMDL targets pollutants from point and nonpoint sources, and accounts for uncertainties in the analysis and modeling (e.g. climate change).[189] The controlled pollutants cover conventional, non-conventional and toxic pollutants, and for each pollutant, a TMDL plan exists. China's TEC aims to control "major pollutants" from industrial and municipal point sources and animal feeding farms. The pollutants may differ for each Five-Year-Plan.[190] The most recent 12th Five-Year-Plan

[187] http://water.epa.gov/lawsregs/lawsguidance/cwa/tmdl/overviewoftmdl.cfm, last visit on 12 May 2015
[188] MEP (24 Sep 2014): "Bulletin about the amount of effluents discharge in each province, autonomous region and municipal city during the first half year". In Chinese: 2014 年上半年各省自治区直辖市主要污染物排放量指标公报. http://www.mep.gov.cn/gkml/hbb/qt/201409/t20140924_289464.htm, last visit on 12 May 2015
[189] TMDL = Wasteload Allocation (WLA) + Load Allocation (LA) + Margin of Safety (MOS)
[190] The 9th FYP controls 8 types of pollutants including COD, petroleum, cyanide, arsenic, mercury, lead, cadmium and chromium IV; the 10th FYP controls COD and ammonia nitrogen, due to the reduction of heavy metal; the 11th FYP controls COD, TN and TP. See Wu, Y. Y., D. Wang, W. J. Zhang, D. Shan and Y. Chen Yan (2010): Total effluent control in Japan and its inspiration for China. China Environmental Plan Institute. In Chinese:日本区域水污染物排放总量控制制度对我国的启示, http://www.caep.org.cn/uploadfile/参考 2010/重要信息 201012：中日总量控制比较.pdf. Important environmental information reference, 6-12, p17, last visit on 12 May 2015

defines only four types of pollutants for TEC, including COD, SO_2, ammonia-nitrogen and NO_X.[191] TEC is thus a strategy far removed from a comprehensive water quality protection, because controlling only four pollutants is insufficient for protection of a water body, along the uncertainty inherent in any the total pollutants calculation.

3. Implementation of a total pollution control plan: the USA TMDL is a pollution "budget" for a water body or watershed that establishes the pollutant reduction needed from each pollutant source to meet water quality goals.[192] Therefore, each TMDL plan expresses the relationship between the necessary reduction of the pollutant of concern and the attainment of the water quality target.[193] TMDL can be made every two years if necessary, because the CWA requires the states to renew their list of impaired waters biennially, and in order to develop a TMDL plan, states should: (1) select the pollutant that leads to the water pollution; (2) estimate the waterbody's assimilative capacity; (3) define all sources of the pollution to the waterbody; (4) make a predictive analysis of pollution in the waterbody and determine the total allowable pollution load; and (5) allocate the allowable pollution among the different pollution sources in a manner that water quality standards are achieved.[194] Once the TMDL plan is renewed and approved by the EPA, state's EPA can then implement the TMDL plan through dividing the total predictive waste load to local areas in "kg/day". In the process of TMDL development, states must take into consideration the seasonal variation of a water body. This allows a TMDL plan to include different requirements for the dry and wet seasons.

   In contrast, first, China's TEC plan is made according to the different social-economical status and hydrological conditions of the eastern, central and western regions of China. Due to the lack of technical support and data, the predictive analysis of total wasteload can be made neither on the basis of a scientific computing method, nor pollution assimilative capacity of the water bodies. Rather it is decided by political

[191] MEP (Dec 2011): Rules for the Total Effluent Reduction Calculation of 12th Five-Year-Plan. 十二五主要污染物总量减排核算细则. http://www.mep.gov.cn/gkml/hbb/bwj/201206/W020121012519874173523.pdf, last visit on 12 May 2015
[192] What is a Total Maximum Daily Load (TMDL)? Available http://dnr.wi.gov/topic/tmdls/tmdlprocess.html
[193] http://www.epa.gov/region5/water/wshednps/pdf/min_merc_final%20dec%20doc%203-27-07.pdf, last visit on 12 May 2015
[194] http://water.epa.gov/lawsregs/lawsguidance/cwa/tmdl/dec3.cfm, last visit on 12 May 2015

intent and public concern.[195] Second, China's TEC aims at pollution reduction by means of governmental control, not at WQS restoration through scientific survey and prediction. Even if the TEC goals are achieved according to the semi annual reports of the provincial EPBs, the water bodies can still be polluted on a daily basis. Third, China's TEC targets are determined every five years. In such a long period, pollutants accumulation, pollution sources, water purification capacity and water mass (influenced by e.g. water usage and climate change) vary significantly and may affect the adequacy of the TEC target. Fourth, the permitted amount of discharge is first allocated among provinces, then among counties, and finally among the discharge entities, in the form of "total allowed discharge concentration" (m/L), or "total allowed discharge speed" (km/h), or "total allowed discharge amount of unit product" (kg/t).[196] Then, the permit holders are requested to comply with the minimum level of effluent standard requirement and the pollutants reduction requirement. There is however no legal document for explanation of their relationships. Fifth, the USA has established total daily load control, and China has chosen a total yearly load even five year load control.

4. Public input: the USA CWA encourages citizens to be involved in the TMDL process. They assist with assessing water bodies, monitoring water quality, suggesting possible control actions, reviewing TMDL drafts, posting comments on states websites, and attending public meetings.[197] Regarding China's TEC, the public has no access to any information about its establishment or its implementation.

5. Enforcement: TMDL is integrated into the USA CWA/NPDES. If a discharger does not comply with that, then he constitutes a violation of the permit, and the enforcement of the NPDES is based on "strict liability". As described further in Chapter 6, NPDES compliance is enforced in four different ways: (1) self monitoring, i.e., permit holders report violation and take corrective actions; (2) EPA's civil penalty or administrative fine of up to $25,000 per violation per day; (3) citizen suit, i.e., if a citizen believes that the EPA cannot prevent future violation, he can file a citizen suit

[195] MOEP (20 Aug 2009): Seeking for a new model for Total Pollutants Control of 12th Five-Year-Plan. Important Environmental Information Reference 5-11. 努力探索 "十二五" 污染物排放总量控制新模, p18.
[196] Song, G. J. (宋国军, 2000): Total effluent control and concentration control for pollutants discharge in China, Environmental Protection Journal 2000 (6), p11-13. 论中国污染物排放总量控制和浓度控制. 环境保护, 2000 年第六期。
[197] http://www.epa.gov/region1/eco/tmdl/publicp.html, last visit on 12 May 2015

against the polluter to have stronger restrictions or against the EPA for non-diligence; (4) criminal prosecution, i.e., if a permit holder discharges pollutants without a permit, publishes false monitoring reports etc., individuals may be charged for criminal offence.

In contrast, China's WPPCL regulates in a very specific way to react to the local governments that did not achieve the load reduction goal and the dischargers who violated the law by "publishing his name". In practice, the names of the governments or enterprises are published on a MEP list, and these named entities must take corrective actions such as technology improvement of wastewater treatment, installation of online monitoring equipment etc. under the MEP supervision (in Chinese: 挂牌督办). Otherwise, the MEP will arrange a meeting with local governmental officials to talk about their responsibility. In the case of severe environmental accidents, the officials assume political accountabilities such as accepting responsibility and resigning their position, according to the "Provisional Regulation for Implementation of Official Accountability" issued by the Central Committee of the Chinese Communist Party and the State Council in 2009.[198]

[198] Central Committee of the Chinese Communist Party (2009), http://www.gov.cn/gongbao/content/2009/content_1371343.htm, last visit on 25 Jul 2015

5.2 TEC Strategy and its Risks

China's WPDP institution to achieve water quality standards is shown in Figure 5.1, which can be summarized as follows. The MEP establishes the environment quality standards for waters. These standards are to be achieved by TEC through discharge allocation and setting discharge standards. But according to the WPPCL, technological and economic conditions of the country must be taken into consideration, so the industries could contribute to the development of discharge standards. The discharge permits are issued by the local EPBs at city-county level to the individual dischargers.

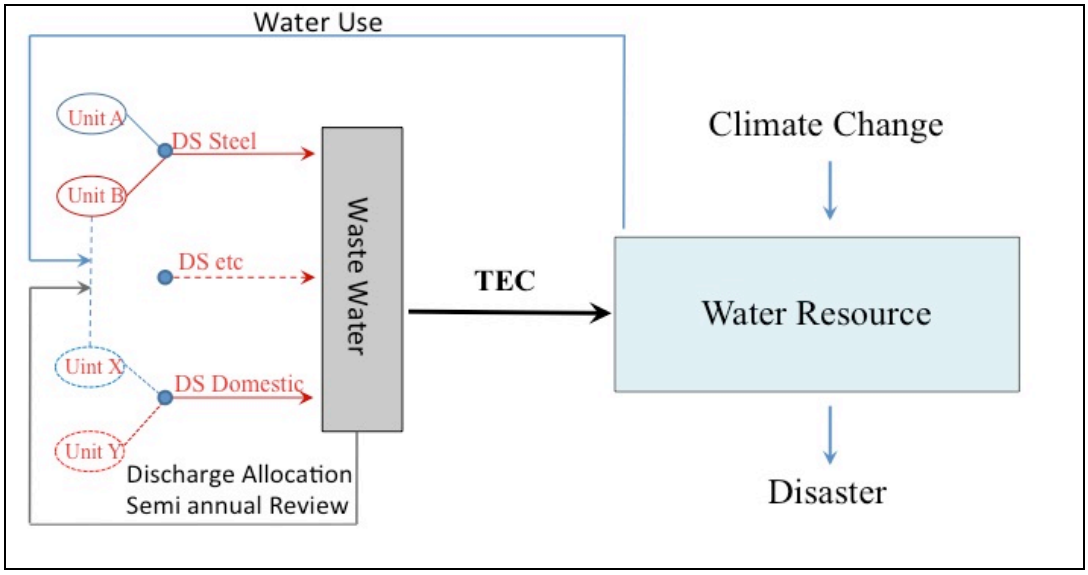

Figure 5.1: A diagram (summarized by this author) for illustration of the institution of China's WPDP system. MEP establishes the environment water quality standards. The standards are to be achieved by TEC. The total waste load is then allocated to discharging units. The standards of discharged waters are defined by the MEP in consultation with industries, and the discharge permits are issued by local EPB. Recently, MEP started to conduct semi-annual reviews of major dischargers. Due to climate change, water levels vary. During low waters, the same TEC strategy may result in water quality disaster.

This is a very complex model and the potential for its failure is significant, because the total emission of pollutants becomes uncontrollable if the discharge standards are flawed or violated. China has already published a sizable set of discharge standards, but explicit information as to how the standards are designed cannot be found in the official documents of the MEP.

The risks for the WPDP to fail can be illustrated by a simple analysis. As Chapra (2008) explains[199] the accumulation for pollutant (e.g. COD) in a water body is given by

$$A_{\text{(Accumulation)}} = P_{\text{(Pollutant Discharge)}} - R_{\text{(Purification)}} \qquad (5.1)$$

where P equals the discharged wastewater times the pollution concentration in that water (C_d). The increase of pollution concentration in the water body (C) is A divided by the water body mass (M). C does not change if discharge equals purification. If discharge is more than purification, then water quality deteriorates. Even for such a simple case, using concentration-based water-quality standard (i.e. C) to determine the concentration-based discharge standard (i.e. C_d) is problematic, because purification is in general unknown, and it is useless to control C_d and not P.

Relationship (5.1) shows that C also depends on the water pollution carrying capacity. During times of low water levels, water quality is poorer for the same discharge. Thus, during low waters, C can be very large and water pollution disasters more likely. Indeed, the famous Taihu eutrophication disaster in 2005 and 2007 both occurred during the low water period (see Chapter 6).

For the TEC implementation, China is divided into administrative regions and main catchment basins. The idea is that for each region/basin the total emission should be limited to ensure water quality. The author is not aware of concrete data for the total emission limits for the main basins, e.g. the Changjiang Basin which covers a vast area of 1.8 million km^2 (see Appendix I). Studies on the total emission limits for small water systems have been done, e.g., Xie et al. (2014) studied the western Taihu Lake and reported that the total emission limit of COD was 60 kt/year and of NH_3-N (ammonia nitrogen), total N (nitrogen), and total P (phosphorus) about 4.0, 6.0 and 0.4 kt/year[200], respectively. The claims are yet to be validated but are useful for deriving discharge standards for the local area. However, such data are not available in general and thus the TEC strategy lacks the scientific basis.

A major difference between the CWA/NPDES of the USA and the WPPCL/WPDP of China is that the former has incorporated the concept of TMDL. The USA federal and state EPAs

[199] Chapra, S. C. (2008): Surface Water Quality Modeling, Lecture 1, Introduction, p13. Waveland Press Inc.
[200] Xie, R. R., Y. Pang and K. Bao (2014): Spatiotemporal distribution of water environmental capacity—a case study on the western areas of Taihu Lake in Jiangsu Province, China. Environmental Science and Pollution Research. DOI 10.1007/s11356-013-2088-9.

have used a variety of methods to develop TMDLs during the past decade. Clearly, the incorporation of TMDL in the NPDES requires strong water management capability, as the major setbacks of its implementation in the USA and decades of legal battles and controversies clearly show.[201, 202] The TMDL concept is yet to be implemented in China's WPPCL/WPDP. The 1988 "Interim Regulations for WPDP Management"[203] rule that a discharge permit is issued if the discharged water meets the requirements of discharge standards, without specifying the TMDL. Relationship (5.1) and the related discussions show this practice is seriously flawed, because an industry can discharge a large amount of polluted water with concentration satisfying the discharge standards and still cause severe water pollution.

The basis of the TEC strategy being employed in China is fragile, as the minimal requirement for the strategy to work is that a TMDL is applied, which is not yet the case in China. To determine TMDL, the pollutants purification capacity (R), the pollutants carrying capacity (M) and the demand for discharge of polluted water (P) must be known. While R involves complex bio-geochemical processes and M, hydro-climatological processes, P involves social-economic activities, making the estimate of TMDL a formidable task. It is however not all hopeless, because China has invested heavily in building up the water quality monitoring network and the MEP has commissioned the "Major Science and Technology Program for Water Pollution Control and Treatment"[204], so that implementing a TMDL within the WPDP is expected in the near future.

By 2010, the total water usage in China was 600 Gt, of which 61% was used for agriculture, 24% for industrial and 13% for domestic purposes.[205] The estimated total industrial wastewater discharge was 23.75 Gt, while the total domestic wastewater discharge was 37.98 Gt.[206] Again COD is used as an example to illustrate the above discussions. Suppose for industrial and domestic purposes, water is taken from water bodies of Category III and the

[201] May, J. R. (2004): The rise and repose of assimilation-based water quality, Part I: TMDL litigation. Environmental Law Reporter, News & Analysis, 34 ELR, 10247-10260.
[202] May, J. R. (2006): Clean Water Act developments: the aftermath of TMDL litigation: consent decrees and settlement agreements. 36th Annual Advanced ALI-ABA Course of Study Environmental Law, 9-10 Feb 2006, Washington D. C.
[203] Effective from 1988 to 2007, the MEP has in 2007 decided to abolish this interim regulation.
[204] MEP, http://nwpcp.mep.gov.cn
[205] National Bureau of Statistics of China (2011): "China Statistical Yearbook 2010".
[206] MEP (2012): Report on the State of Environment for 2010; 全国环境状态公报 (2010 年).

wastewater after use is discharged back to the same water bodies. Then, the net total discharge of COD can be computed using the data shown in Fig 5.2:

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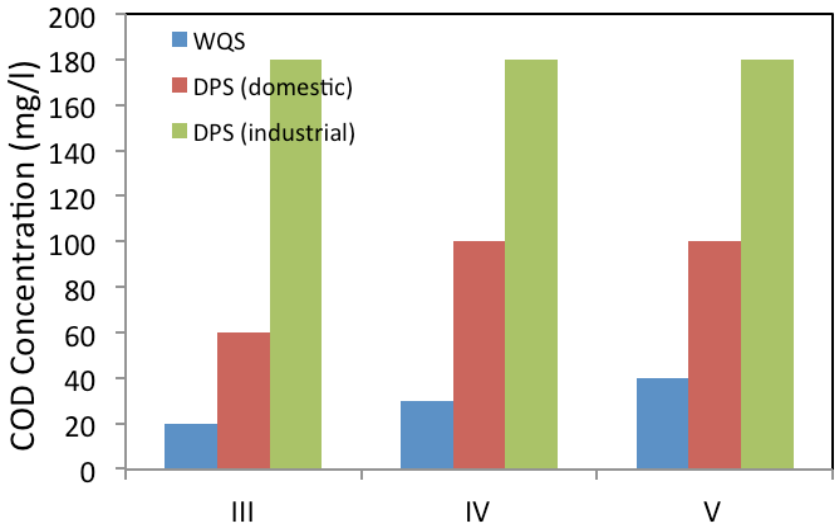

Figure 5.2: Differences between water-quality standard (WQS) and industrial and domestic water pollutants discharge permit standard (DPS) for water-quality categories III, IV and V.

$$COD_{net} = 23.75 \text{ Gt x } (180 - 20) \text{ mg/l} + 37.98 \text{ Gt x } (60 - 20) \text{ mg/l} = 5.32 \text{ Mt} \quad (5.2)$$

This implies that the environment must have the capacity to absorb 5.32 Mt of COD p.a., in order for the water quality to remain unchanged. But, in that year, the total COD discharged was 12.381 Mt[207] excluding agricultural runoff, more than twice of the discharge standard required for water quality of Grade III. Consequently, it leads to water quality deterioration.

The TEC strategy is particularly risky if the permit system is not well monitored and strongly enforced. If the monitoring is limited to the quality of discharged water, and not the daily load, then the TEC target is vulnerable. In addition, according to Ma et al. (2013)[208], 15.5 Gt of industrial wastewater (62% of the total) was discharged per year without permit.

The core problem can be traced back to the original purpose of the WPPCL which is designed to "balance" economic development and environmental protection. Article 13 of the WPPCL states "on the basis of the national water environment standard, the State Council determines

[207] MEP (2012): Report on the State of Environment for 2010; 全国环境状态公报 (2010 年), http://zls.mep.gov.cn/hjtj/qghjtjgb/201201/t20120118_222703.htm, last visit on 12 May 2015.
[208] Ma, Z. et al. (2013): MEP Major Science and Technology Program for Water Pollution Control and Treatment, "Research on water price and tax policy of water environment protection in China", 水专项 "中国水环境保护价格与税费政策示范研究". http://nwpcp.mep.gov.cn/cgzl/zl/201312/t20131219265255.html, last visit on 12 May 2015.

the national water pollutants discharge standard, taking into consideration the national economic and technological conditions". In contrast, the USA CWA's primary objective is "to restore and maintain the integrity of the nation's waters. The objective is translated into two fundamental national goals: to eliminate the discharge of pollutants into the nation's waters, and to achieve water quality levels that are fishable and swimmable.

Chapter 6: Comparison of Discharge Permit Enforcement

An important component of a permit program is its legal enforcement, i.e., the proper legal response in case of non-compliance with requirements of the permit. In the USA, the two cornerstones for the enforcement of the CWA/NPDES include (1) citizens' access to environmental information, to governmental decision making and to courts; and (2) government enforcement. In the PRC, the enforcement of the WPPCL/WPDP program appears to be rather inadequately limited to administrative sanctions.

6.1 Legal Basis for Environmental Law Enforcement in China

The enforcement of the WPPCL/WPDP system in China depends on the relationship of the WPPCL to other laws of the nation (Fig 4.3). The most important ones include the constitutional law which defines the environmental responsibility of the nation and the environmental rights of the citizens, to the civil and criminal laws which define the degree of civil sanction and criminal punishment for water pollution and to the administration law based upon which the WPPCL can be implemented.

6.1.1 Environmental Access Rights

Principle 10 of the "Rio Declaration" (1992) states that "access to information, public participation and access to justice (referred to as "environmental access rights") are critical for sustainable development and are essential to addressing environmental issues fairly and effectively"[209]. In June 2012, 20 years after the signing of the Rio Declaration, Rio+20 Declaration restated Principle 10 and emphasized the importance of societies based on the rule of law and standards of transparency and accountability. [210] The access rights have advanced from principle to actions both in the USA and PRC. For example, public input is transplanted into the USA/CWA TMDL development (as discussed in Chapter 5), and the citizen suits provision has been an indispensible factor in the CWA and other environment-related statutes. China has also established a hearing process when making administrative decisions, and in 2015, the new EPL has developed special provisions regarding information

[209] Unit Nations General Assembly (1992): Rio Declaration on Environment and Development (Rio de Janeiro, 3 -14 June 1992). A/CONF.151/26 (Vol. I)
[210] United Nations Environment Program (Jun 2012): Rio+20 Declaration on Justice, Governance and Law for Environmental Sustainability. http://www.unep.org, last visit on 12 May 2015

opening and public participation. In particular, 134 courts and tribunals have been established in 16 provinces of China for environmental and resources protection related cases,[211] and in June 2014, the highest Court of the PRC founded its internal court for environment and resources. Despite the progress of the PRC in promoting environmental access rights, information availability to the public and enforcement of environmental laws require improvement.

6.1.2 Basic Laws for Enforcement of Pollution Discharge

In the Chinese legal framework, provisions on environmental protection can be found in civil and criminal laws. Article 124 of the General Principles of Civil Law states that "Any person who pollutes the environment and causes damage to others in violation of state provisions for environmental protection and the prevention of pollution shall bear civil liability in accordance with the law".[212] On this basis, the WPPCL does not require proof of fault or intention when imposing environmental civil liabilities. The situation is similar in the USA, i.e., environmental civil and administrative liability is a strict liability.

China's Criminal Law (1997) defined environmental pollution and natural resource destruction to be a crime (Articles 338-346). The 2011 Amendments to the Criminal Law[213,214,215] lowered the threshold of the incrimination. But according to the "National Bulletin on Environmental Statistics (2010)", there were only 11 environmental criminal cases, in comparison to 694 administrative review cases and 116,820 administrative penalty cases[216]. In the more recent National Bulletins for 2011, 2012 and 2013[217], no criminal cases

[211] http://www.chinacourt.org/article/detail/2014/07/id/1339942.shtml

[212] NPC (1986): The General Principles of the Civil Law of the People's Republic of China, in Chinese,中华人民共和国民法通则; Promulgated in 1986; Effective in 1987.

[213] Article 338 (1997): "Whoever, in violation of the regulations of the State, discharges, dumps or treats radioactive waste, waste containing pathogen of infectious diseases, toxic substances or other hazardous waste on the land or in the water bodies or the atmosphere, thus causing a major environmental pollution accident which leads to the serious consequences of heavy losses of public or private property or human casualties, shall be sentenced to fixed-term imprisonment of not more than three years or criminal detention and shall also, or shall only, be fined; if the consequences are especially serious, he shall be sentenced to fixed-term imprisonment of not less than three years but not more than seven years and shall also be fined." Translated by http://www.chinalawedu.com

[214] Article 338 (2011): "Whoever, in violation of the state provisions, discharges, dumps or disposes of any radioactive waste, any waste containing pathogens of any infectious disease, any poisonous substance or any other hazardous substance, which has caused serious environmental pollution, shall be sentenced to imprisonment of not more than 3 years or criminal detention and/or a fine; or if there are especially serious consequences, be sentenced to imprisonment of not less than 3 years but not more than 7 years and a fine." Translated by http://www.ceolaws.net.

[215] http://www.npc.gov.cn/npc/xinwen/2011-02/25/content_1625679.htm

[216] National Bulletin on Environmental Statistics (2010), in Chinese: 全国环境统计公报 2010, http://zls.mep.gov.cn/hjtj/.

were reported and the major environmental cases were all dealt with through administrative penalties and petition letters and visits (信访). These petition letters and visits were responded to by the special department of State Bureau for Letters and Calls. Also telephone and internet complaints now play a role in environmental quality supervision, and the proposals from NPC and People's Political Consultative Conference (of non-communist party members) are important ways for solving environmental problems and disputes. This reflects that China's government prefers to resort to administrative measures to deal with the possible violations of the environmental laws, other than to legal procedures. This practice better protects local industrial and economic development from legal sanctions. As a result, the criminal law has so far played little role in the field of environmental protection in China.

On 28 Oct 2012, the SCNPC enacted the Environmental Impact Assessment Law (EIAL), aimed at national sustainable development and preventing harmful impacts of industrial activities on the environment. In 2008, the legislative body began to examine the enforcement status of the EIAL in five provinces, including Shanghai, Chongqing, Shan Dong, Shan Xi and Inner Mongolia.[218] It was found that relationships of interests widely existed between the entities for environmental impact assessment (EIA) and for EIA review. It is often the case that the two belong to the same entity. According to the MEP, 333 EIA entities (1163 in total national wide) are affiliated with the local EPBs.[219] As a consequence, the fairness and independence of the EIA result are often questionable.

On 6 Dec 2001, the Supreme People's Court adopted Several Provisions on Evidence of Civil Litigation.[220] The provisions provided for example the judicial interpretation on the burden of proof of statutory exemptions as follows: "if the litigation of environmental damage compensation is caused by the environmental pollution, then the injurer shall bear the burden of proof of the statutory exemptions and the fact that there is no causation between his act and the damages." Based on this provision, if the injured takes an action against the suspected polluter, then the latter shall bear the burden to prove or otherwise the causation between the

[217] Id, 215, National Bulletin on Environmental Statistics but for 2011, 2012 and 2013.
[218] Chen, Z. L. (Vice Chairperson of NPC, 2008): Report on the enforcement status of the Environmental Impact Assessment Law. 陈至立, 全国人大常委会执法检查组关于检查《中华人民共和国环境影响评价法》实施情况的报告. http://www.npc.gov.cn/npc/xinwen/2008-10/27/content_1538466.htm, last visit on 22 Jul 2015.
[219] Wang, E. D. (王尔德, 29 Jan 2013): Investigation of EIA implementation by the Ministry of Environmental Protection shows 88 entities have problems. 21 Century Economics. 环保部：环评机构专项执法抽查 88 家存问题, 21 世纪经济报道. http://finance.sina.com.cn/china/20130129/031214429919.shtml, last visit on 22 Jul 2015.
[220] Supreme People's Court of the PRC (6 Dec 2001): Some Provisions of the Supreme People's Court on Evidence in Civil Procedures. Promulgated on 6 Dec 2001; Implemented on 1 Apr 2002. No. 33 of [2001]. 最高人民法院关于民事诉讼证据的若干规定，法释〔2001〕33 号.

damage and the action. This is the precautionary principle, which is an approach to risk management stating that if an action or policy has a suspected risk of causing harm to the public or to the environment, in the absence of scientific consensus that the action or policy is not harmful, the burden of proof that it is not harmful falls on those taking an action.

During 2000-2013, there were fewer than 60 lawsuits raised by environmental public interest groups in China. During 2011-2013, there were only 30,000 environmental dispute cases, in contrast to 10 million other cases heard by all national level courts. The High-Level Court of Guizhou Province reported that less than 1% of the environmental disputes could be dealt through the court system, and in 2013, environmental cases account only for 0.4% of the total cases in that province.[221] Mr. Tang Lin, a Vice Dean of the Guizhou High-Level Court, concluded the reasons for that are (1) the requirements to commence a civil public interests litigation are rigorous; (2) it is difficult to collect evidence; (3) expert testimony incurs high costs; and (4) the probability of losing the case is high.

The first obstacle listed above has been dealt with in the new EPL of 2015. In the past, the NGOs which raised a legal suit against polluters were often questioned by the defendant of their qualifications. Since the EPL of 2015, social organizations that are registered at the civil affairs departments of the governments at or above municipal levels, and are specialized in environmental protection public interest activities for five consecutive years or more without law violation records (Article 58), are qualified as plaintiffs for environmental lawsuits. In a recent case, the Environmental Protection Federation of Taizhou vs. Chang Long Chemical Engineer Company and other five chemical enterprises (Sep 2014, Middle-Level Court of Taizhou), the court recognized the Environmental Protection Federation of Taizhou as a qualified plaintiff, and decided upon a penalty of 160 million Chinese Yuan for water environmental compensation and reparation. The plaintiff, according to Article 58 of the 2015 EPL, was not entitled to the economic benefits from the litigation. Instead, this huge amount of money was mostly used for the rehabilitation of the polluted waters and for other special local environmental programs. This is an ice-breaking case in China's environmental protection legal history. While the plaintiff is empowered with legal qualifications, evidence collection is still difficult for pollution victims, and the determination of the amount and kinds

[221] Wang, L., Q. Yan, F. Li and X. Hu (8 Oct.2014): The situation that it is difficult to raise environmental lawsuit needs change. Economic Information. 王丽, 闫起磊, 李放, 胡星：环境纠纷诉讼难亟待改. 经济参考报 http://dz.jjckb.cn/www/pages/webpage2009/html/2014-10/08/content_96327.htm?div=-1, last visit on 22 Jul 2015.

of compensation are also a challenge for the Chinese courts, which need more technical and expert legal assistance in this new field of law.

In despite of the legislation's progress and continuing exploration of the judicial system, pollution victims prefer to express their anger in the form of peaceful or violent demonstration against polluters and local governments. Such cases have become frequent in recent years and sometimes result in positive outcomes. For example, the 2007 Xiamen public "walking" protest against the PX (P-Xylene) construction,[222] the 2012 Ningbo demonstration against the Sinopec Refinery construction,[223] and the 2011 Dalian demonstration against the PX construction.[224] In the first two cases, the government yielded to the public pressure and reversed the original permissions for the constructions. In the last case, due to the lack of information and public reporting about the PX project, before the citizen of Dalian got to know the existence of the PX facility, it had been already operating for three years, and their "walking" protect was in vain.

The Amendments to the Criminal Law of the PRC, which took effect on 1 May 2011, added new clauses on "crime of undermining environmental and resources protection" and on "crime of misconduct in environmental protection and monitoring". Article 46 was revised (original Paragraph 338) as follows: "Whoever, in violation of State's laws, discharges, dumps or disposes of radioactive waste, waste containing pathogen of infectious diseases, toxic substances or other hazardous waste, thus causing serious environmental pollution, shall be sentenced to fixed-term imprisonment of not more than three years or criminal detention and be concurrently or separately fined. If the consequences are especially serious, he/she shall be sentenced to fixed-term imprisonment of not less than three years but not more than seven years and be concurrently fined." According to this article, the person who discharges toxic or hazardous wastes into national water and air, and causes pollution, shall be criminally liable. However, waste discharge without immediate serious pollution appears to be able to escape from criminal responsibility. This loophole gives polluters the opportunity to pollute the environment without penalty imposed.

[222] Global Nonviolent Action Database (2007): Chinese residents force relocation of chemical plant in Xiamen, 2007.
[223] Jacobs, A. (28 Oct 2012): New York Times, Protests over chemical plant force Chinese officials to back down. http://www.nytimes.com/2012/10/29/world/asia/protests-against-sinopec-plant-in-china-reach-third-day.html
[224] Watts, J. (14 Aug 2011): The Guardian, Tens of thousands protest against chemical plant in northern China. http://www.theguardian.com

But apart from public protests, are there more effective mechanisms to deal with the environmental disputes? Or, as Principle 10 of the Rio Declaration proposes, to solve the disputes in court or tribunal? Until now, the answer is somewhat disappointing. On the one hand, the authority conceals the information about construction projects with environmental risks, or hides the pollution facts from the citizens until they find out the damage which has already occurred. This author is not aware of any cases of citizens taking legal action against the authorities for hiding the facts, or polluters for harming the environment after the facts are eventually exposed to the public. On the other hand, the citizens affected by water pollution often have great difficulties to initiate a legal process because courts are reluctant to deal with this kind of cases under political pressure and because they often do not have the capacity to provide scientific or technical evidence about water pollution.

Clearly, the legal response to environmental pollution in China is not sufficient to protect the citizens from environmental harm. The combination of pollution dischargers without social responsibility and respect to law, a GDP-oriented government which acts as an umbrella for pollution and a court that is closely associated with the government practically shuts the door for citizens to appeal for their environmental interests.

According to the law, an effluent discharger must have a permit. But the reality is very different, pollution discharge without permit, non-compliance with permit requirements and non-renewal of expired permit are so widely spread that local governments often ignore illegal pollution discharges. Most polluters prefer to pay the small penalty rather than to stop illegal discharges. There are no official data for the illegal discharge status, but it is common in China, that effluents are discharged without control, for example, from the pharmaceutical industry. It was found in 2010, the Haerbin Pharmaceutical Factory (哈药集团) had directly discharged waste gases, waste water and solid wastes to the surrounding districts, and it was exposed in 2015 by the media that the Huaxing Pharmaceutical Factory （华星制药）had also directly discharged waste gases and water. Both of them are state-owned leading companies in China. In both case, the companies ended up with only having to pay the administrative penalties.

Judicial intervention in administrative discretion in China is quite limited. Reasons are on the one hand, courts are reluctant to review the decisions of the administrators because of their financial dependence on the allocation of the local government's treasury, although they are

entitled to do so. Only the non-issuance of permits in a designated period (20 days after EPB receives application) and dissatisfaction with the administrative penalty decision can be reviewed by the higher level administrations or directly by the courts. However, regarding the permit issuance that ignores potential environmental risks, permit violation or official failure in environmental monitoring and law enforcement, there is a legal vacuum in which the public can do little but to suffer silently or to protest aggressively. Whether the public can enjoy the legal standing to raise legal actions against administrators for improper permit issuance or against polluters for permit violation is a constant challenge for China's judicial system.

The 2008 WPPCL legislators were only willing to open a narrow door for the public to resort to legal actions for environmental protection or damage relief. Hereby, triple constraints are set up which makes the public resorting to judicial protection difficult. First, the plaintiff is confined to persons "directly injured" to have the legal standing to a raise lawsuit against the polluters for compensation of health or economic damages. The NGOs or the public who are not directly injured but possess environmental interests do not have the legal standing; second, the potential defendant is confined to the polluter who directly caused environmental damage, but not the decision maker who improperly issued the permit or negligently monitored the dischargers; third, the scope of a lawsuit is confined to the health and economic compensation of the directly injured, but not for the rehabilitation of the polluted water resources.

In comparison, the 2012 "Amendments to the Civil Procedure Law"[225] provides the possibility for grassroots NGOs to bring lawsuits against environment polluters. Its Article 55 states that: "Legal institutions and organizations can launch a legal action against persons who infringe on social public interests, including environmental polluters and others who encroach on the interests of the public". This provision appears to facilitate public interests lawsuits and to provide social organizations the legal standing in environmental disputes. However, the term "legal institutions and organizations" are not precisely defined by the legislators, but left for the court to interpret. In 2013, the All-China Environment Federation (ACEF, 中华环保联合会) has brought as plaintiff eight litigations, but all of them were refused to be heard by the

[225] Article 55 of the Civil Act: "Organizations with legal standing may file law suits in the people's court against pollution to the environment, harm to the legitimate interests of consumers and public interest." In Chinese: 《民事訴訟法》第 55 条："对污染环境、侵害众多消费者合法权益等损害社会公共利益的行为，法律规定的机关和有关组织可以向人民法院提起诉讼."

relevant courts with the reason of no standing.[226] The courts responded that they were uncertain about which "legal institutions and organizations" have the legal standing and they needed to wait for the clarification from the legislators. In 2014, no public interest case was heard.

In response to the ongoing litigation standing problems, the newly revised EPL 2015 allows NGOs to file a litigation in case of environmental pollution, ecological damage and harm to the public interests under the following preconditions[227]: (1) the NGOs must be registered at municipal level or higher level governments; (2) must be engaged in activities for environmental protection for 5 years or more and have no law violation records; (3) must not seek economic benefits from litigation. The courts shall accept the litigations filed by the NGOs that meet the above criteria. The 2015 EPL marks a new era for the public interests environmental litigation. In 2015, the ACEF raised two civil litigations and both were accepted to be heard by the Middle-Level Court of Dongying, Shandong. The Beijing Nature Friends and Fujian Green Family raised a lawsuit as joint plaintiffs against Fujian Nanping for dumping waste stones, which was accepted by the Middle-Level Court of Nanping.

6.1.3 Independence of the Courts

China's political system is distinctly different from the USA political system. The Chinese Communist Party has absolute power over the branches of legislative, executive and judiciary. It is not the purpose of this study to comment on this political structure which has proven advantageous in many ways in governing the most populous country of the world, although it has been under continued criticisms from some western politicians. However, while China claims to have or strives to achieve judiciary independence, China's judicial system has never been independent since the foundation of the PRC and indeed in the entire Chinese history. It is in particular not independent in checking and balancing the lawful behavior of the Chinese government. While the USA CWA/NPDES is strengthened through citizen and governmental enforcement, China's political system only allows enforcement which relies heavily on

[226] Zhao, Y. L. (赵伊蕾), 2014: Last year, all of public interest litigation raised by the All- China Environment Federation were refused. China Youth Daily, 04 Apr 2014. http://zqb.cyol.com/html/2014-04/04/nw.D110000zgqnb_20140404_3-05.htm, last visit on 22 Jul 2015.
[227] Article 58 of Environmental Protection Law published in China Daily on 20 May 2014 in Chinese and English. 新版《环境保护法》（双语）中国日报网 2014-05-20, http://www.chinadaily.com.cn/language_tips/trans/2014-05/20/content_17522868_3.htm, last visit 22 Jul 2015.

administrative penalties with some legal involvement. As a consequence, as Wang (2007)[228] noted, China's environmental law enforcement has two critical weaknesses:

- Lack of Supervisory Power: the implementation of environmental laws falls under the jurisdiction of administrative agencies instead of the judiciary. While the formal supervisory power over the implementation of the environmental laws rests upon the legislature, this supervisory power is itself not properly enforced.
- Lack of Public Participation: due to the lack of technical, legal and funding support, private persons often give up to file a lawsuit against polluters. Although the NGOs have more resources and sometimes are willing to raise litigation, their legal standing was not recognized by the courts in the past until the 2015 EPL.[229] The 2015 EPL also requires all level governments to disclose environmental information and encourages public participation in environmental monitoring.

6.2 Governmental Enforcement Action

The framework and organizational setting for environmental law enforcement in China, including the WPPCL, are illustrated in Fig 6.1. The enforcement is carried out primarily through political measures in response to pollution accidents or public pressure. The political measures are sometimes mixed with administrative and minor monetary penalties.

In China, the institutional arrangement has evolved considerably over time and by the end of the 20th century, a dual leading system governing environmental management has come into existence with the so-called vertical and horizontal institutional arrangement. The vertical institutional arrangement refers to environment protection agencies at four different levels, i.e., the MEP under the State Council, the provincial EPBs, the municipal EPBs and the town-level EPOs (Environmental Protection Offices). Local EPBs have the right to advise their upper level institutions. In the horizontal arrangement, other ministries are also involved in environmental protection in their administration sectors, e.g. the MWR. But the MEP is responsible for nationwide environmental protection and management, and the other authorities must cooperate with the MEP on major environmental issues. Also within the horizontal arrangement, China has established river basin management organizations, representing the MWR in charge of river basin management and development and major

[228] Wang, C. F. (2007): Chinese Environmental Law Enforcement: Current Deficiencies and Suggested Reforms. Vermont J Environmental Law 8, p159-193.
[229] It has taken several years for this author to complete this study. During this time, China's environmental legal system has evolved at a fast pace. Updates need to be frequently made.

hydraulic projects and representing the MEP and MWR in charge of water pollution prevention and control.

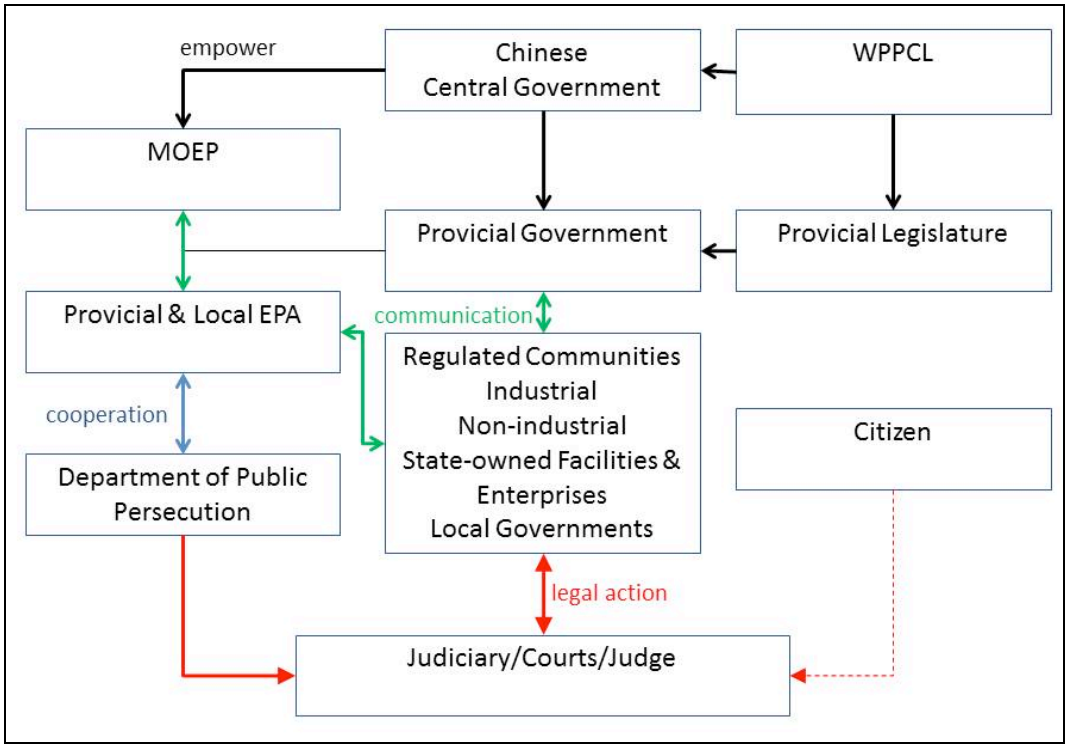

Figure 6.1: The basic Chinese environmental law compliance/enforcement framework and organizational setting.

6.2.1 Administrative Penalties

Governmental enforcement action is the primary mechanism for WPPCL/WPDP enforcement. The concepts of administrative penalty, civil penalty, daily-loading penalty, etc. have been discussed during the WPPCL legislative process, but are in the end not fully adopted. The highest administrative penalty standard accounts for 500,000 CNY (Chinese Yuan) for the discharge of highly toxic wastewater, highly and moderately radioactive solid garbage and wastewater, and discharge of toxic effluents or polluted water containing pathogens by via seepage wells, pits, cracks or karst caves.[230] The penalty is not levied per day. Again, the pollution control authority is the local EPB which is a branch of the local government and must comply with its socio-economic agenda. As economic growth has been, until very recently, the nation goal of China, and most water polluters are SOEs (State owned enterprises) which play a pivotal role in economic growth, providing the government with

[230] Article 76 of the WPPCL in Chinese: 向水体排放剧毒废液，或者将含有汞、镉、砷、铬、铅、氰化物、黄磷等的可溶性剧毒废渣向水体排放、倾倒或者直接埋入地下的；向水体排放、倾倒放射性固体废物或者含有高放射性、中放射性物质的废水的；利用渗井、渗坑、裂隙或者溶洞排放、倾倒含有毒污染物的废水、含病原体的污水或者其他废弃物的, 处五万元以上五十万元以下的罚款.

revenues and the public with employment, local EPBs have neither the incentives nor sufficient power to force industries to comply with environmental laws. In some cases, local EPBs even act as "umbrellas" to shield the polluters from legal punishment. If the polluter is a SOE, its political power often prevails over the legal authority to make way for the water pollutants discharge. Hence, the citizens, confronted with a government with political superiority and a company with economic superiority and the "umbrella" from the local EPB, are in a very weak position in the struggle for their environmental safety from pollution.

Government enforcement actions take place mostly to contain the outcry of public dissatisfaction in the form of violence and/or massive peaceful demonstrations (e.g. a "walking" protest, as large numbers of people pretend to walk on the street to convey a political message), such as the earlier-mentioned case of the 2011 Dalian public "walking" demonstration. In such cases, the polluters and the pollution control administrators are simultaneously blamed by the public, and ironically the local EPBs are often punished for negligence in environmental monitoring (Appendix III).

The government enforcement actions of the WPPCL/WPDP are mostly in the form of administrative penalties including:

(1) Temporary closure and safety checks of the particular polluting facility;

(2) Small fines on the polluters;

(3) Temporary demotion or transfer of the responsible administrators;

(4) Punishment of low-ranking EPB officers as scape-goats to quiet public dissatisfaction.

The characteristics of this type of enforcement are clearly seen in the Nov 2005 severe water pollution case of the Songhua River. The incident was caused by the benzene plant explosion of the Jilin Petrochemical Company, and the Songhua River was severely polluted by the large amounts of toxic chemicals leaked to the river. The Communist Party of China and the government imposed party disciplinary and administrative punishments on 12 EPB officers, including the EPB Director of the Jilin Province. The former SEPA Director was relieved of his duty[231] (but later appointed to be the Deputy Director of the National Development and Reform Commission[232]). The investigation of the State Council concluded that Jilin

[231] Pan, P. P. (2005): China Fires Environment Agency Chief Over Handling of Toxic Spill. Washington Post Foreign Service (3 Dec 2005).

[232] Xinhua News Agency (7 Jan 2007): Sacked Environmental Chief Appointed NDRC Deputy Director. http://china.org.cn/english/environment/195234.htm, last visit on 23 Jul 2015.

Petrochemical Company, Jilin EPA and SEPA all have responsibilities for this incident (Appendix A2).

Only in rare cases, the criminal law is invoked and imprisonment of polluters followed. This for example occurred in the case of the Jul 2009 Xinan Ji River[233] arsenic wastewater pollution incident.[234] Yixin (亿鑫) Chemicals illegally produced arsenilic acid (阿散酸) and stored large quantities of arsenic wastewater in a secret reservoir and on 20-23 Jul 2009, secretly pumped the wastewater into the river. As punishment, three persons were sentenced to 11, 6 and 5 years imprisonment, plus a civil lawsuit against the offenders.

6.2.2 Contradiction to Governmental Enforcement: Pollution Economics

Discharged industrial and domestic wastewater can be divided into 3 categories: (1) water satisfies; (2) exceeds and (3) fails the discharge standard. According to the official statistics of 2010[235], 95% of the industrial and 70% of the domestic wastewater fall into category 1[236], 5% of the industrial and 30% of the domestic wastewater to category 2, and none to category 3.

The discharge standards are in practice determined by the MEP in consultation with industries. In this process, the industries play a leading role, and the standards are primarily designed to protect their interests or at least, not to harm their interests. According to Ma et al. (2013)[237], because of the large discrepancy between the water-quality standard and the low water pollutants discharge standard, the industries only need to pay a low fee for wastewater treatment to achieve an economic benefit of 200 billion CNY per year.

Water pricing in China is very complex, involving 3 levels of government (national, provincial and local), 4 types of fees (water resource, supply, treatment and discharge fee), 5 water quality categories (Chapter 3) and 6 administrative departments (Ministries of Finance, MEP, MWR etc.). Different water supply, treatment and discharge arrangements result in huge differences in the cost of industrial water use.

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[233] In Shandong Province, 山东沂南涑河砷化物水污染事件

[234] Guangdong Environmental Inspection Net (2013): China's 10 worst environmental pollution cases. Available in Chinese , http://www.28hb.com/posts/全国 10 大环境污染事件案例.html, last visit on 23 Jul 2015.

[235] MEP (2012): Report on the State of Environment for 2010; 全国环境状态公报 (2010 年), http://zls.mep.gov.cn/hjtj/qghjtjgb/201201/t20120118_222703.htm, last visit on 12 May 2015.

[236] In contradiction to the statement of Z. Ma (2013).

[237] Ma, Z. (2013): Report for the MEP Project on "China's water price and tax policy for water environmental protection". School of Environment and Natural Resources, China People's University. 马中, 水专项"中国水环境保护价格与税费政策示范研究"报告，中国人民大学环境学院.

Ma et al. (2013) estimated that the total industrial water use in China in 2009 was 73.2 billion m^3.[238] Most Chinese industries take natural water of Category III, and discharge back to the same natural water after treatment. The subsidized water resource fee is 0.13 CNY/m^3 and the discharge fee also 0.13 CNY/m^3. Thus, the cost of industrial water use is 0.26 CNY/m^3 (~ 0.04 USD/m^3). The actual cost of the water is as follows: unsubsidized water resource fee 0.75 CNY/m^3, waste water treatment fee 1.28 CNY/m^3 and discharge fee 0.13 CNY/m^3, i.e., in total 2.16 CNY/m^3. Thus, the industry makes an economic profit of 1.9 CNY/m^3. This implies that the Chinese government is willing to sacrifice water quality for economic development, profoundly contradicting the WPPCL philosophy. A similar situation is found in the case of the domestic wastewater treatment, because wastewater treatment facilities are subsidized by the government, which is deemed necessary for social stability.

Due to these fundamental contradictions, the Chinese government is handicapped to enforce the WPPCL. The enforcement actions of the Chinese government are mostly visible in cases of severe water pollution accidents when there is a public outcry, by sacrificing some EPB officers as scapegoats. A more interesting, but less visible form of the enforcement is that the Chinese government actually shoulders some of the responsibilities of water pollution caused by industrial and domestic wastewater discharges. For example, during the periods of the 10th and 11th Five Year Plan, the Chinese government spent 180 billion CNY for water pollution settlement.[239]

6.3 USA CWA Enforcement

The CWA is supported by a compliance/enforcement scheme within the general framework of the environmental law enforcement. The concept of "environmental justice", which is new to China, has become a widely accepted premise and the moral basis of environmental law enforcement in the USA. It has also become one of the EPA's top priorities to integrate environmental justice into compliance/enforcement programs and program-implementations.[240]

The most frequent enforcement action is first administrative penalty, and followed by judicial (civil and criminal) actions by the states and the EPA. The EPA processed 1,440 final

[238] This is three times the estimate of the MEP shown in Figure 4.2, which was about 25 billion m^3. Reasons for this difference are not clear.
[239] Id, 237, Ma, Z. (2013)
[240] USA EPA (2014): Plan EJ 2014 "Advancing EJ through Compliance and Enforcement"

administrative penalty orders in 2013[241]. The EPA may refer civil cases to the U.S. Department of Justice (DOJ), referring 138 civil cases in 2013. The U.S. Attorney General's Office and the DOJ's Environmental Crimes Section and the State Attorneys General, in coordination with the EPA criminal investigators and general counsel, may prosecute criminal violations against individuals or entities who knowingly disregard environmental laws or are criminally negligent. The EPA reported the assessment of nearly $1.15 billion in civil penalties (administrative and judicial) and $4.5 billion in combined criminal fines, restitution, and court-ordered environmental projects during 2013.[242] However, more than four decades since the CWA was enacted in 1972, the CWA compliance/enforcement scheme has also shown deficiencies. At the present, about 50% of the NPDES (small-individual) permit holders violate the permit requirements. The overall effectiveness of the compliance/enforcement strategy of the EPA remains to be of considerable concern.

6.3.1 Statutory framework, key players and infrastructure

Environment law enforcement in the USA operates within a complex framework and organizational setting. While the laws and regulations are administered by the EPA, they also involve federal and state regulators and the regulated community. Fig 6.2 depicts the USA environmental law compliance/enforcement framework and the key players. The roles of the key players are briefly described below.

[241] USA Fiscal Year
[242] Esworthy, R. (2014): Federal Pollution Control Laws: How Are They Enforced? Congressional Research Service, 7-5700, RL34384.

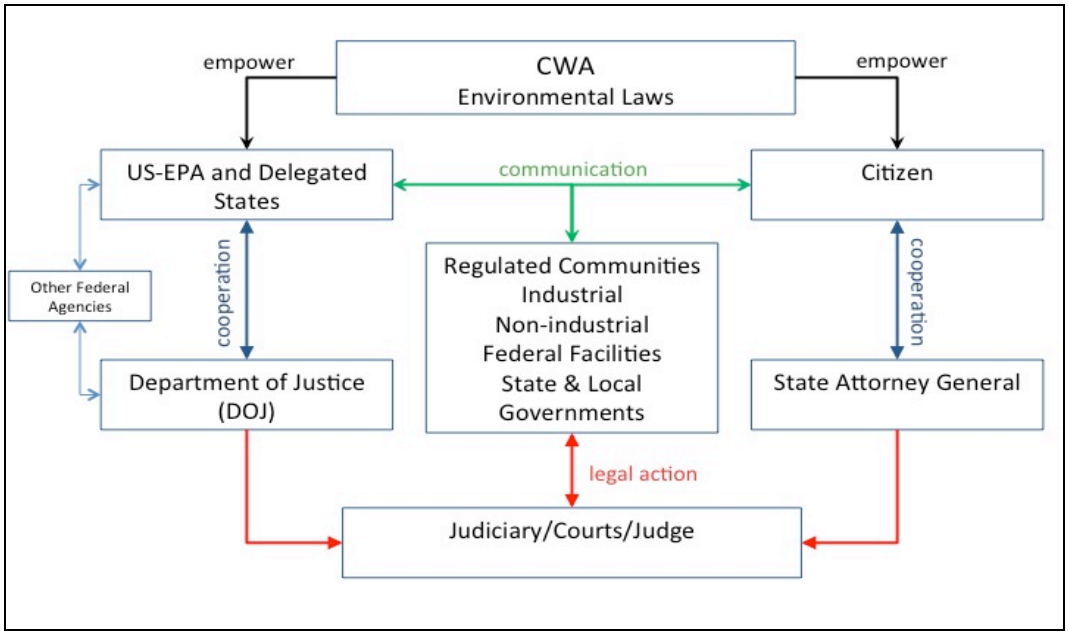

Figure 6.2: The basic USA environmental law compliance/enforcement framework and organizational setting.

EPA: The EPA promulgates national regulations and standards; together with the delegate states, it is responsible for administrating the permitting, monitoring and enforcing programs; provides information to the public and technical and compliance assistance to the regulated community; employs various administrative and judicial tools, as well as incentives, to promote and ensure compliance.

Department Of Justice (DOJ): The DOJ represents the EPA in civil and criminal legal actions against alleged violators; represents the EPA in defending laws, programs and regulations, when the EPA intervenes in, or is sued under, environmental citizen suits.

Other Federal Agencies: The EPA and DOJ coordinate with other federal agencies, e.g., the Federal Bureau of Investigation, Department of Transportation (DOT), Department of Homeland Security, National Oceanic and Atmospheric Administration, USA Internal Revenue Service (IRS) etc.

Delegated Authority: The EPA delegates to states the authority to implement national programs. The delegate states must have demonstrated the capacity to administer and enforce the programs. In case of the CWA, they assume primary enforcement responsibilities and conduct a large proportion of inspections and enforcement actions.

Citizens: Citizens are authorized to participate in environmental law enforcement. They identify and report violations, comment on enforcement cases and initiate enforcement proceedings against violations; bring actions against the federal or state EPA for non diligence. Through the EPA "National Report a Violation" website, citizens can lodge online complaints, and through the "EPA Fugitives" website, assist in locating alleged environmental criminal fugitives.

Regulated Community: it covers a range of industrial and non-industrial entities, federal facilities and state and local governments, including utilities, refineries, manufacturing and processing facilities, agriculture producers and processors, mobile sources, etc.

6.3.2 Enforcement Tools and Mechanisms

The USA EPA employs an array of tools to achieve law compliance, including monitoring, investigation, administrative and judicial (civil and criminal) actions, as well as compliance assistances and incentives. The tools have the following functions:

- to identify and correct noncompliance;
- to restore environmental damage; and
- to impose penalties to deter violations.

The idea behind the tools is to balance compliance through provision of guidance/assistance and violation correction by imposition of penalties and legal actions. In practice, the EPA takes a pragmatic approach with its compliance/enforcement programs relying more on pollution control technologies and focusing judicial actions on large cases that are expected to result in large environmental benefits.

The EPA and the delegated states are empowered by the CWA to take enforcement actions.[243] The CWA Section 309[244] rules that the primary enforcement options for the EPA include:

- issue administrative compliance orders;
- assess administrative penalties;
- refer civil cases to the DOJ for penalties and injunctive relief; and
- refer criminal cases to the DOJ for prosecution.[245]

[243] Glicksman, R. L. and D. H. Earnhart (2007): The Comparative Effectiveness of Government Interventions on Environmental Performance in the Chemical Industry, 26 Stan. Envtl. L. J. pp317, 332.
[244] 33 U.S.C. § 1319.
[245] http://www2.epa.gov/enforcement/water-enforcement. Last visit on 23 Jul 2015.

In practice, the USA EPA takes tough civil and criminal enforcement actions against violators only as the last option, as reflected in the enforcement procedure of the Illinois State EPA (Fig 6.3). Most CWA/NPDES violations are dealt with and settled through Administrative Enforcement Actions (see also Section 6.3.6). Once a violation is identified, the EPA or state may give the permit holder an informal notice of permit violation or initiate a formal administrative action in the form of a notice of violation or an administrative order for compliance. An administrative order imposes legally enforceable requirements for achieving compliance within a specified period, but may or may not include sanctions and penalties. The administrative enforcement actions either: (1) require violators take actions to comply with the permit requirements; (2) revoke a violator's permit to discharge; and/or (3) impose penalties for permit non-compliance. Most administrative enforcement actions lead to either consent agreements or final administrative orders. Administrative orders are processed at the federal level through an administrative adjudicatory process, filed before an administrative law judge, and at the regional level by the EPA's regional judicial officers.

Administrative enforcement actions may also include Supplement Environmental Projects (SEPs). These are projects beneficial to environmental and human health, which a violator undertakes voluntarily in exchange for mitigation of penalties. The application of SEPs as an enforcement mechanism has become more popular in recent years, as the benefit of a SEP appears to be more beneficial to the environment rather than monetary fines or penalties alone.[246]

[246] Gelpe, M. R. and J. L. Barnes (1990): Penalties in settlements of citizen suit enforcement actions under the Clean Water Act. William Mitchell Law Review 16, p1025-1040.

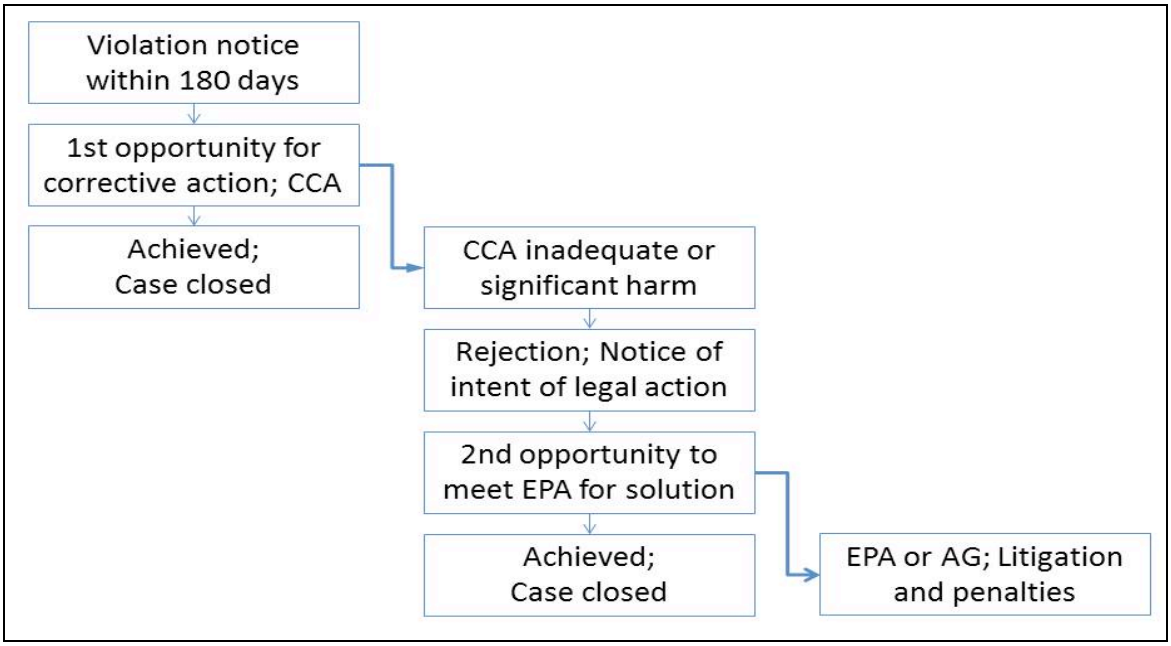

Figure 6.3: NPDES enforcement procedure of the USA Illinois State EPA.

Civil cases constitute a large component of the enforcement actions, second only to administrative cases. They are lawsuits filed in court against permit holders for alleged violation of permit requirements or administrative orders. Civil cases may be filed in the federal district court by the DOJ on behalf of the EPA or by State Attorney General on behalf of the state. As with administrative cases, many civil judicial actions lead to a consent decree.

The CWA Section 309(c) authorizes criminal enforcement actions against individuals or entities who negligently or deliberately violate the statute, especially for repeated offenders. The criminal enforcement scheme includes imprisonment, monetary penalties, or both. Any person, who negligently introduces into a sewer system or into a publicly owned treatment works any pollutant or hazardous substance which such person knew or reasonably should have known could cause personal injury or property damage, shall be punished by a fine of not less than $2,500 nor more than $25,000 per day of violation, or by imprisonment for not more than 1 year, or by both. It is a felony if it is committed "after a first conviction," bringing a maximum $50,000 fine for each day of violation or up to two years in prison, or both.[247] A party who is convicted of "knowingly" committing any of the same violations will face a penalty of "not less than $5,000 but not more than $50,000 per day of violation, or by imprisonment for not more than 3 years, or by both." For a subsequent conviction, the maximum fine and prison sentence can be doubled to $100,000 a day and 6 years in prison.

[247] CWA, Section 309 (c)(1)

[248] Section 309 (c)(3) states that who knowingly places another person in imminent danger of death or serious bodily injury, shall be subject to a fine of not more than $250,000 or imprisonment of not more than 15 years, or both; for an organization, not more than $1,000,000. Section 309 (c)(4) stipulates the punishment of false statements (knowingly) for a maximum $10,000 in fines, or not more than 2 years imprisonment, and doubled for repeat offenders. The EPA investigates federal environmental crimes and the AGO and DOJ prosecute criminal cases on behalf of the EPA.

6.3.3 Violation Prevention

Parallel to enforcement actions, the EPA and states also provide compliance assistance to permit holders to understand their obligations to prevent violations and reduce the need for enforcement actions. Also, the EPA and states assist violators to achieve compliance.[249]

6.3.4 Monitoring, Inspections and Evaluations

The basis of the enforcement programs is compliance monitoring, data compilation and evaluation of behavior of the regulated community. Data and data evaluation allow the EPA to identify violations and to set enforcement priorities. The data can eventually be used in an enforcement action. Monitoring discharge activities also increases the awareness of permit requirements and encourages compliance. Several forms of compliance monitoring have been introduced by the EPA:

- Self-Monitoring/Reporting: the NPDES requires permit holders to monitor and record their own compliance statutes and report the results to the permitting authority. Self-monitoring encourages the permit holders to better comply with the law.
- Review: the EPA compiles and reviews the self-monitoring data and data otherwise collected.
- Site Inspection and Evaluation: Inspections are conducted for initial assessment of permit compliance and the degree of non-compliance.
- Area Monitoring: Area monitoring looks at environmental conditions in the vicinity of a facility, or across a certain geographic area.

The EPA has a number of national databases including enforcement and compliance data elements, which are available to EPA staff and in some cases, state and local governments, but not open to the public. However, the Enforcement and Compliance History Online

[248] CWA, Section 309 (c)(2)
[249] State Agency Contributions to Enforcement and Compliance, ECOS 01-004, April 2001.

(ECHO), introduced in 2003 has become the most prominent publicly accessible database. A list and descriptions of the EPA's enforcement/compliance databases can be found in the EPA's "Compliance and Enforcement Data Systems" website.[250]

6.3.5 Citizen Enforcement Action

The federal EPA and the states have the obligation, according to the USA Freedom of Information Act, to disclose to citizens what they know, including to divulge evidence of a polluter's violation of a permit limit.

Civil enforcement actions constitute an indispensable component of the CWA enforcement strategy which supplements the EPA enforcement actions. Fourteen USA federal environmental laws empower citizens to act as "Private Attorney Generals" to enforce compliance.[251] In particular, the CWA Section 505 states that any person has the right to commence a civil action on his own behalf against either (1) any person who violates an effluent standard or limitation, or (2) the EPA for failure to perform any act or duty…which is not discretionary.[252]

The first issue concerning citizen action is the legal standing of the citizen. To have an individual standing, citizens must show: (1) they have suffered an injury in fact that is concrete and particularized, actual and imminent, and not conjectural or hypothetical; (2) the injury is fairly traceable to the defendant's challenge action; (3) it is likely, as opposed to speculative, that the injury will be redressed by a favorable court decision. Plaintiffs need not establish the causal connection with absolute scientific rigor. Citizen claimants need not show prudential standing. As a general matter, plaintiffs invoking federal laws should show their claim falls "within the zone of interests" meant to be protected by the statute. Yet, this does not apply when Congress grants citizen suits authority.

Environmental citizen claimants are required to provide a 60-day notice before commencing an action under the CWA, although action may be brought immediately for violations of new source performance standards or toxic effluent limitations. No action may be commenced prior to the 60 days after the plaintiff has given notice of the alleged violations to the EPA,

[250] http://echo.epa.gov/facilities/facility-search?mediaSelected=all, last visit on 23 Jul 2015.
[251] May, J. (2004): Discharges from historic mining properties: asserting and defending citizen suits under the Clean Water Act, p38, in Chapter 23 of "Proceedings of the rocky mountain mineral law fiftieth annual institute", 22-24 Jul 2004.
[252] 33 U.S.C. §1365(a)

the state in which the alleged violation occurs and to the alleged violator of the standard, limitation, or order, provided by Section 505 (b) (1) (A) [33 U.S.C. 1365]. The EPA requires notice of intent to identify the specific standards and limitations the recipient of the notice is alleged to be violating, the person responsible, the location of the alleged violation, the date or dates of such violation, and the full name and address of the person giving the notice. [253]

The preclusion follows the following procedure: Advance notice of intent; government enforcement (civil action; administrative action; prior enforcement action); permit shield: compliance with a NPDES permit suffices for compliance with the Act (Section 402, 33U.S.C.1342). The Act's permit shield provision exempts pollutants known to but not regulated by the issuing agency from claims for unpermitted discharges. In the case of Piney Run Preservation Ass'n v. County Commissioners of Carrol County, Maryland,[254] the Fourth Circuit reversed the decision of the lower court holding that it was unlawful for a wastewater treatment plant to discharge heated wastewater without expression in its NPDES permit, rather applied the "permit shield" provision of Section 402 (k), and ruled that the discharge not to be prohibited because: (1) a permit provision stating "discharge of pollutants not shown shall be illegal" is ambiguous and did not limit thermal discharge; (2) the permit did not expressly prohibit discharges of unlisted pollutants; and (3) the state was aware of the potential for thermal discharge when it issued the permit, yet did not set a corresponding effluent limit. This case created great controversy at the time.

Citizens are also empowered to act against the EPA administrator if it fails to perform any nondiscretionary act or duty. Citizen suits are also important to develop new regulatory programs and to improve existing regulatory programs. The Flannery Decree, for example, as a result from the consolidation of several citizen law suits, required the EPA to issue BAT effluent limitations for 65 toxic pollutants.[255]

On the other hand, barriers have been placed by the law to constrain the power of civil actions against alleged polluters. Most noticeably, citizens cannot sue for wholly past violations, unless they can show that the violations are likely to continue after they file a suit. A violator may thus cause tremendous harm with illegal discharges, but escape from citizen suits if it

[253] 40 C.F.R. pt. 135 (2003)
[254] 268 F. 3d 255 (4th Cir. 2001).
[255] Glicksman, R. L. (2004): The Value of Agency-Forcing Citizen Suits to Enforce Nondiscretionary Duties, 10 Widener L. Rev. pp353, 362-364.

cannot be shown that the discharge might reasonably recur. Obviously, this is a significant barrier for citizen groups to act effectively.

6.3.6 Statistics and Appraisal

A summary of the EPA environmental enforcement actions carried out over the 5 year period (2008–2012) are summarized in Tables 6.4 – 6.7 (adapted from Esworthy, 2013[256]).

Table 6.4: EPA Administrative, Civil and Criminal Enforcement Actions, FY2008-FY2012

Enforcement Action	2008	2009	2010	2011	2012
Administrative Compliance Orders	1390	1588	1302	1324	1088
Administrative Penalty Order Complaints	2056	1914	1901	1760	1760
Final Administrative Penalty Orders	2084	1916	1830	1735	1780
Civil Judicial Referral	280	277	233	199	179
Civil Judicial Cases Concluded	192	201	200	182	144
Criminal Judicial Referral	N.A.	N.A.	N.A.	N.A.	N.A.
Criminal Judicial Cases Initiated	319	387	346	371	321

Table 6.5: Number of the EPA Enforcement Inspections and Evaluations by Statute, FY2008-FY2012

Statute	2008	2009	2010	2011	2012
CAA	3953	3384	3690	3558	4055
CWA	3691	3488	3446	3364	3439
SDWA	5946	6927	7034	5955	6161
…					
Total	19882	19724	21012	18963	19834

Table 6.6: Environmental Enforcement Penalties Assessed by EPA: Administrative, Civil, and Criminal, FY2008-FY2012 (nominal dollars in thousands—not adjusted for inflation)

Statute	2008	2009	2010	2011	2012
Administrative	$38,197	$31,609	$33,359	$44,881	$52,023
Civil Judicial	$88,356	$58,497	$70,249	$104,391	$155,539
Criminal[a]	$63,454	$96,000	$41,000	$35,000	$44,000
Total	$190,108	$186,105	$144,600	$184,272	$251,562

a. Criminal penalties represent fines and restitution .

[256] Esworthy, R. (2013): Federal Pollution Control Laws: How Are They Enforced? Congressional Research Service, 7-5700, RL34384. Data from the EPA databases
http://www.epa.gov/compliance/data/results/nets.html
http://www.epa.gov/enforcement/data/eoy2012/eoy-trends.html
http://www.epa.gov/compliance/resources/reports/nets/netsg2inpectionslongterm.pdf

Table 6.7 Supplemental Environmental Projects (SEPs) Dollar Values as Reported by the EPA: FY2008-FY2012
(dollars in thousands—not adjusted for inflation)

Statute	2008	2009	2010	2011	2012
CAA	$15,679.8	$12,509.7	$8,160.0	$6,665.7	$6,244.5
CWA	$13,904.6	$5,264.9	$12,419.0	$10,488.0	$27,023.9
SDWA	$1,428.0	$3.8	$325.0	$1,212.8	$103.1
…					
Total	$39,046.1	$41,121.1	$23,774.3	$25,386.8	$43,606.0

The data revealed that the EPA's civil, administrative, criminal enforcement actions, environmental enforcement penalties assessed as well as SEPS have remained steady. In 2012, the EPA initiated 1088 administrative compliance orders and 1760 administrative penalty order complaints and imposed 1780 final administrative penalty orders[257]; referred 179 civil cases to the DOJ, filed 119 civil complaints with the court; concluded 144 cases and opened 320 new cases. The civil penalties amounted to $207.6 million. EPA enforcement actions have increased weighting on SEPs, with a total of $43.6 million spend in 2012.

Despite the robustness of the EPA program, the success of enforcement is mixed. According to Andreen (2007),[258] the number of cases the EPA referred to the DOJ fell 55% between 1997 and 2002. The most recent data show that the EPA opened 346 new environmental crime cases in 2010, an 11% decline from 387 in 2009. The number of people convicted for environmental crimes dropped from 738 in 2001 to 470 in 2006.[259] Criminal charges were brought against 289 defendants in 2010. Of the cases completed during that year, 198 defendants either pleaded guilty or were convicted at trial. Over the years, the conviction rate on average is approximately 90%. In 2010, individual criminal defendants were sentenced to a total of 72 years of jail-time. Another major form of law enforcement is economic penalties. In 2010, environmental criminal defendants were assessed a total of $41 million in fines and restitution, and the courts ordered criminal defendants to pay $18 million for environmental projects.[260]

The rate of permit violation remains high. From 2003 to 2005, about 20% of all major dischargers were in substantial non-compliance with their permits. During 2005, 57% of these

[257] EPA-OECA, Enforcement Annual Results for Fiscal Year 2012, released on 17 Dec 2012, http://www.epa.gov/enforcement/data/eoy2012/eoy-data.html
[258] Andreen, W. L. (2007): Motivating Enforcement: Institutional Culture and the Clean Water Act, 24 Pace Envtl. L. Rev. 67. http://digitalcommons.pace.edu/pelr/vol24/iss1/4
[259] Solomon, J. and J. Eilperin (2007): Bush's EPA is pursuing fewer polluters. Wash. Post, 30 Sep 2007.
[260] Data from http://www.epa.gov/Compliance/resources/reports/endofyear/eoy2010/criminal/index.html#cases

major dischargers (3600 out of 7000) exceeded their permit discharge limits at least once[261]. The most recent statistics of the EPA for 2010 shows that, in addition to the major facilities, the NPDES covers 440,000 small individually-permitted facilities, known as the ANCR (Annual Noncompliance Report) facilities. Permitting authorities (46 states and the Virgin Islands and federal EPA for the remaining 4 states) reviewed discharge data for 82% of ANCR permittees to determine whether violation occurred. The states which provide detailed data to the federal EPA are classified as "verified states" while the states which provide general statistics to the EPA as "non-verified states". The violations are classified as violations and serious violations (Category I). An overview of the statistics is presented in Table 6.8. These statistics show that after 40 years of NPDES, about half of the ANCR permit holders (i.e. 47%, if data from the verified states are used) are in noncompliance with their permit requirements and 35% in serious non-compliance with their permit requirements. In 2008, the permit violation rate was as high as 73% and Category I violation rate as high as 60%. The EPA believes the more recent improvement of permit compliance is probably due to the publication of the data to the general public.

Table 6.8: NPDES permit violation and serious violation rates for 2008, 2009 and 2010.[262]

Year	**2008**	**2009**	**2010**
Violation Rate – Verified States	73%	63%	47%
Violation Rate – Non-verified States	39	36	44
Violation Rate - Overall	45	45	45
Category I Violation Rate – Verified	60	46	35
Category I Violation Rate – Non-verified	18	25	25
Category I Violation Rate – Overall	26	28	29

The high rate of permit violation can be partially attributed to the insufficient capacity for law enforcement. Most of monitoring and enforcement tasks are carried out by the EPA regional offices. Yet, from 1997 to 2007, the enforcement funding to EPA regions decreased by 8% in inflation-adjusted terms, forcing the regional officials to reduce the number of enforcement staff by 5%. In 2003, the federal government targeted to eliminate 200 enforcement jobs.[263] Over the period 1997–2007, EPA's grants to states to implement federal environmental programs declined by 9% in real terms, while the enforcement responsibilities increased.[264] The budget cuts affected the number and quality of enforcement actions directly, but they also

[261] Andreen, W. L. (2007): Motivating enforcement, citing the Office of Enforcement and Compliance Assurance of the EPA.
[262] USA EPA Annual Noncompliance Report, Calendar Year 2010.
[263] Mintz, J. A. (2004): "Treading Water": A preliminary assessment of EPA enforcement during the Bush II administration, 34 Envtl. L. Rep. (Envtl. Law Inst.) 10, pp912-10, 914
[264] GAO EPA-State Enforcement Report.

contributed to the "EPA's loss of credibility as a stringent overseer of state enforcement and compliance.[265] Over 2011-2012, congress cut the EPA's budget by 18% from $10.3 billion to $8.5 billion. In particular, the funding for water quality fell 29%, from $5.6 billion to $4 billion.[266] This significantly weakened the ability of the EPA to fulfill its mandate in environmental law enforcement.

6.3.7 Federal Facilities

The federal government also causes pollution and is part of the regulated community. For example, the DOD (Department of Defense) and DOE (Department of Energy) are responsible for the largest and most polluted sites in the country.[267] In general, federal facilities must adhere to the environmental laws and regulations to the same extent as other regulated bodies. However, legal questions exist when federal facilities are subject to enforcement actions, such as monetary penalties. Enforcement against federal facilities for violations of the CWA has encountered difficulties because of the interpretation of the USA Supreme Court of the CWA's sovereign immunity provision and its definition of "person". The CWA has provisions for federal facilities to comply with the law,[268] but in the DOE v. Ohio case, the Supreme Court held that federal facilities and agencies are immune from civil penalties for past violations under the CWA because the Act does not unequivocally waive sovereign immunity for civil penalties.[269] This decision also applied to the SDWA, but Congress amended the SDWA in 1996 to expressly waive federal sovereign immunity for civil administrative penalties.[270] However, similar amendment has not been made to the CWA. Further, the Supreme Court also held in the DOE v. Ohio case that federal facilities were immune from civil penalties under the CWA's citizen suit provisions because the USA was not included in the definition of "person".[271] Federal facilities enjoy until today immunity for non-compliance with the CWA.

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[265] Flatt, V. B. (1997): A dirty river runs through it (the failure of enforcement in the Clean Water Act), 25 B.C. Envtl. Aff. L. Rev. 1, 28.
[266] Davenport, C. (2013): National Journal Daily of 4 Mar 2013.
[267] Kassen, M. R. (1995): The Inadequacies of Congressional Attempts to Legislate Federal Facility Compliance with Environmental Requirements, 54 Md. L. Rev. 1475; Percival, Environmental Regulation, supra note 25 at 1034; de Saillan, C. (2008): The Use of Immient Haxard Provisions of Environmental Laws to Compel Cleanup at Federal Facilities, 27 Stan. Envtl. L.J. 43, p4849.
[268] 33 U.S.C. § 1323
[269] Andreen, W. L. and S. C. Jones (2008): The Clean Water Act A Blueprint For Reform, Center for Progressive Reform, White Paper #802.
[270] 42 U.S.C. § 300(j)(6)(1996)
[271] Id. 270.

The legal entanglement in the CWA enforcement actions against federal facilities is of particular relevance to China. China faces similar problems but on much larger dimensions. The Chinese state owns not only national facilities, such as those of the People's Liberation Army, but also about 300,000 enterprises which dominate the Chinese economy. It is an enormous challenge to take enforcement actions against state owned facilities and major enterprises for compliance with the regulations under the WPPCL.

Chapter 7: A Case Study of China's WPDP System

With an area of 36,900 km^2 and a watercourse of 120,000 km long, Taihu in Jiangsu Province is the third largest lake in China.[272] Its drainage basin is associated with the most economically developed areas of China, encompassing Shanghai, Jiangsu, Zhejiang and Anhui. In 2007, the total population of the basin was 49 million, with a total GDP of 2865 billion CYN and a GDP per person twice that of the national average.[273] The economic growth in the Taihu Basin depended mainly on chemical, paper-making, electroplating and other heavy pollution industries. The lack of environmental awareness and effective water pollution control measures resulted in serious pollution of Taihu and water quality disasters. Despite the implementation of the WPPCL/WPDP and highly publicized actions by the government, the water quality of Taihu has not significantly improved. Thus, Taihu serves as an excellent case to study the functioning of the WPPCL/WPDP.

7.1: Taihu Pollution in 2007

In 2007, Taihu saw the worst eutrophication outbreak in history. Large quantities of blue-green algae in the lake degraded its water, causing severe water pollution and threatening the water safety of Wuxi City (population of 6.3 million). From the 1980s to the 2000s, the water quality of Taihu dropped from Grade II to III to Grade IV to V (Fig. 7.1) and in the five years prior to the 2007 eutrophication outbreak, the water quality of Taihu was consecutively classified as Category V.[274]

Since Apr 2007, it had been hot and dry in the Taihu area, and the water level low. The warm temperature and low rainfall provided the best conditions for the growth of blue-green algae. At the time of the outbreak, the nitrogen content in the fresh water was more than 4.6 mg/l with maximum levels exceeding 10.0 mg/l (10 times the standard for water-quality Category III, Table 5.1). The discharge of wastewater into Taihu massively exceeded the environmental capacity of the lake over a long period of time[275], and the low water level exacerbated the gravity of the pollution with catastrophic consequences.

[272] State Council of China (2008): Integrated Plan for Taihu Basin Water Environment Treatment Plan. Revised in 2013. In Chinese: 太湖流域水环境综合治理总体方案.
[273] Management Bureau of Taihu Lake Basin (2008): Environment Statues Report of Taihu Lake.
[274] Data from the Report on the State of Environment (SOE) for 2002, 2003, 2004, 2005 and 2006 published by the Ministry of Environmental Protection of China.
[275] Gao, C., J. Y. Zhu, K. W. Dai et al. (2003): Impact of rapid urbanization on water quality and related mitigation options in Taihu Lake area. Sci. Geogr. Sinica 23: pp746-750.

The conflict between China's desire for economic development and environment protection is clearly reflected in the Taihu case. Polluted water discharged into Taihu comes from industrial, domestic and agricultural sources. The large cities (e.g. Suzhou and Wuxi) and the town clusters in the Taihu Basin are strong in textile, chemical and food manufacturing. Although discharge standards exist, the transfer of low-technology and heavy-pollution industries to the town clusters resulted in large quantities of polluted water discharged into the waterways flowing to the lake. Fig 7.1 shows that the water quality very much worsened during 1981-2001. In 2007, the water quality was classified Category V or worse for 60% of the entire lake (Fig. 7.2). As the water quality worsened, the economy flourished. In 2006, Jiangsu Province achieved a GDP of 2.1 trillion CNY and became the 2nd largest economy of China.

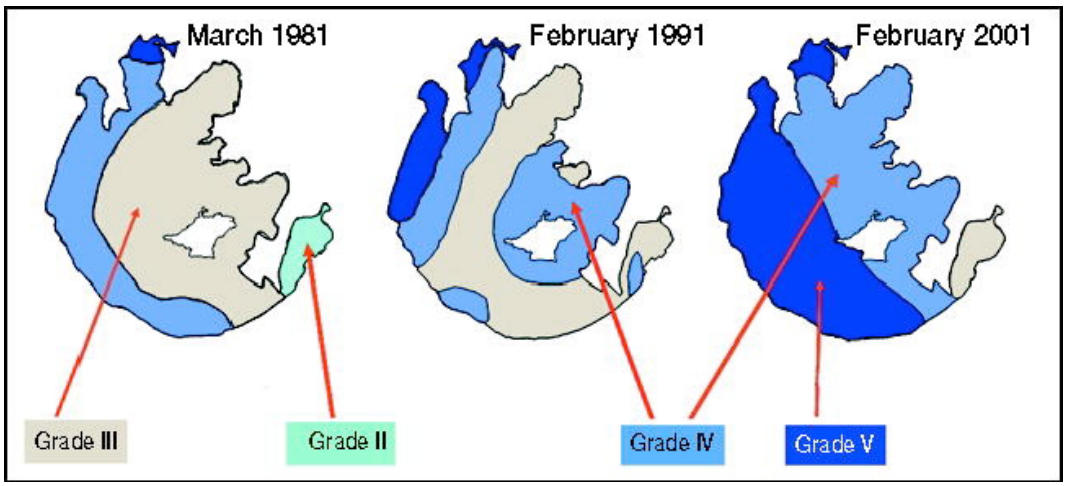

Figure 7.1: Worsening of water quality during 1981-2001. Adapted from Shao et al. 2006.[276]

Another major source of water pollution is domestic sewage. The lake basin has dense river networks, and the river banks are densely populated. People living along the rivers discharge sewage directly into the waterways, and thus the scattered sources of domestic wastewater have become a major problem of water pollution. The population density in the Taihu area has now reached about 1000/km^2 and is one of the highest in the world, but the area seriously lacks the sewage treatment systems and infrastructures.[277]

[276] Shao, M., X. Y. Tang, Y. H. Zhang and W. J. Li (2006): City clusters in China: air and surface water pollution. Front Ecol. Environ. 4 (7), pp353-361.
[277] Gao, C., J. Y. Zhu, K. W. Dai et al. (2003): Impact of rapid urbanization on water quality and related mitigation options in Taihu Lake area. Sci. Geogr. Sinica 23: pp746-750.

Agriculture is another main source of water pollution, and the modern agricultural activities have significantly increased non-point source pollution. On average, the application of chemical fertilizer (pure) increased from 24.4 kg/hectare in 1979 to the recent 66.7 kg/hectare. The increased use of fertilizers, as well as pesticides, has caused serious environmental pollution.[278] However, the discharge of agricultural water pollutants in this region has no environmental standard whatsoever.

7.2: Failure of the Permit Pilot Program for Taihu Basin

Confronted with the worsening water quality in the Taihu region, the central and provincial governments took highly publicized clean-water actions. The best known example is the "Taihu Zero Action"[279] in 1999. The State Council jointly with the relevant provinces of Jiangsu, Zhejiang and Shanghai launched a massive clean-water campaign in the mid-1990s, in order to achieve the ambitious and unrealistic goal of "Taihu Clean Water" by 2000. The campaign reached its climax in 1998. It was announced that the "Taihu Zero Action" was completely successful, i.e. by 0:00 on 1 Jan 1999 all key sources of waste water discharge to the Taihu basin, comprising 1035 enterprises, had achieved the emissions standards. The "Taihu Zero Action" was to be the 1st phase of water pollution control for Taihu and by 2000, the water quality of flows into and from Taihu would have reached the targeted water quality standard (Category III).

However, despite the government instrumented measures such as the "Taihu Zero Action" the water quality of Taihu continued to deteriorate. In the 1990s, the industrial and domestic wastewater discharges into Taihu were estimated respectively to be 540 Mt and 320 Mt per year. By 2000, the total point source discharge to Taihu was a massive 5.33 Gt (3.24 Gt from industrial and 2.09 Gt from domestic sources)[280]. The water pollution control for Taihu was a total failure.

A campaign similar to "Taihu Zero Action" was repeated for the region in 2006, the so-called "Three Chemical Remediation Action", to use the "the most resolute, the most rigorous and thorough" measures to renovate small chemical plants. However, by the time of the 2007 eutrophication outbreak, the government was unable to close a single small chemical plant.

[278] Li, J., Q. W. Min, Z. J. Li, W. J. Jiao, Z. Yuan and F. Lun (2012): Agricultural pollution pressure in the Taihu Lake Basin. Chinese J. Eco-Agriculture 20(3): p348-355.
[279] Sun, W. H. (孙红卫，2003): Comparative analysis of water quality of Taihu Lake around "Zero-Point Action". Jiansu Environ. Sci. and Tech. 16(1), doi: 10.3969/j.issn.1674-4829.2003.01.014. 零点行动"前后太湖水质比较分析.
[280] Qin, B. Q. (2008): Taihu Lake, China: Dynamics and Environmental Change. Springer.

In 2008, the Jiangsu provincial government imposed for the Taihu Basin the most stringent discharge standard in China for water treatment facilities.[281] The government established 44 new wastewater treatment facilities and required 169 existing wastewater treatment facilities to upgrade the discharge standard from Standard B to A (e.g. the permitted COD concentration was decreased from 60 to 50 mg/l). However, this significantly increased the cost of water treatment from 1.3 CNY/m^3 to 2.0–2.2 CNY/m^3. Statistics of the Jiangsu EPB shows that 70% of the wastewater treatment facilities did not comply with the standard, due to the high cost and the high concentration of the polluted water prior to the treatment. Until today, the water quality of Taihu remains poor.

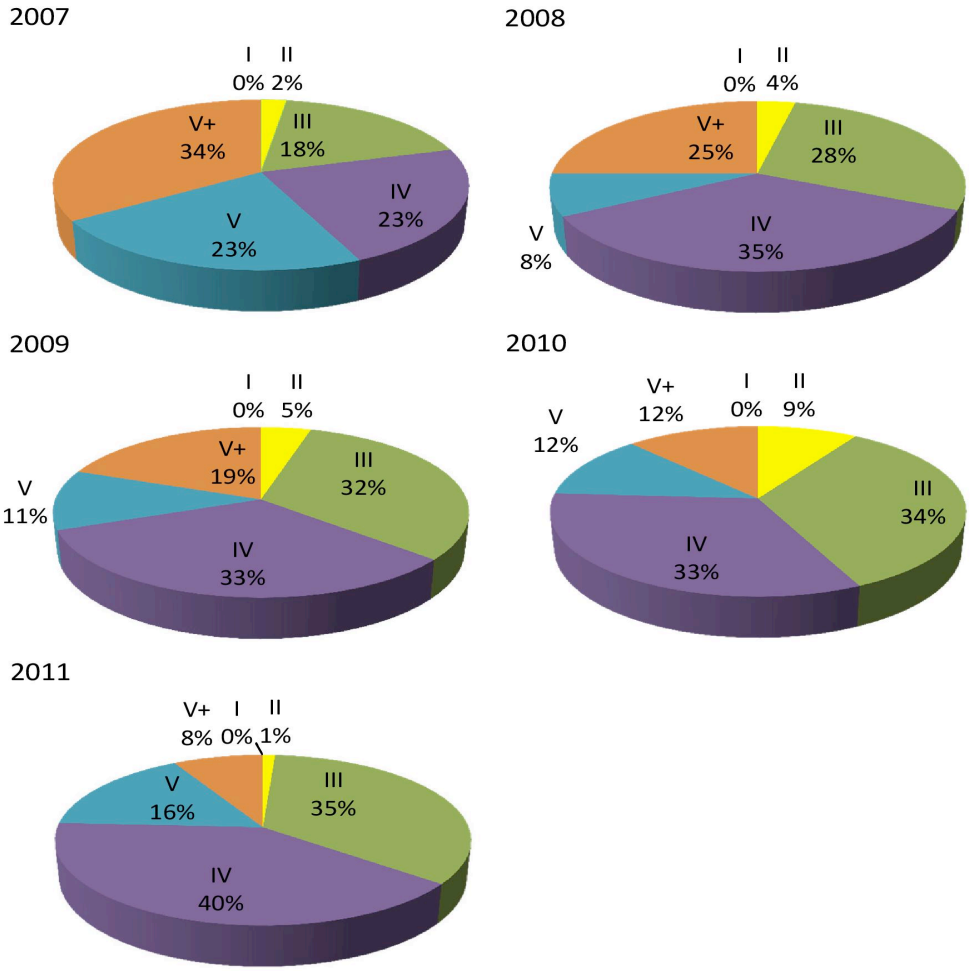

Figure 7.2: Percentage of water quality grade of Taihu for 2007 – 2011. The figure shows that water quality improvement over the 5 years was marginal. Data from the MEP Reports on State of the Environmental 2007, 2008, 2009, 2010 and 2011. Data more recent than 2012 are not yet published.

[281] Jiangsu Province Environmental Protection Bureau (2007): Discharge Standard of Main Water Pollutants for Municipal Wastewater Treatment Plant & Key Industries of Taihu Area. Adopted on 8 Jul 2007; Effective on 1 Jan 2008. 江苏省环境保护厅, 太湖流域城镇污水处理厂主要水污染物排放限值.江苏省地方标准 DB32/1072007.

Fig. 7.2 shows the water quality change for Taihu over the period 2008-2011[282]. The overall improvement of the water quality is marginal, if at all significant. The Taihu case study shows that the WPPCL/WPDP system has so far not functioned properly for many weaknesses, as discussed below:

- Conflict between Economic Development and Environmental Protection: The role of the government in Taihu water pollution requires careful analysis. For a long period of time, the government placed economic growth to be the highest priority, and nurtured the chemical enterprises to flourish in the basin, which caused severe pollution.
- Lack of Clear Definition of Legal Responsibility: Although the WPPCL was passed in 1984 and the supporting criminal laws and civil procedure laws came to existence, no criminal or civil lawsuits have ever been filed in the Taihu water pollution case. The difficulty lies partly in the lack of clear definition of legal responsibility. This is especially the case for Taihu, as every industry "for the good of economy" is polluting the water. Who should then be responsible?
- Ad hoc Governmental Administrative Enforcement: In the aftermath of the 2007 Taihu water quality disaster, several large enterprises were suspended for water pollution rectification and administrative penalties were imposed on 5 local government officers due to non-diligence. This is clearly a white wash, as no legal charges can be taken against any individuals or any organization.
- The protection of Taihu water quality requires regional cooperation, as it involves multiple administrative regions (Jiangsu, Anhui, Zhejiang and Shanghai). The administrative division has proven to be an institutional nightmare, as each of the regions has demands on the use of the Taihu water resources, but not one is willing to finance the water pollution prevention and control. The divisions between the various departments are equally formidable. For example, the environmental protection departments are responsible for monitoring and supervising the water environment; the water departments manage the rivers and lakes, while the construction departments manage the sewage systems. Farming, fish farming, chemical industries etc. all belong to different ministries. When the entire system deteriorates, then no administrative institution assumes full responsibility.

[282] Data the report of the State of Environment (SOE) for 2007, 2008, 2009, 2010 and 2011 published by the Ministry of Environmental Protection of China. Data more recent than 2012 are not yet available.

China continues to rely heavily on administrative measures for water pollution prevention and control. In 2008, the State Council approved the *Integrated Plan for Taihu Basin Water Environment Treatment Plan*[283] and the Jiangsu Province established the new *Taihu Water Pollution Prevention and Treatment Office*.[284]The effectiveness of the administrative measures remains to be assessed.

- Lack of Public Enforcement of Law: The lack of public participation in environmental law enforcement is obvious in the Taihu case. No environmental NGO is actively involved in the enforcement of the law against water pollution. It has been claimed from unconfirmed sources, that a group of environmentalists applied twice to the Civil Affairs Department of Wuxi to form an environmental NGO but it was twice rejected with the argument that a NGO of this type was already in existence. It turned out that a social group of the sort indeed existed, but was never active. There is also a serious lack of information disclosure to the public. The government did not allow the public to have full access to important environmental data, supervision and participation. For example, the government did not acknowledge the serious Taihu water disaster of 2007, until the media had reported the case.

7.3 The Case of Town of Zhoutie (周铁镇)

As an administrative response to the 2007 Taihu water quality disaster, 5 local government officers were demoted for negligence. Among the 5 officers, 3 were from the chemical industrial Town of Zhoutie[285]. At the time, one of the chemical plants was identified to have illegally discharged wastewater to the lake. The town, located at the western margin of the lake, occupies an area of 73.2 km^2 and a lake coastline of 22 km. At one stage, the town accommodated more than 300 chemical manufacturers which contributed to 85% of the local economy. During the "Taihu Zero Action", the number of chemical plants was reduced to 152 by 2007, and since the implementation of the *Integrated Plan for Taihu Basin Water Environment Treatment Plan* in 2008, the number of chemical plants further reduced to 46.

[283] State Council of China (2008): Integrated Plan for Taihu Basin Water Environment Treatment Plan. Revised in 2013. In Chinese: 太湖流域水环境综合治理总体方案
[284] In Chinese: 江苏省太湖水污染防治办公室
[285] Qian, P. F. (钱鹏飞，2007): Out of the critical situation: Taihu after the water pollution accident of Wuxi. 走出危局：无锡水污染事件后的太湖. People's Daily: http://paper.people.com.cn/dd/html/2007-08/15/content_19740890.htm, last visit on 22 Jul 2015.

Now, the contribution of the chemical industry to the local economy has been reduced to 30%.[286, 287]

The policy of the government successfully transformed the industrial structure of Zhoutie. Before 2007, the town supported a machinery-based industry contributing 10% to the local economy. Because the local chemical manufacturers moved out of the town, machinery manufacturers moved in. By 2011, Zhoutie has accumulated more 190 machinery manufacturers, contributing 50% of the 14 billion CNY local economy.

According to the Jiangsu EPB, the water quality of the rivers in the vicinity of Zhoutie has improved from Category V+ to Category V or better. Also the areas of Taihu affected by the blue-green algae has been on the decline from the peak 1100 km^2 in 2007 to the recent about 500–600 km^2, but scientists have pointed out that "restoring Taihu to a truly healthy state will be a challenge akin to ongoing efforts to bring polluted Lake Erie back from the near-dead." [288]

Although industrial water pollution in the Taihu Basin has been reduced through industrial structural change, agricultural water pollution issues have become more prominent. Zhoutie is also an area growing traditional food crops which demand much more nitrogen and phosphorus fertilizers for vegetable cultivation. Nitrogen and phosphorus are the main pollutants leading to blue-green algae blooms. For example, for rice cultivation, 150 kg/mu[289] organic fertilizers are applied per year. Zhoutie has 56000 mu of arable land, with 36000 mu for food production and 20000 mu for vegetable cultivation. The situation of Zhoutie is not unique in the Taihu Basin. The entire basin is increasingly threatened by water pollution due to agricultural activities.

[286] Li, S. L. (李少林, 2012): Taihu 100 Billion Yuan Environment Treatment: a Case Study of Zhoutie (太湖千亿环境治理周铁样本调查). China Securities Journal, 20 Nov 2012. http://www.cs.com.cn/ssgs/gsxw/201211/t2012112037400311.html.

[287] Li, K. C., 2007: Zhoutie after the Wuxi water crisis. East Morning Herald, 18 Jul 2007. 无锡水危机之后的周铁镇, http://www.sina.com.cn 2007 年 07 月 18 日 03:17, 东方早报.

[288] Stone, R. (2011): China aims to turn tide against toxic lake pollution. Science, New & Analysis, 2 Sep 2011: Vol. 333 no. 6047 pp1210-1211. DOI: 10.1126/science.333.6047.1210:

[289] 1 mu = 666.67 m^2

7.4 New Developments

Recently, China has accelerated its WPPCL enforcement actions. On 1 Jan 2014, China enacted the Urban Water Discharge and Polluted Water Treatment Regulations.[290] The regulations restated that future industrial enterprises, institutions, individuals and commercial households must have permits (drainage license) to discharge wastewater. Discharging polluted water without a permit shall incur a fine to a maximum of 500,000 CNY. Cities have also established monitoring hotlines for citizens to report water pollution events and activities.

[290] State Council of China (2013): 城镇排水与污水处理条例

Chapter 8: Conclusions and Recommendations

8.1 Summary of Comparison

It has been challenging to compare the legal systems of two countries as different as the USA and China. The two countries have very different political structures, economic developments, histories and cultures. The USA is a democratic country, in which the rule of law is essential, while China has a centralized power structure under the leadership of the Chinese Communist Party. The two countries also have different economic priorities. The USA is a developed country, while China is a developing country with a high priority on GDP growth, employment and social stability (Section 4.1). The USA has a much smaller population and more abundant natural resources, and in many ways faces less environmental pressure than China. The USA has a long history of environmental law practice, while China is still establishing its environmental legal framework. Despite these differences, China can greatly benefit from the USA experience to improve its WPPCL/WPDP, taking into consideration its political, economic, social and cultural realities.

Both the CWA (USA) and WPPCL (PRC) are designed in response to water pollution problems in the respective countries, and both employ a discharge permit system as a vehicle to achieve the environmental management goals. However, while the CWA/NPDES has enjoyed much success in improving the water quality of the USA, the WPPCL/WPDP has not been able to curb the trend of increased water pollution in China, apart from some improvement in regions which have suffered disastrous water pollution levels. Then, what are the reasons?

Substantial differences exist between the legal systems between the two countries. The foremost one lies in the objectives of the laws: the CWA aims to restore and maintain the chemical, physical, and biological integrity of the waters, while the WPPCL aims to balance economic development and environmental protection. The objective of the CWA places water integrity high on the national agenda and reflects the ethical premise of clean water. In contrast, the WPPCL retains economic development as the highest national agenda and water quality protection secondary. As a result, although the WPPCL provides a legal basis for

water quality protection in China, it at the same time provides an implicit justification of economic development at the expense of water quality. The catastrophic water pollution levels China experienced in recent years demonstrates the destructive powers of the explosive economic growth to the water integrity, which are far beyond the jurisdiction of the WPPCL.

Table 8.1: Summary of comparison between the USA CWA/NPDES and PRC WPPCL/WPDP.

	USA CWA/NPDES	**China WPPCL/WPDP**
Objectives	restore and maintain chemical, physical, and biological integrity of national waters: eliminate water pollutants discharge, goals of swimmable and fishable water	Prevent and control water pollution, safeguard the drinking water, facilitate sustainable development of economic and society; balance economic development and environmental protection
Role	Essential	Parallel to political decisions, becoming increasingly important
Jurisdiction	All waters of USA, territorial seas, and wetlands are protected by the law	Surface and ground water, drinking water safety with high priority, industrial and municipal wastewater with stricter control strategy
Functionality	Detailed and functional	Only principles; details given by regulations
Standards	Dual discharge standards, technology-based and water quality-based. Water quality-based standard has potential but failed so far to play a major role	Discharge standard and discharge allocation based on TEC with design flaws and difficulty in implementation
Enforcement	Governmental and citizen enforcement	Weak in all aspects. Citizen enforcement is almost non-existent

The roles the laws play in the two countries also differ. While the CWA/NPDES plays a central role in the USA, the WPPCL/WPDP is in general supportive. For example, the most noticeable results in water pollution control achieved in the Taihu Basin in recent years cannot be attributed to the WPPCL/WPDP but to the political decisions of the government to close the heavily polluting chemical plants around the Taihu Lake and the direct investment by the government to develop the water treatment facilities. These administrative measures do not necessarily make use of the law. Changes in government policies can achieve quick results, but they are mostly ad-hoc and inconsistent.

The CWA has a broad scope of jurisdiction, i.e., it extensively defines all waters of the USA, including territorial seas and wetlands, are protected by the law, while the WPPCL is more specific and dedicated primarily to drinking water safety and then to industrial and municipal wastewater control. The legislation procedures in the USA and China are also very different. The CWA, legislated by the USA Congress, is a detailed law, further concretized via the NPDES to be directly executable and enforceable. By doing so, the NPDES becomes an integral part of the law. In contrast, the WPPCL legislated by the SCNPC stipulates only the principles of water pollution prevention and control and its implementation is realized via the regulations of the State Council, which until today (Jul 2015) are still in preparation. The legislation and implementation are thus not an integral part and consequently, although the SCNPC amended the WPPCL in 2008, it remains unimplemented for more than 6 years. The legislation-implementation process in China is further complicated, because the WPPCL can also be interpreted by the provincial legislative bodies, and the provincial governments need to respond to these interpretations and develop the corresponding regulations for implementation. So far, the WPDP is implemented based on the regulations of local governments, which do not apply across the entire country. This complicated process separates the law from implementation and generates a large degree of variations. The outcome in the reality becomes very different from what the law is supposed to achieve.

On the technical level, the NPDES employs a dual-standard system, i.e., the technology-based standard and water quality-based standard. The technology-based standard has proved to be very successful, but the water quality-based standard, despite its potential, has failed to produce convincing results. Interestingly, China's TEC strategy is more similar to the USA water quality-based approach, and the WPDP becomes merely a method for discharge allocation. As discussed in Chapter 5, the TEC strategy has flaws in its design, and in particular, it has large risks of failure if the WPDP is not checked by the TMDL. Technology-based standards also exist in China, but they are so far proposed by the industries with the MEP only playing a supervisory role. The technology-based standards now implemented in China give permissive conditions for water pollutant discharge and it is said that all waters discharged from industrial point sources are polluted waters.

Both the CWA/NPDES and the WPPCL/WPDP in theory employ administrative, civil and criminal enforcement measures. The CWA/NPDES relies heavily on administrative and civil enforcement (settlement of monetary penalties, or consent decree) and rarely on criminal

enforcement actions. The enforcement of WPPCL/WPDP relies primarily on administrative measures and administrative fines, which bypass civil and criminal legal actions. The administrative fines are mostly much lower than the cost needed for pollution relief or WPDP compliance. The lower cost practically allows permit holders to discharge pollutants without compliance. There have been very few cases of criminal enforcement actions against direct polluters in China, but quite a few cases against local EPB's officers for non diligence of duty. Further discussion on law enforcement in China is given in Section 8.2.

8.2 Summary on Enforcement of China's WPPCL/WPDP

Over the last three decades, significant progress has been made in the Chinese environmental legal framework with the enactment of a number of environmental laws (Fig 1.1). However, over the same period, China's water quality has seriously deteriorated with water pollution reaching unprecedented levels. With population and economic growth, the pressure on China's water quality is further increasing, and there is so far no clear evidence that the WPPCL can achieve its environmental objectives.

The law itself is part of the problem for this situation, because disjunctions exist between the law and the practice (Wang, 2007).[291] The rapid pace of environmental law legislation in response to the deteriorating environment makes them sometimes incompatible with the basic laws and unenforceable. For example, the WPPCL was enacted in 2008, but it was not until 1 May 2011 when the "*crime of undermining environmental and resources protection*" and "*of misconduct in environmental protection and monitoring*" was clearly defined in the *Criminal Law of People's Republic of China*.

In China, the implementation of environmental laws is subject to administrative laws. However, the administrative laws are not well developed and the administrative organizations are unable to cope with the demand of the environmental laws. For example, China did not establish the MEP until 2008. Its predecessor, the SEPA, had little administrative power and was mainly an agency for environmental policy development, monitoring and statistics. The SEPA and local EPBs had then neither the power nor the capacity for adequate law enforcement.

[291] Wang, C. F. (2007): Chinese Environmental Law Enforcement: Current Deficiencies and Suggested Reforms. Vermont J Environmental Law 8, pp159-193.

A major problem for the WPPCL/WPDP is the weakness of the law enforcement mechanism. It appears in itself a contradiction that a law in a centralized political system cannot be effectively enforced. This shows that the enforcement of environmental laws cannot be considered in isolation. In a country of great complexity such as China, a law may exist, but purposely not enforced if it is inconsistent with the highest national priority, yet selectively enforced to balance the interests at regional and local scales. Over the last few decades, the highest national priority of China has been social stability and economic development. Thus, China spends a large amount of its revenue to sustain social stability, but provides little resources for environmental law enforcement. Public participation plays an important role in the CWA/NPDES of the USA, but a very little role in the WPPCL/WPDP of China. The subtle reason for this is that the existence of social groups and NGOs in China may be viewed as a potential threat to social stability. Public participation in environmental protection is probably most valuable during the process of environmental impact assessment. Article 5 of China's EIAL[292] stipulates that the state should encourage the general public to participate in environmental impact assessment. Articles 11 and 12 of the EIAL state that public opinions should be included in the assessment reports of construction projects. However, details of the public participation, e.g. number of participants, procedure and legal responsibilities, are not specified, which makes public participation in environmental impact assessment meaningless.

Although the enforcement of the WPPCL/WPDP is lax in the national fabric, partial and local enforcement actions have been taken. Reliable statistics are not known to the author, but common experience indicates that a large majority of the WPDP holders do not comply with the permit requirements, the non-compliances are not promptly dealt with and the polluters are left free from corrective responsibilities. The lack of enforcement greatly weakens the authority of the law and generates a feedback towards the worsening of water quality nationwide.

China's environmental law enforcement is most active, when the public outrage in response to severe environmental pollution accidents is high. Such events often trigger social instability. China's Criminal Law now includes articles which define environmental crimes. It is estimated that only 5% of environmental criminal violations have been prosecuted,[293] because environmental authorities are reluctant to transfer environmental cases to judicial authorities and there is a lack of expertise to deal with environmental disputes in the judicial community.

[292] SCNPC, 28 Oct 2002, Environmental Impact Assessment Law, enactment on 1 Sep 2003.
[293] The Statistics of the State Environmental Protection Administration (2002).

The practical enforcement of the WPPCL/WPDP is the responsibility of local EPBs. State-owned enterprises play a dominating role in China's economy. The employment opportunities and tax revenues are essential to local governments. China's WPPCL/WPDP enforcement relies primarily on administrative financial penalties. The fines are mostly low, such that the polluters do not have to pay heavy fines and reduce the tax revenue of local governments. The local governments tend to interfere with the local EPBs and their enforcement activities. The final decision of administrative action rests on local government, rather than the EPB.

8.3 Recommendations

Despite the great contrasts between the USA and the PRC, it is still valuable to use the CWA/NPDES as a reference to consider how the WPPCL/WPDP can be better designed and implemented in China. Many specific recommendations can be made, but the following are considered to be most important[294].

Ethical Premise: China should promote its traditional ethical premise of "nature-human harmony" and the new ethical premise that "water must be clean". Therefore, the economic factor should no longer serve as the determining or even the only consideration for the social welfare and people's happiness. Economic expansion should no longer be the only measure for maintaining social stability. This ethical premise is now increasingly realized in China and the request of the people for a better environment is becoming stronger everyday. Thus, the objective of the WPPCL should no longer be the "balance" between economic development and environment protection, but the protection of water quality. Only by doing so, environmental protection can be placed among the highest priorities in the national agenda, not secondary to economic growth. The WPPCL should no longer have the dual role of providing a legal basis for water quality protection and an implicit justification of economic development at the expense of water resources.

Concrete Law: the WPPCL only stipulates the principles while its implementation is done through regulations at various administrative levels. The disjunction between the law and practice has the unusual consequence, that after six years of its enactment (in 2008), the WPPCL is still waiting for regulations for its full implementation. Given China's reality, embedded in the regulations are the priorities of the governments, which are not always

[294] China's environmental legal framework has been evolving at a fast pace in the past few years. The author is pleased to observe that some of the recommendations made in this thesis are fully consistent with the new developments in China.

consistent with the original purpose of the law. It is thus desirable for the NPC to legislate concrete environmental laws that are directly implementable and are subject only to supplementary regulations, rather than heavy reliance on regulations.

Discharge Standards: Chapter 5 demonstrates that the main function of China's WPDP is to allocate the pollution discharge load to enterprises to serve the TEC strategy. The risks for the TEC to fail are large as it has serious flaws in its design. The dual-standard system employed in the USA NPDES functions much better. In particular, the technology-based standard has proven to be very successful, and the TMDL technique is necessary for the water-quality based standard to work, although the implementation of TMDL encountered considerable difficulties. China's WPPCL/WDPD should adopt in future the dual standard approach. The law should authorize the MEP to establish technology-based standards and to introduce the TMDL technique to secure the effective implementation of the water-quality based standard.

Enforcement: A major weakness of China's WPPCL/WPDP is the lack of law enforcement. There are contradictory demands in the society, some working to enhance the enforcement, while others operating to weaken the enforcement. The enforcement of the WPPCL/WPDP employs in theory administrative, civil and criminal enforcement, but in practice its enforcement relies primarily on administrative measures which bypass all other legal actions. Therefore, in addition to the administrative measures, China should activate its entire legal system to enforce environmental laws. The law should authorize citizens to participate in law enforcement. Citizens should enjoy access to freedom of information and the right to take legal actions against alleged polluters and duty-negligent administrative bodies. Finally, the law should promote the culture of cooperative responsibility and to allow for incentives for the regulated community to comply with the law.

Appendix A1: Major rivers in China

River	Length (km)	Drainage Area (km^2)	Runoff (km^3)
Changjiang (Yangtze)	6,300	1,808,500	951.3
Huang He (Yellow)	5,464	752,443	66.1
Heilongjiang (Amur)	3420	896,756 *	117.0
Songhua (Sungari)	2,308	557,180	76.2
Zhujiang (Pearl)	2,210	442,100	333.8
Yarlung Zangbo	2,057	240,480	165.0
Tarim	2,046	194,210	35.0
Lancangjiang	1,826	167,486	74.0
Nujiang	1,659	137,818	69.0
Liaohe	1,390	228,960	14.8
Haihe	1,090	263,631	28.8 **
Huaihe	1,000	269,283	62.2
Irtysh	633	57,290	10.0
Luan He	877	44,100	6.0
Minjiang	541	60,992	58.6
Total	5,224,473	2,039.0	

Notes:
* Including the Songhua River Basin
** Including the Luan He River Basin
Source: http://www.eoearth.org/article/Water_profile_of_China

Appendix A2: Recent Water Pollution Events in China and Legal Responses[295]

Among these cases, the Taihu water pollution disaster is the most outstanding, as it affected the largest area and population. The Taihu water pollution disaster occurred despite the implementation of the WPPCL/WPDP program and the highly publicized effort of the government, and reflects most clearly the difficulties in water pollution prevention and control in China and the problems in China's environmental legal system. The 2007 Taihu water pollution case is therefore selected for a case study presented in Chapter 7 of the thesis.

Event	Pollution Impact	Enforcement	Comments
Jul 1994, Huaihe	Rain forced release of $2x10^9 m^3$ upstream polluted water; serious downstream water pollution; affecting 1 million people over 54 days	Impossible to determine legal responsibility; No legal action	Entire basin pollution by industry; Cross borders of Henan, Anhui, Jiangsu and Shandong
Feb-Apr 2004, Tuojiang, Sichuan	Discharge of waste water from Sichuan Chemical Company Ltd	Negligence crime of local EPB; Imprisonment of 2 EPB officers for 2.5 yrs, 1 for 1.5 yrs	Scapegoat approach; Protecting local industry.
Apr 2005, Zhejiang Dongyang	Local chemical and pesticides factory caused serious pollution	Not known	Confrontation of residents with police; Violence resulted 10s deaths and 100s injuries; Damage of 10s police cars
13 Nov 2005, Songhuajiang	Jilin Petrochemical Company benzene plant exploded; Large amounts of toxic chemicals polluted Songhua River	Party & administrative disciplinary punishment for 12 EPA officers, including Jilin EPB Director and national SEPA Director General	Investigation of State Council: 1) Jilin Petrochemical, Jilin EPB inadequate response; 2) Petroleum China lacks environment awareness; 3) State EPA
Apr 2005 Zhusan	County EPB allowed in 2001 establishment of waste site without permission of villagers; EPA assessment later confirmed pollution of drinking water and arable land; 3 deaths	29.05.2006, villagers took legal actions against EPB for health & property damages and demand for 2.66 million CNY compensation	
15 Nov 2006, Sichuan Luzhou Power Plant	Luzhou Power Plant 17 tons diesel fuel fixed with cooling water leaked through drainage system, causing Yangtze River pollution	Ordered for immediate rectification; Plant fined 200,000 CNY; Adm. penalties for responsible company officers	Minor penalties
20 Feb 2009, Jiangsu Yan City (□城市)	Large quantities of Potassium salt waste water discharged into Mangtou River (蟒蛇) polluting drinking water for 200,000 people for 3 days; economic damage amounts to 5.4 million CNY	Two legal representatives of the company were sentenced to 10 yrs and 6 yrs imprisonment for crimes of "discharging dangerous substances"	First criminal case for environmental pollution in China.
Jul 2009, Shangdong 山□沂南涞河砷化物水□染事件	Yixin (□鑫) Chemicals illegally produces, Arsanilic acid (阿散酸), and stores large quantities of arsenic waste water a secrete reservoir. 20 - 23 July, secretly pumping waste water into the Nansu (南涞) river	One person sentenced to 11 yrs prison; fine of 500,000 CNY; Other two sentenced to 6 and 5 yrs prison; Civil law suit against offenders	
2007 Jiangsu, Taihu	Summer 2007, Taihu water level lowest in 50 yrs; High temperature and algie boom due to high nutrient lake water.	Suspension of several large enterprises for rectification; Adm. penalties for 5 local government officers due to negligence	Environment disaster due to long term water pollution. Unable to take legal actions against polluters. Local officers as scapegoat

[295] www.hrc.gov.cn

Appendix A3: Major USA Federal Pollution Control Laws

Statute	Major USA Code
Comprehensive Environmental Response	42 U.S.C. §§9601-9675
Compensation, and Liability Act (Superfund)	
Clean Air Act	42 U.S.C. §§7401-7671
Clean Water Act	33 U.S.C. §§1251-1387
Safe Drinking Water Act	42 U.S.C. §§300f-300j
Solid Waste Disposal Act/Resource Conservation and Recovery Act	42 U.S.C. §§6901-6991k
Oil Pollution Control Act (1990)	33 U.S.C. §§2701 et seq.
Environmental Planning and Community-Right-To-Know Act	42 U.S.C. §§11001-11050
Federal Insecticide, Fungicide, and Rodenticide Act	7 U.S.C. §§136-136y
Toxic Substances Control Act	15 U.S.C. §2601 et seq.
Pollution Prosecution Act of 1990	42 U.S.C. §4321

Abbreviations:

ACEF	All-China Environment Federation
AGO	Attorney General's Office (USA)
ANCR	Annual Noncompliance Report
BAT	Best Available Technology
BADT	Best Available Demonstrated Control Technology
BCT	Best Conventional Pollutant Control Technology
BPT	Best Practicable Control Technology Currently Available
BOD	Biological Oxygen Demanding material
CAFO	Concentrated Animal Feeding Operations
CNY	Chinese Yuan
COD	Chemical Oxygen Demand
CWA	Clean Water Act (USA) General Accountability Office
DMR	Discharge Monitoring Report
DOD	Department of Defense (USA)
DOE	Department of Energy (USA)
DOJ	Department of Justice (USA)
DOT	Department of Transportation (USA)
ECHO	Enforcement and Compliance History Online
EIA	Environmental Impact Assessment
EIAL	Environmental Impact Assessment Law (China)
ENRD	Environment and Natural Resources Division (USA DOJ)
EPA	Environmental Protection Agency (USA)
EPA	Environmental Protection Administration (China)
EPB	Environmental Protection Bureau (China)
EPO	Environmental Protection Office (China)
EPL	Environmental Protection Law (China)
FWPCA	Federal Water Pollution Control Act (USA)
GAO	General Accountability Office (USA)
GB	Guobiao, National Standard (China)
GDP	Gross Domestic Production
MEP	Ministry of Environmental Protection (China)
MWR	Ministry of Water Resources (China)
NGO	Non-Governmental Organization
NPC	National People's Congress (China)
NPDES	National Pollutants Discharge Elimination System (USA)
OECD	Organization for Economic Cooperation and Development
POTW	Public-Owned Treatment Water facilities
PRC	People's Republic of China
PSES	Pretreatment Standard for Existing Sources
PSNS	Pretreatment Standard for New Sources
SCNPC	Standing Committee of the National People's Congress (China)
SDWA	Safe Drinking Water Act (USA)
SEP	Supplement Environmental Projects
SEPA	State Environmental Protection Administration (China)
TEC	Total Emission Control; Total Effluent Control
TEL	Technology-based Effluent Limit
TMDL	Total Maximum Daily Loads
TN	Total Nitrogen
TP	Total Phosphorus
UN	United Nations
USA	The United States of America
USC	The United States Congress
WPDP	Water Pollutants Discharge Permit (China)
WPPCL	Water Pollution Prevention and Control Law of China
WQS	Water Quality based Standard

Statement:

This thesis was supervised by Prof. Dr. K. W. Junker and independently written by Yuan Ye, who is responsible for the originality and creativity.

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