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Evaluation of the Implementation of Water Pollution Prevention and Control Plans in China: The Case of Huai River Basin

(For Discussion Only)

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This report is one of the background papers series of the World Bank Policy Analytical and Advisory (AAA) Assistance Program “China: Addressing Water Scarcity”. It was prepared by a research team led by Professor Ma Zhong, Dean, School of Environment and Natural Resources, Renmin University of China. Its objective is to understand the key problems influencing water pollution control in China and determine the tasks of further research. The views expressed herein are those of the authors and do not necessarily reflect either the views of the World Bank and other related institutes, or the views of the Executive Board of the World Bank and the Governments they represent. Song Guojun and Chen Hongfeng at School of Environment and Natural Resources, Renmin University of China have participated in the compilation of this report.

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List of Abbreviations and Acronyms

Environment Report 2000	Report on the Environmental Status in China 2000
Environment Report 2005	Report on the Environmental Status in China 2005
EPB	Environmental Protection Bureau
FYP	Five-Year Period
HRB	The Huai River Basin
HRWRC	Huai River Water Resources Commission
HRWRPB	Huai River Water Resources Protection Bureau
MOC	Ministry of Construction
NDRC	National Development and Reform Commission
Ninth Five-Year WPPCP for HRB	Ninth Five-Year Plan and Program of Water Pollution Prevention and Control for the Huai River Basin
SEPA	State Environmental Protection Administration
SEPBB	State Environmental Protection Bureau
SPC	State Planning Commission
Tenth Five-Year WPPCP for HRB	Tenth Five-Year Plan of Water Pollution Prevention and Control for the Huai River Basin
The Anhui Plan	Tenth Five-Year Plan of Water Pollution Prevention and Control for the Huai River Basin under the Jurisdiction of Anhui Province
The Henan Plan	Tenth Five-Year Plan of Water Pollution Prevention and Control for the Huai River Basin under the Jurisdiction of Henan Province
The Leading Group	The Leading Group of Water Resources Protection for the Huai River Basin
The Ordinance	The Interim Ordinance on Water Pollution Prevention and Control in the Huai River Basin
The Zhengzhou Plan	Tenth Five-Year Plan of Water Pollution Prevention and Control for the Huai River Basin under the Jurisdiction of Zhengzhou City
WPPCP	Water Pollution Prevention and Control Plan
MWR	Ministry of Water Resources

Introduction

Since mid 1990s, Chinese government has pledged to carry out large-scale water pollution prevention and control in the key polluted basins of three rivers and three lakes and formulated plans for water pollution prevention and control during two successive five-year periods. However, by the end of the tenth five-year plan (2005), the water quality of the rivers has not met the targets prescribed in the plans.

The Huai River Basin (HRB), as one of the key polluted basins, has witnessed very modest improvement through ten years of water pollution prevention and control efforts. After making a comprehensive view of the WPPCPs for HRB, a hierarchical structure can be found, with a national plan, detailed plans in four provinces along the river, and plans at municipal and even county level. All the plans followed a convention which first defines water quality targets, determines the total discharge control targets on the basis of water quality targets, then screens treatment projects based on the total discharge reduction requirements, and finally stipulates supervision and management measures to ensure sound implementation. Despite the great efforts made, there is a long way to go to achieving the objective of controlling the water pollution and turning the water clean in HRB.

The purpose of the research is to help the World Bank AAA “Addressing China Water Scarcity” to identifying the challenges and priority areas China is facing in implementing water pollution control plans in river basins. It took HRB as a case. Through data collection from different official information sources and in accordance with the targets set by the ninth and tenth five-year WPPCPs, the research objectively evaluated the implementation of the WPPCPs, identified problems of planning per se, and analyzed institutional barriers which affected the implementation of the plans. Suggestions on the preparation and implementation of WPPCPs were made based on the evaluation and analytical results.

Chapter 1 Brief Introduction to the Huai River Basin

1.1 Background

1.1.1 Geographic Location

The Huai River Basin (HRB) is located between the Yangtze River Basin and Yellow River Basin, 112°E -121°E, 31°N -36°N, covering an area of 270,000 km². According to the Tenth Five-Year WPPCP for HRB, the basin embraces 35 cities in four provinces, namely Henan, Anhui, Jiangsu, and Shandong. ^[1]

HRB is composed of two water systems, one is the Huai River to the south of the old Yellow River and the other is the Yishusi River to the north. The catchment area of the Huai River water system is 190,000 km², accounting for about 70% of the total area of the basin. The Huai River originates from Tongbo Mountain in Henan Province, flowing through Henan and Anhui, and entering the Yangtze River at Sanjiangying in Jiangsu, stretching for approximately 1000 km (of which 364 km are in Henan Province, 436 km in Anhui Province, and 200 km in Jiangsu Province), with an average hydraulic slope of 0.2‰. Besides the waterways to the Yangtze River, the Huai River also has water courses heading to the sea and the Irrigation Channel of North Jiangsu. The new Huaimu River connects the Huai River system and the Yishusi River system. Among numerous tributaries on both sides of the Huai River, 15 main tributaries cover an area of more than 2000 km² each, and 21 main tributaries have a catchment area larger than 1000 km².

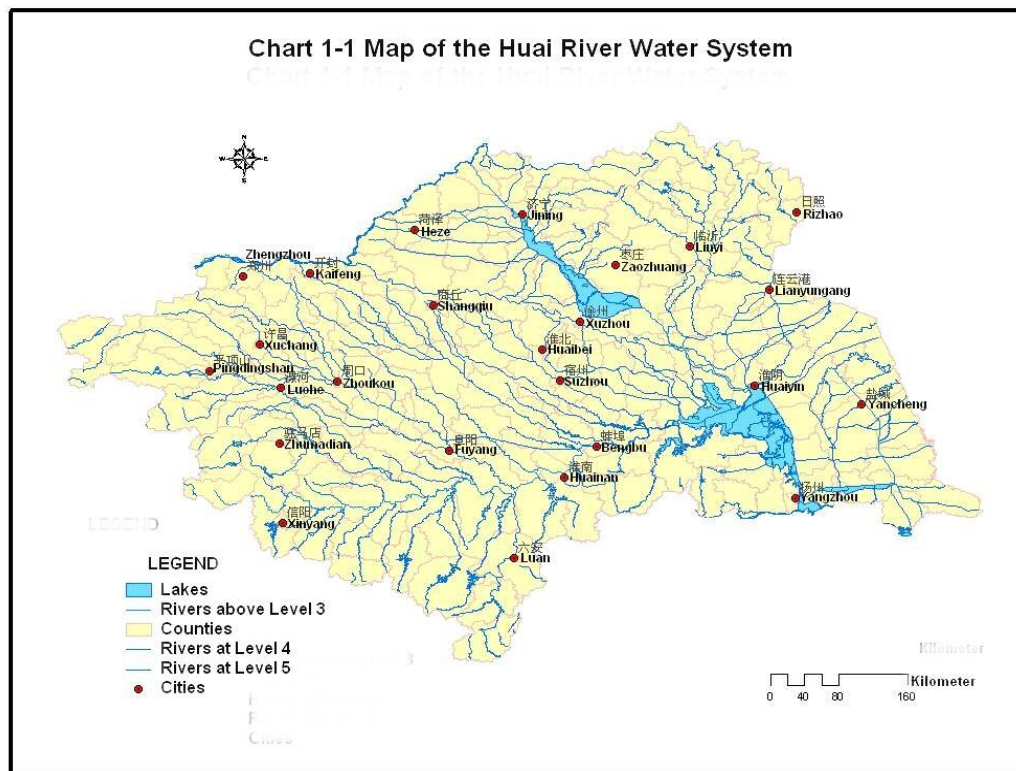
The Yishusi water system originates from Yimeng Mountain in Shandong, and is composed of the Yi River, Shu River and Si River, with a total catchment area of nearly 80,000 km². There are 12 main tributaries which cover a catchment area of more than 1000 km², while another 15 tributaries flow directly into the sea. (See Chart 1-1).

1.1.2 Population

During the past fifty-plus years, the total population of HRB has continued to increase, but the growth rate has begun to slow down in recent years. From 1949 to 1980, the average annual growth rate of population in HRB was 17.2‰; but from 2000 to 2003, the average growth rate fell to 5.21‰. The total population of Huai River Basin in 2003 reached 168.0116 million, accounting for 13% of the nation's population. ^[2]

^[1] SEPA, "Tenth-Five-Year Plan of the Water Pollution Prevention and Control for Huaihe River Basin", *Tenth-Five-Year Plan of the Water Pollution Prevention and Control for "Three Rivers and Three Lakes"*. Chemical Industry Press, Beijing. Sept. 2004: Page 4

^[2] The total population of Huai River Basin includes the population of the administrative regions detailed to the county



HRB is densely populated, with a density in 1994 of 580.67 persons per km², rising to 623.59 persons per km² in 2003, this being 4.65 times the country's population density of 134 persons per km² at that time.^[3]

1.1.3 Economic Development

Over the past 10 years, the economy of the Huai River Basin region has continued to grow. In 1994, the total GDP of HRB regions including Henan, Anhui, Shandong and Jiangsu provinces was 421.476 billion yuan. This rose to 1.046662 trillion yuan in 2003, equal to an increase of 148.33% during the 10 years (at current prices). GDP per capita in the same period increased from 2,684 yuan to 6,230 yuan, up 132.12%. However, the proportion of the per capita GDP of HRB to that of the country did not increase, but declined from 73.4% in 1994 to 69.0% in 2003. In the meantime, the urbanization rate in the Huai River Basin continued to increase, from 13.02% in 1990 to 20.22% in 2003, but was still only half the national average level of 40.53%.^[4]

level of Henan, Anhui, Shandong and Jiangsu provinces within the basin. Data sources are Statistical Yearbooks of the four provinces, related cities and counties in the Huai River Basin.—Noted by the author.

^[3] Ditto

^[4] National Bureau of Statistics, “Report on China’s National Economic and Social Development for 2003”, Feb.26, 2004, National Bureau of Statistics website http://www.stats.gov.cn/tjgb/ndtjgb/qgndtjgb/t20040226_402131958.htm

HRB has a mild climate, and is China's major grain-producing area. Excessive application of pesticides and fertilizers in agricultural production brought about agricultural non-point pollution, adversely impacting the water environment in HRB, and becoming an important pollution source of NH₃-N in water bodies. At present, there is still a lack of effective pollution prevention and control measures for non-point source pollution.

Industry in HRB was very underdeveloped. However, market liberalization has stimulated a rapid development of industry in the area. At the time of the introduction of large-scale pollution control in the Huai River in 1993, the number of township industrial enterprises and above had grown by 1.5 times, and industrial output by 14.5 times over the 1978 levels. Enterprises, especially agricultural product processing enterprises with a low level of technology, developed rapidly. The rapid development of village and township enterprises in HRB was another driving force for economic growth. However, the village and township enterprises became a major source of water pollution in HRB in part due to outdated technology and lack of pollution treatment facilities.

1.1.4 From Flood Control To Pollution Control: History of Water Environment Protection in HRB

Because it is located at a confluence of a variety of climates, plus the unique topography, the basin has been known for its frequent disasters.^[5] The Chinese government has shown great concern for the flood impaired basin. According to statistics of the Ministry of Water Resources, from 1951 to 2000, total investment in Huai River water control had been 92.3 billion yuan; more than 5,700 reservoirs had been constructed in the whole basin, 2,164 km of water courses excavated, and more than 50,000 km of embankment reinforced. During the same period, 5427 sluices and over 60,000 irrigation and drainage stations had been built, and more than 8.946 million hectares irrigated.^[6]

However, with rapid economic development and urban expansion, water pollution has begun to haunt people living in HRB, particularly since the 1970s. Since the reform and opening up, HRB, as the birthplace of agricultural institutional reform, has witnessed a boom in village and township enterprises, including paper making, distillery and food processing industries, which are highly water-intensive and polluting. These small enterprises not only further aggravated the shortage of water resources in HRB, but also increased pressure on the environment, leading to successive pollution incidents.

From 1988 to 1994, several large-scale pollution incidents occurred in the basin, severely threatening the safety of drinking water, and influencing production and quality of life. Especially in the spring of 1989 and July 1994, large-scale pollution occurred in

^[5]Zhengtao Ou, *A Secret Visit to the Huai River*, Xinhua Publishing House, Beijing. Jan, 2005: Page 19.

^[6]Zhengtao Ou, *A Secret Visit to the Huai River*, Xinhua Publishing House, Beijing. Jan, 2005: Page 36-37.

the Huai River, where drinking water sources all along the river were damaged and no safe water was available to residents.^[7]

Enhancement of urbanization in HRB increased the demand for water resources, and increased the burden of urban domestic pollution on the water environment. In 1999, domestic wastewater discharges in HRB exceeded industrial wastewater discharges for the first time, and the disparity has broadened annually ever since^[8]. The proportion of major industrial water pollutant discharge to the total amount in basin dropped from 70% in 1994 to 40% in 2004.^[9]

The government has been concerned about Huai River pollution since 1978. At that time, the Huai River Water Resources Commission formulated the Key Points of Pollution Prevention and Control Plan for Water Sources in the Huai River Basin, and started to build water quality monitoring networks. In 1988, approved by the Environmental Protection Committee of the State Council, a “Leading Group of Water Resources Protection for the Huai River Basin” was set up (hereinafter referred to as the Leading Group), and the vice governors of the four provinces along the river rotated to assume the head of the group. The Ministry of Water Resources and the State Environmental Protection Bureau also sent representatives to take part. The headquarters were located in the Water Resources Protection Bureau of the Huai River Commission. In 1990, the Leading Group released the first batch of 64 wastewater treatment projects to be implemented within a prescribed time limit. In 1995, the State Council clarified again the duties of the Leading Group: “to coordinate and resolve significant issues of water resources protection and pollution prevention and control, supervise and inspect pollution control in HRB, and exercise other powers authorized by the State Council.”

In May 1994, the Environmental Protection Committee of the State Council held an on-the-spot meeting of environmental law enforcement and inspection in HRB, stirring up the issue of pollution control in the basin to a climax. The meeting decided on the schemes for water pollution prevention and control in HRB. Song Jian pledged at the meeting to make the river water clean by the end of the 20th century. On June 15, 1994, the State Environmental Protection Bureau, the Ministry of Water Resources, and the four provinces along the river jointly promulgated the “Decision on Preventing Pollution Emergencies of Water Courses in the Huai River Basin (trial).” In July 1994, after a large-scale pollution incident occurred in the Huai River, the Office of the State Council issued the “Urgent Circular of Preventing Major Pollution Accidents from Happening Again in the Huai River Basin”. In August 8, 1995, the State Council promulgated the “Interim Ordinance on Water Pollution Prevention and Control in the Huai River Basin”

^[7]Zhengtao Ou, *A Secret Visit to the Huai River*, Xinhua Publishing House, Beijing, Jan, 2005: Page 40-41.

^[8]Zhengtao Ou, Yugao Cai, Ying Cao. 10 years in controlling pollution in Huai River, 60 billion yuan are all lost? Aug.3, 2005, xinhua website http://news.xinhuanet.com/report/2005-08/03/content_3303409.htm

^[9]Zhenhua Xie. “Make Efforts To Improve Water Environment Situation in Huai River Basin in the Guide of Scientific Development View”. *Environmental Protection*, Volume 11, 2004: Page 4-9.

(hereinafter referred to as the Ordinance), which is the first and so far the only legislative document concerning a watershed. The Ordinance pledged that “all the industrial pollution sources in the basin should have achieved standard discharge levels by 1997, the water quality of the main rivers, lakes and reservoirs of HRB should have met the requirements of the water pollution prevention and control plan, and the Huai River should be turned into a clean water body”.

According to the Ordinance, the Leading Group was reconstructed. SEPA and the Ministry of Water Resources became heads of the Leading Group, with HRWRC a member of the group. The Huai River Basin Water Resources Protection Bureau under the dual leadership of MWR and SEPA has become the headquarters of the Leading Group.^[10]

In June 29, 1996, the State Council approved the “Ninth-Five-Year Plan for Pollution Prevention and Control for the Huai River Basin”. Since then the work of water pollution prevention and control in HRB has been incorporated into the national key projects for “three rivers and three lakes”.

Approved by the State Council in 1995, 19 key polluting enterprises of large and medium size, including Zhoukou MSG factory, were required to undertake wastewater treatment within agreed deadlines or stop or limit production. By the end of June 1996 □ 1,111 small paper mills with an annual output of 5,000 tons or below had been closed in the basin. By the end of September that year, 3,876 small enterprises belonging to 15 industries, such as small chemical plants, small leather plants and small fertilizer mills, had been closed. By the end of 1997, 1,139 of the 1,562 enterprises with daily wastewater discharge of more than 100 tons in the whole basin had achieved the required discharge standards. About four billion yuan has been invested in the treatment of industrial pollution sources in the basin during the period between 1994 and 1997.^[11]

Around 2000, SEPA and the four provinces along the Huai River began to draw up the Tenth Five-Year Plan of WPPCP for HRB, which was approved by the State Council after review on January 11, 2003.

After a significant pollution incident occurred in mid-July 2004, from 23 to 24 October that year, Vice Premier Zeng Peiyan visited Anhui, and presided over an on-the-spot meeting on pollution prevention and control in HRB held by the State Council in Bengbu. At the meeting, SEPA, entrusted by the State Council, signed accountability documents for the goals to prevent and control water pollution in the Huai River Basin with Henan, Anhui, Shandong and Jiangsu Provinces respectively.^[9]

^[10] SEPA informally withdrew from the leadership of the Bureau later. – Noted by the author.

^[11] The Huai River Basin Water Resources Protection Bureau. Situation of Water Pollution Prevention and Control in Huai River Basin in Ninth-Five Years, Apr.25, 2003, website <http://www.hrc.gov.cn/hhsbj/www/special/swrfz/2003723170914.htm>

On December 28, 2004, the Office of the State Council promulgated the “Notice on Strengthening Water Pollution Prevention and Control in the Huai River Basin” (OSC [2004] 93), which set clear goals and strategies to implement it by stages.^[12]

1.2 Scope of Assessment

1.2.1 Category of Plans

According to the project objectives, the assessment focuses on the plans for water pollution prevention and control for HRB. Since Huai River pollution prevention and control is also related to other plans, in order to achieve the objectives of the assessment, the following five categories of related plans need to be analyzed, which are:

- Five-year plans for national economic and social development
- Five-year plans for environmental protection
- Plans for water resources management, including the plan for water resources utilization, the plan for water resources protection and the plan for water and soil conservation
- City master plans.
- Land use plans.

1.2.2 Level of Plans

According to China's environmental protection laws and environmental management systems, the central government is responsible for the overall plans and policies of water pollution prevention and control, and all levels of local government (provincial, city and county government) are responsible for detailed implementation of the national plans. It is therefore necessary to assess the four tiers of plans on water pollution prevention and control in HRB in a holistic way.

1.2.3 Related Sectors

Different kinds of plans related to water pollution prevention and control in HRB are developed and implemented by related sectors of different levels of governments, which are:

First, Development and Reform Commissions. DRCs at national, provincial, city and county levels of government are responsible for the preparation of the national or local five-year plans on national economic and social development, including the contents of environmental protection, which are to be implemented after discussion and approval of the local People's Congress.

Second, Environmental Protection Bureaus. SEPA and EPBs at provincial, city and county levels of government are responsible for the preparation of five-year plans on

^[12] OSC [2004] 93, “Office of the State Council on Strengthening the Work to Prevent and Control Water Pollution in the Huai River Basin”, Dec. 28, 2004.

national or local environmental protection, including pollution control for water, air, noise, solid waste and ecological protection, which are to be implemented after approval by the government at the same level. SEPA and the provincial or municipal EPBs in HRB are in charge of the preparation of plans for pollution prevention and control and supervision of implementation.

Third, the Huai River Water Resources Commission of the Ministry of Water Resources. HRWRC is responsible for the preparation of water resource management plans in HRB, including the “Plan for Comprehensive Utilization of Water Resources”, the “Plan for of Water Resources Protection” and the “Plan for Water and Soil Conservation”.

Fourth, the Municipal Planning Bureau and the Construction Bureau. Urban Development Master Plans are developed by the construction and planning sectors of municipal government according to “Urban Planning Law”. Plans at city level or above require the approval of the State Council. Generally, a special chapter being devoted to environmental protection. These plans are often made at irregular intervals.

1.2.4 Time Frame of the Assessment

This project evaluates plans during the Ninth FYP and Tenth FYP, which is from 1996 to 2005.

Chapter 2 Water Pollution Prevention and Control Plans for the Huai River Basin

The Water Pollution Prevention and Control Plans (Abbreviated as WPPCP) for the Huai River Basin are specialized plans including plans for the whole basin well as plans at provincial, city and county level, which are separately formulated by the central authorities and EPBs and the planning departments at local levels.

This assessment report also refers to some related plans, such as National Economy and Social Development Plans, Environmental Protection Plans, Water Resources Plans, City Master Plans, and Land Utilization Plans. (Table 2-1)

This Chapter mainly introduces WPPCPs at three levels:

- Ninth and Tenth Five-Year WPPCPs for HRB authorized by the State Council of China.
- Tenth Five-Year WPPCPs for the Huai River Basin under the Jurisdiction of Henan Province and Anhui Province authorized by Henan and Anhui Provincial Governments respectively.
- Tenth Five-Year WPPCP for the Huai River Basin under the Jurisdiction of Zhengzhou City authorized by Zhengzhou Municipal Government.

This report chooses Henan Province and Anhui Province as cases of the provincial level plans. Henan Province and Anhui Province are situated upstream of HRB, and the two provinces are representative in terms of economic development and pollution control levels. Another case is Zhengzhou City, the capital of Henan Province and the biggest city in the Huai River Basin, which represents the municipal level.

Table2-1 List of WPPCPs for HRB and Related Plans

Classification	WPPCPs	Other plans
State level	Ninth Five-Year WPPCP for HRB	Ninth Five- Year Plan on National Economic and Social Development Ninth Five-Year Plan on National Environmental Protection Master Plan for National Land Utilization (1996-2010) Plan for Long-term Water Supply and Demand for the Huai River (1996-2000-2010)

	Tenth Five-Year WPPCP for HRB	Tenth Five-Year Plan for National Economy and Social Development Tenth Five-Year Plan for National Environmental Protection Huai River Water Resource Protection Plan (Baseline year:1998) Ecology Construction Plan for Water and Soil Conservation in the Huai River Basin
		Outline of the Eleventh Five-Year Plan for National Economy and Social Development Eleventh Five Year Plan for National Environmental Protection
Provincial level	Tenth Five Year WPPCP for HRB in Henan Province Tenth Five Year WPPCP for HRB in Anhui Province	Tenth Five-Year Plan for National Economy and Social Development for Henan Province Tenth Five-Year Plan for National Environmental Protection for Henan Province Water Resources Protection Plan for the Huai River Basin in Henan Province (not available) Water and Soil Conservation Plan for HRB in Henan Province (not available) Water Resources Comprehensive Utilization Plan for HRB in Henan Province (not available) City (town) System Plan for Henan Province (not available) Master Plan for Land Utilization for Henan Province (1997-2010)
City level	Tenth Five-Year WPPCP for HRB in Zhengzhou City	Tenth Five Year Plan for National Economy and Social Development for Zhengzhou City Tenth Five-Year Plan for Environmental Protection for Zhengzhou City (not available) Water Resources Protection Plan for HRB in Zhengzhou City (not available) Huai River Basin Water and Soil Conservation Plan for Zhengzhou City (not available) Huai River Basin Water Resources Comprehensive Utilization Plan for Zhengzhou City (not available) Master Plan for Urban Development for Zhengzhou City (1995-2010) Master Plan for Land Utilization for Zhengzhou City (1997-2010)
County level	WPPCP for the Shuangji River in Xinmi City (2003-2006)	Tenth Five-Year Plan for National Environmental Protection for Xinmi City (not available) Tenth Five-Year Plan for Environmental Protection for Xinmi City (not available) Master Plan for Urban Development for Gaomi City (not available) Master Plan for Land Utilization for Xinmi City (not available)

2.1 National Plans for Water Pollution Prevention and Control for the Huai River Basin

2.1.1 Background

2.1.1.1 Ninth Five-Year WPPCP for HRB^[13]

A leading team for compilation of WPPCP was set up jointly by ten ministries and commissions, including SEPA, SPC, MWR, together with provincial Planning Commissions, EPBs and water departments in Henan, Anhui, Jiangsu and Shandong Provinces, as well as HRWRPB. Relevant experts were organized and began to compile the Ninth Five-Year WPPCP for HRB in March 1995, and finished the draft in August 1995. The draft was revised after review at the seventh conference of State Department Environment Protection Commission.

On March 28, 1996, the Ninth Five-Year WPPCP was submitted to the State Council by SEPB, SPC and MWR. On June 29th, 1996, the State Council approved the plan.

2.1.1.2 Tenth Five-Year WPPCP for HRB^[14]

The Tenth Five-Year WPPCP for HRB was compiled by SEPB and SPC, and approved by the State Council. The planning time span was 2001-2005. The planning area included 35 cities in four provinces, which were divided into 7 planning zones, namely Upstream Henan Planning Zone, Anhui Planning Zone at middle reaches, Henan Planning Zone at middle reaches, Hongze Lake Planning Zone, Nansi Lake Planning Zone, Yishu River Planning Zone and Downstream Planning Zone. Altogether 111 control units were designated, and correspondingly 111 water quality control sections. According to the goals and duties of the tenth Five-Year WPPCP, control units have been adjusted from 64 units in the ninth Five-Year WPPCP to 111 units,^[15] which was primarily a recognition of the need for pollution control at the eastern route of the water diversion projects from south to north in Jiangsu Province and Shandong Province.

2.1.2 Main Contents of WPPCPs

The main contents of the Ninth and Tenth Five-Year WPPCPs for HRB are shown in Table 2-2.

^[13] Editor Team. Ninth Five-Year Plan of Water Pollution Prevention and Control for the Huai River Basin. In June, 1996.

^[14] SEPA. Tenth Five-Year Plan of the Water Pollution Prevention and Control for the Huai River Basin, *Tenth Five-Year Plan of the Water Pollution Prevention and Control for "Three Rivers and Three Lakes"*. Chemical Industry Press, Beijing, Sept. 2004

^[15] *The Ninth Five-Year WPPCP for HRB* referred to 34 control units and 82 monitor sections, without mentioning '64'. —Noted by the author.

Table 2-2 The Ninth and Tenth Five-Year WPPCPs for HRB

	The Ninth Five-Year WPPCP	The Tenth Five-Year WPPCP
Planned Areas	According to the characteristic of the Huai River system, the administrative regionalization and the protection goals, the planned areas were divided into seven control zones, 34 control units, and 100 control subunits. After appraisal of pollution types and pollution time interval, and considering pollutants discharge quantity, altogether 32 priority sections were identified, and 32 key control subunits determined.	The planned areas were divided into 7 planning zones, 111 control units, and correspondingly 111 water quality control sections
Water Quality Targets	<ul style="list-style-type: none"> • Make the Huai River water body clear by 2000 • 82 water quality monitoring sections • The water quality in the main stream of the Huai River and the upstream of Yihe River should achieve the Surface Water Environmental Quality Standard Class $\square\square$GB3838-88\square, and the water quality of other branches should achieve Class \square. 	<ul style="list-style-type: none"> • The water quality at 50 sections in the main stream of the Huai River, the route of water diversion from south to north and urban drinking water sources should reach Class III. • The water quality of 46 sections should achieve Class IV, and for 3 sections, the water quality should reach Class V. • For 12 sections where there is no runoff and the flux is mainly controlled by sluice gates, the COD concentration should be lower than 70 mg/L.
Pollution Control Targets	<ul style="list-style-type: none"> • By the end of 1997, all the industrial pollution sources in the entire basin should meet discharge standards. The maximum permitted COD discharge in the entire basin should be 890,200 tons, including 247,200 tons for Henan Province, 207,700 tons for Anhui Province, 171,500 tons for Jiangsu Province, and 263,800 tons for Shandong Province. • By the end of 2000, the maximum permitted COD discharge in the entire basin should be 368,000 tons, including 127,400 tons for Henan Province, 77,000 tons for Anhui Province, 98,900 tons for Jiangsu Province, and 64,700 tons for Shandong Province. • 	<ul style="list-style-type: none"> • The total discharge amount of COD should not exceed 643,000 tons, i.e., reduced by 39.3% compared with 2000 level, and the quantity entering the River should be less than 466,000 tons. • The total amount of Ammonia Nitrogen discharge should be controlled within 113,000 tons, reduced by 25.7% compared with 2000 level, and the quantity of entering river should be less than 91,000 tons.
Treatment Projects	<ul style="list-style-type: none"> • Construction of 303 projects for water pollution prevention and control, among which 114 projects are selected for 	<ul style="list-style-type: none"> • There are 488 projects in 9 categories, among which 211 projects belong to projects prescribed in the plan for east

	The Ninth Five-Year WPPCP	The Tenth Five-Year WPPCP
Projects	<p>priority units and 189 alternative projects for other units. See Table 2-3.</p> <ul style="list-style-type: none"> Total funds for alternative projects of WPPC in HRB are approximately 16.6 billion yuan, which is partly provided by the local governments and enterprises. The polluting enterprises must be responsible for investing in pollution abatement. The central government subsidized funds include: loans of 0.963 billion yuan for environmental protection by SPC and 0.3 billion yuan for technological innovation by NETC, and an appropriation of 0.05 billion yuan from the State Treasury (for subsidizing well drilling .) 	<p>route pollution control for water diversion from south to north. See Table 2-3.</p> <ul style="list-style-type: none"> The total investment is 25.59 billion yuan, among which 10.83 billion yuan is used for the projects listed in the plan of east route pollution control for water diversion from south to north and the fund raising options are consistent with those in the plan for the east route pollution control. Local governments are responsible for the remaining 14.76 billion yuan with appropriate support from the central government.
Supervision and Management	<p><u>Pollution Sources and Water Quality Monitoring</u></p> <ul style="list-style-type: none"> Initially building up monitoring systems for agro-ecology, fishery and water quality, and monitoring and supervision systems for total amount control, with an overall investment of 32 million Yuan. Establishing provincial boundary water quality monitoring systems□ SEPB and MWR undertook the responsibility entrusted by "the Ordinance", and carried out comprehensive monitoring for 593 main pollution outlets in HRB in the end of 1997 year and 1998. <p><u>Management Measures</u></p> <ul style="list-style-type: none"> Issuing water pollution prevention and control bulletins; Organizing joint prevention and control for provincial trans-boundary water pollution; Developing total amount control audit; Using the flux regulation of sluice gates and preventing water pollution accidents; Stipulating the duties of various functional departments of central government and provincial governments in the four provinces along the Huai River. 	<p><u>Pollution Sources and Water Quality Monitoring</u></p> <ul style="list-style-type: none"> Installing online monitoring instruments in 1562 key industrial enterprises in HRB and implementing dynamic monitoring. Establishing automatic monitoring stations at provincial boundary sections and major monitoring sections in the main stream of the Huai River, taking full use of existing capacities for provincial trans-boundary monitoring. Capacity building for water environmental monitoring networks in HRB, developing pollution emergency response systems and information capacity building. Carrying out comprehensive investigation on water pollution constituents and loads in HRB, and gradually implementing standardized management on discharge outlets into the rivers; Enhancing the technical support system and monitoring for total amount control of pollutant discharge <p><u>Management Measures</u></p> <ul style="list-style-type: none"> Four provincial governments are responsible for water environment quality under their jurisdiction respectively, and they should take measures to guarantee reduction of

	The Ninth Five-Year WPPCP	The Tenth Five-Year WPPCP
	<p><u>Management</u></p> <ul style="list-style-type: none"> • Formulating a water pollution accident reporting system and processing measures; • Establishing a licensing system for water drawing in the basin; • Establishing the total pollutants discharge quantity checking and verification system in the basin; <p>Trying out the wastewater levy system for urban and township sewage centralized treatment.</p>	<p>total discharge amount and water quality at provincial trans-boundary sections to meet prescribed standards.</p> <p><u>Management</u></p> <ul style="list-style-type: none"> • Strict implementation of environmental impact assessment for the newly built projects, and implementing the joint upstream and downstream review of polluting projects. • Carrying out cleaner production vigorously; • Strengthening control of pollution caused by ships; • Comprehensively implementing total amount checking and ratifying system for water pollutant discharge and implementing the pollution discharge licensing system and the total amount control system for the main pollutants (COD_{Cr}, NH₃-N) and other typical pollutants. Every year 314 pollution outlets should be monitored 2~4 times. The total amount control targets should be integrated into the responsibility contacts of the governors of local governments; • Carrying out pollutant discharge registration and licensing system, and implementing regular inspection and announcement for total pollutant amount control and water quality of major sections; • Establishing strict accountability investigation system; <p>Establishing sound mechanisms for investment, operation, charging and pricing for water pollution prevention and control.</p>

Table 2-3 Projects of the 9th and 10th five-year WPPCPs for HRB

Project Classification	The 9 th five-year Plan		The 10 th five-year Plan	
	Project Number	Investment (billion Yuan)	Project Number	Investment (billion Yuan)
Municipal Wastewater Treatment Plants	67	5.753	161	14.89
Industrial Restructuring and cleaner production	17	0.993	131	2.4
Treatment of Industrial Point-sources	153	3.461	116	1.73
Potable Water Project	4	0.236	3	0.28
Capacity Building	2	0.083	13	0.59
Agro-ecological engineering (Treatment of non-point pollution of Agriculture*)	1	0.134	6	0.39
Technical Innovation of Pollution Sources (Integrated Treatment for the Basin *)	36	1.030	29	2.58
Demonstration Projects (City Garbage Disposal Plants *)	17	4.449	14	0.89
Centralized Drinking Water Safeguard Projects (Wastewater Interception and Diversion Projects *)	6	0.461	15	1.25
Total	303	16.6	488	25.59

Note: In brackets are the classification names in the 10th five-year plan.

2.2 Tenth Five-Year WPPCPs for HRB at Provincial Level

As requested by the State Council, the four provinces along the Huai River must make WPPCPs for HRB within their territory. This report specifically analyzes the Tenth Five-Year WPPCP in Henan and Anhui Province, which are upstream of the Huai River basin.

2.2.1 Background of the Plans

2.2.1.1 Tenth Five-Year WPPCP for HRB in Henan Province^[16]

^[16] Environment Protection Bureau and Development Planning Commission of Henan Province, The Tenth-Five-Year Plan of Water Pollution Prevention and Control for the Huai River Basin in Henan Province. July, 2003.

On July 28th, 2003, the Henan Provincial Government approved the Tenth Five-Year WPPCP for HRB in Henan Province (The Henan Plan). (Henan Government Document [2003] No.144)

2.2.1.2 Tenth Five-Year WPPCP for HRB in Anhui Province^[17]

The Anhui Plan was made by Anhui EPB and Anhui Planning Committee, but Anhui provincial government did not formally issue a document to approve it.

2.2.2 Content of the Plan

In Table 2-4, the treatment projects of the Henan Plan and the Anhui Plan are listed. In Table 2-5, the main contents of the two plans are presented.

Table 2-4 Projects of the Tenth Five-Year WPPCPs for HRB in Henan & Anhui Provinces

Project Classification	Henan Province		Anhui Province	
	Project Number	Investment (milli)	Project Number	Investment (milli)
Municipal Wastewater Treatment Plants	34	3140	18	1646.00
Industrial Restructuring	20	506	19	949.58
Industrial Point-sources Comprehensive Control	26	595	11	455.34
Integrated treatment projects for the Basin	8	840	2	150.00
Potable Water Projects	1*	91	1	140.00
Self-Capacity Building	3	116	4	148.69
Municipal Garbage Disposal Plants	7	221	4	414.89
Treatment of agricultural non- point pollution sources	1	100	11	1068.00
Water Saving and Wastewater Reuse	/	/	5	271.56
Environmental Protection Industry	/	/	4	177.50
Sum	100	5609	79	5422.00

Note: This project includes drilling 368 wells.

^[17] Editor Team. The Tenth Five-Year Plan of Water Pollution Prevention and Control for the Huai River Basin in Anhui Province. 2002

Table 2-5 Main contents of the Henan Plan and the Anhui Plan

	The Henan Plan	The Anhui Plan
Scope of the Plan	The plan's baseline year is 2000, and the target year is 2005. It includes 11 cities and 68 counties in HRB under the jurisdiction of Henan Province, which are divided into 2 planning zones, 20 control units, 39 control subunits and 37 controlled sections.	The plan's baseline year is 2000, and the plan term is 2001-2005. It includes 9 cities covering an area of 66,941 square kilometres.
Water Quality Targets	<p>In the condition that the flux of the main streams of the Huai River and the main tributaries can meet ecological requirements, the following water quality standards are applied:</p> <ul style="list-style-type: none"> • The water quality of 4 controlled sections along the main stream of the Huai River and for the drinking water sources of Xuchang City should be Class III. ; • The water quality of 2 controlled sections at the headstream of the Yinghe River, the Beiru River, and the Honghe River should be Class II ; • The water quality of 16 controlled sections along the main tributaries with natural runoff should be Class IV ; • The COD concentration at 14 controlled sections along the tributaries without natural runoff should not be higher than 70mg/l. 	<ul style="list-style-type: none"> • Improve water environment quality of HRB, and make sure that the water quality of the main stream reaches Class III and that of main branches within the Province reach Class,IV on condition that upstream water quality is stabilized at the same standards. • The water quality of pollution discharge watercourses without natural runoff should reach the discharge standard for the municipal wastewater advanced treatment plant. • The water quality of the east route of water diversion from south to north should meet the national requirements.
Total Pollutant Control Targets	<p>The total amount of COD discharge should be controlled to less than 187,300t/a, and the total amount entering the rivers less than 127,400t/a.</p> <p>The total amount of NH₃-N discharge should be controlled to less than 45,000 t/a, and the total amount entering the rivers less than 32,700t/a.</p>	<p>The total amount of COD discharge should be controlled to less than 117,000t/a, and the total amount entering the rivers less than 88,400t/a.</p> <p>The total amount of NH₃-N discharge should be controlled to less than 35,500 t/a, and the total amount entering the rivers less than 31,400t/a.</p>
Treatment Projects	<ul style="list-style-type: none"> • There are 100 projects belonging to 8 categories, which require a total investment of 5.61 billion yuan. For details see Table 2-4; 	<ul style="list-style-type: none"> • There are 79 projects belonging to 10 categories, which require a total investment of 5.422 billion yuan. For details see Table 2-4;

	The Henan Plan	The Anhui Plan
	<ul style="list-style-type: none"> Local governments and polluting enterprises are responsible for the funding, while the central and provincial governments may provide appropriate support; The pollution abatement investment of industrial enterprises should be mainly raised by the enterprises on their own, while the central and provincial governments may provide loans at subsidized interest rates for certain desirable projects. To attract social capital for wastewater treatment, through establishing charging system for sewage and garbage disposal. 	<ul style="list-style-type: none"> The fund should be mainly raised from local sources, while concerned provincial departments may give support for acquiring loans, using foreign capital, and economic policy; To implement WPPCP for HRB, it is planned to apply for national investment of 1.735 billion Yuan . Seeking 1.686 billion yuan of loans or grants from international or domestic financial organizations. The Province and cities will invest 1.086 billion yuan Self-raised funds will be 0.915 billion yuan.
Supervision and management	<p><u>Pollution sources and water quality monitoring</u></p> <ul style="list-style-type: none"> Set up automatic monitoring stations at the sections on the provincial boundaries, and primary sections of the main stream of the Huai River and key city boundaries; <p><u>Supervision measures</u></p> <ul style="list-style-type: none"> Each city's government should be responsible for the water environment quality in its territory, and take measures to make sure that the total discharge reduction targets are fulfilled and the water quality at sections across cities' boundary meet relevant standards. <p><u>Management system</u></p> <p>Implement the pollution discharge licensing system and total amount control system for the main pollutants (COD_{Cr}, NH₃-N) and other typical pollutants. Monitoring 122 discharge outlets entering the rivers 2~4 times per year.</p>	<p><u>Pollution sources and water quality monitoring</u></p> <ul style="list-style-type: none"> Investing 40.69 million yuan to set up an automatic monitoring system for primary water pollution sources; Investing 80 million yuan to build capacity for environment monitoring. <p><u>Management system</u></p> <ul style="list-style-type: none"> Adjust the number of water quality target sections from 24 to 32, which include 6 sections along the main stream of the Huai River, 9 sections at provincial boundary, and 20 sections related to pollutants input. The government which has not built municipal wastewater treatment plants within the planned time limit is not allowed to develop other projects.

2.3 Tenth Five-Year WPPCP for HRB in Zhengzhou City^[18]

2.3.1 Background of the Plan

The Zhengzhou Plan was compiled by Zhengzhou Environment Protect Bureau. The plan's base-line year was 2000, and the target year was 2005. It included 7 cities and counties which are divided into 3 control units, 3 control subunits and 3 controlled sections.¹⁹ On December 9th, 2003, the Zhengzhou Municipal Government made a written approval reply to the Zhengzhou Plan (Zhengzhou Governmental Document [2003] No.302).

2.3.2 Content of the Plan

Table 2-6 Main Contents of the Zhengzhou Plan

	The Zhengzhou Plan
Water Quality Targets	COD _{Mn} and NH ₃ -N. ^[20] The water quality targets for 6 controlled sections within the city's region: one section to reach Class II, one section to reach Class IV, three sections to reach Class V, and one section COD concentration to be less than 70mg/l.
Total Amount Control Targets	<ul style="list-style-type: none"> The indicators of total amount control are COD and NH₃-N. In 2005, the COD total discharge amount should be controlled within 28,840t/a, while the total amount entering the rivers less than 22,245t/a. The NH₃-N total discharge amount should be controlled within 7,913 t/a, and the total amount entering the rivers less than 7,321t/a.
Treatment Projects	<ul style="list-style-type: none"> A total investment of 723 million yuan is needed for 6 municipal wastewater treatment plants, which was 5 in the original text, to be built or extended during the 10th five-year, and 2 industrial point-source comprehensive abatement projects to be built. An investment of 6.2 million yuan is needed to set up 13 pollution-source and water quality monitoring projects, including 5 automatic monitoring stations at trans-boundary sections, 2 on-line apparatuses at wastewater treatment plants, and 6 projects for monitoring network building.
Treatment Projects	<p>Sources of funds</p> <ul style="list-style-type: none"> Apply for national investment for the 10th five-year plan. Incorporate large-scale environmental protection projects into Planning Committee's investment plan; Put infrastructure construction projects into the plans for city construction. Make legal use of the pollution discharge levy according to national policy; Attract foreign capital for environment protection; Encourage enterprises to give priority to invest in industrial

^[18]Zhengzhou Municipal Environmental Protection Bureau. The Tenth-Five-Year Plan of Water Pollution Prevention and Control for the Huai River Basin in Zhengzhou. December 2003

¹⁹ (it was stated there were "6" controlled sections in Page 13 of the same plan---- annotated by Mazhong).

^[20] NH₃-N was not listed as a parameter like national or provincial plan---- Noted by the author.

	restructuring and cleaner production.
Supervision and Management	<p>Pollution sources and water quality monitoring</p> <ul style="list-style-type: none"> • Monitor COD, NH3-N and other typical pollutants at the 9 drainage outlets entering the rivers 2~4 times per year. <p>Supervision measures</p> <ul style="list-style-type: none"> • Each city and county government should be responsible for water environment quality in its own territory, and take measures to make sure that the pollutants reduction targets are met and the water quality at trans-boundary sections meet corresponding standards. • Establish connection between the responsibility of water quality targets and the government's finance.

Chapter 3 Implementation of Water Pollution Prevention and Control Plans for the Huai River Basin

3.1 Water quality control targets

3.1.1 Implementation of the Ninth Five-Year WPPCP for HRB

The Environmental Quality Standard for Surface Water (GB3838-88) is applied for assessing the water quality at the end of the Ninth Five-Year WPPCP for HRB.

There are two sources of data available for the assessment.

- (1) Report on the State of the Environment in China 2000 publicized by SEPA (referred to as Environment Report 2000 below)^[21]
- (2) The Tenth Five-year WPPCP for HRB^[22]

The assessment results of the monitoring sections based on the two sources are shown in Table 3-1.

Table 3-1 Comparison of the results of water quality assessment based on different data sources at the end of the Ninth FYP

Water quality Class	Environment Report 2000	Tenth Five-year WPPCP for HRB	
	82 monitoring sections	110 monitoring sections	21 provincial trans-boundary sections
II		3 (2.7%)	1 (4.8%)
III		17 (15.5%)	2 (9.5%)
IV	45 (54.8%) ^[23]	10 (9.1%)	
V	7 (8.9%)	15 (13.6%)	4(19.0%)
Worse than V	30 (36.3%)	65 (59.1%)	14 (66.7%)

Sources: 1. SEPA. <Report on the Environmental Status in China 2000>. 2001. SEPA Website, <http://www.sepa.gov.cn/plan/zkgb/2000/>

2. SEPA. Tenth Five-Year Plan of Water Pollution Prevention and Control for the Huai River Basin, published in the <Collection of Tenth Five-Year Plans of Water Pollution Prevention and Control for Three Rivers and Three Lakes >, Chemical Industry Press, Beijing, 2004:7-8

It can be seen that although Environment Report 2000 and the Tenth Five-year WPPCP for HRB were both provided by SEPA, the assessment results of the water quality status were very different. The former indicated that there were 45.2% of sections

^[21] SEPA. Report on the Environmental Status in China 2000. 2001, SEPA Website, <http://www.sepa.gov.cn/plan/zkgb/2000/>

^[22] SEPA. Tenth Five-Year Plan of Water Pollution Prevention and Control for the Huai River Basin, published in the <Collection of Tenth Five-Year Plans of Water Pollution Prevention and Control for Three Rivers and Three Lakes>, Chemical Industry Press, Beijing, 2004:7-8

^[23] The figure is calculated from the proportion of the sections reaching certain standards based on the <Report on the Environmental Status in China 2000>

in HRB where the water quality was Class V or worse, while the latter indicated that more than 72.7% of sections were at or worse than Class V, especially for the provincial trans-boundary sections such sections accounted for 85.7%.

(1) Both the sections in the Environment Report 2000 and the sections reported by the Tenth Five-year WPPCP for HRB were not exactly consistent with the monitoring sections set by the Ninth Five-year WPPCP for HRB, so the assessment results of the water quality were not consistent.

(2) Both sets of data show that the targets of pollution prevention and control of the Ninth Five-year WPPCP for HRB have not been achieved.

3.1.2 Implementation of the Tenth Five-Year WPPCP for HRB

The Environmental quality standard for surface water GB3838-2002 was applied for evaluating water quality at the end of the Tenth Five-year WPPCP for HRB.

The data about the Huai river water quality at the end of Tenth FYP came from three sources:

- (1) Report on the Environmental Status in China 2005 published by SEPA,(referred to as Environment Report 2005 below) ^[24]
- (2) SEPA Notified the Enforcement Situation of Accountability Documents of Water Pollution Prevention and Control for the Huai River Basin, (referred to as Enforcement Situation) ^[25]
- (3) HRWRC. Report on Water Quality Status at Provincial Boundaries and Main Rivers in the Huai River Basin (referred to as Water Quality Report). ^[26]

According to the Environment Report 2005 published by SEPA on 2006-6-12, the water system of the Huai River was moderately polluted. The mainstream of the Huai River was slightly polluted, and the tributaries were heavily polluted. The main pollution indices were COD_{Mn}, BOD₅, NH₃-N and petroleum.

Enforcement Situation reported by SEPA indicated that 88% of the 25 sections at provincial boundaries achieved the standard in 2005, 20% higher than the figure in 2004.

According to the Water Quality Report, published monthly by the Huai River Water Resources Commission, from January to December in 2005, 26.2% of the 46 provincial sections had reached Class III, 24.1% reached Class IV, and 9.3% reached Class V. The water quality of 40.4% sections was worse than Class V, and the average percentage of the sections reaching corresponding standards was 60.7% in terms of the Tenth Five-year WPPCP for HRB.

The assessment results of the water quality for the Huai River from different sources are shown in Table 3-2.

Table 3-2 Comparison of water quality assessment results at the end of the 10th

^[24]SEPA. Report on the Environmental Status in China 2005, released in 2006 on SEPA website, <http://www.sepa.gov.cn/plan/zkgb/05hjgb/>

^[25]SEPA. SEPA Notified the Enforcement Situation of Responsibility Documents of Water Pollution Prevention and Control for the Huai River Basin, SEPA Website, http://www.sepa.gov.cn/xcyj/zwhb/200605/t20060524_76740.htm

^[26] Huai River Water Resources Commission. Report on Water Quality Status at Provincial Boundaries and Main Rivers in the Huai River Basin, Huai River Water Resources Commission Website, <http://www.hrc.gov.cn/hhsbj/www/special/index.asp?typeid=26&type1=省界水质>

Five-Year WPPCP for HRB based on different data sources

Water quality Class	Environment Report 2005		Enforcement Situation 2005	Water Quality Report	
	86 national controlled sections	32 national controlled sections at provincial boundaries	25 sections at provincial boundaries	50 main river sections	46 provincial boundary sections
I, II	3 (3%)	1 (3%)		4 (7.7%)	
III	12 (14%)	3 (9%)		15 (31%)	12 (26.2%)
IV	33 (38%)	13 (41%)		10 (20.8%)	11 (24.1%)
V	11 (13%)	5 (16%)		5 (9.2%)	4 (9.3%)
Worse than V	27 (32%)	10 (31%)		16 (31.3%)	18 (40.4%)
Percentage of up-to-standard sections*			88%		60.7%

Note: According to the prescribed standards for each section in the Tenth Five-Year WPPCP for HRB.

Sources : 1. SEPA. Report on the State of the Environment in China 2005. Published in 2006, SEPA Website, <http://www.sepa.gov.cn/plan/zkgb/05hjgb/>

2. SEPA. SEPA Notified the Enforcement Situation of Accountability Documents of Water Pollution Prevention and Control for the Huai River Basin, SEPA Website, http://www.sepa.gov.cn/xcyj/zwhb/200605/t20060524_76740.htm

3. HRWRC. Report on Water Quality Status at Provincial Boundaries and Main Rivers in the Huai River Basin, Huai River Water Resources Commission Website, <http://www.hrc.gov.cn/hhsbj/www/special/index.asp?typeid=26&type1=□□□□>

The following conclusions can be drawn:

- (1) The 86 national controlled sections mentioned in the Environment Report 2005, 96 sections in the Water Quality Report released by Huai River Water Resources Commission and the 111 sections set by the Tenth Five-Year WPPCP for HRB were not well matched, and there were no complete data sources directly related to the sections set in the Tenth Five-year WPPCP for HRB. This is similar to the situation at the end of the Ninth Five-year WPPCP for HRB, and the difference is that for the assessment of the Ninth Five-year WPPCP for HRB, the data inconsistency occurred in the same department (SEPA), while for the Tenth Five-year WPPCP for HRB, the data were inconsistent between two departments (SEPA and MWR).
- (2) Different sourced data were not consistent with each other, but they all reflected that the water quality targets set by the Tenth Five-year WPPCP for HRB have not been achieved.

3.2 Total quantity control targets of water pollutants discharge

3.2.1 Implementation of the Ninth Five-Year WPPCP for HRB

The Ninth Five-Year WPPCP for HRB only stipulated the total quantity control targets for COD. It set the maximum allowed discharge quantity of COD in 1997 at 890,200 tons; and in 2000, the maximum quantity was 368,000tons.

The data about the discharge of COD by the end of the Ninth Five-year WPPCP for HRB came from three sources:

- (1) Report on the Progress of the Water Pollution Prevention and Control in the Huai River Basin released by SEPA in 2001 (referred to as Progress Report 2001 below)^[27]
- (2) China Environmental Yearbook 2001 published in 2001 (referred to as Yearbook 2001)
- (3) Data for the baseline year (2000) of the Tenth Five-Year WPPCP for HRB.

The comparison of the assessment results for total quantity control based on different data sources is shown in Table 3-3

Table 3-3 Comparison of the total quantity figures in 2000 based on different data sources^[28]

Data sources	COD	Total quantity ($\times 10^4$ t)	Henan Province	Anhui Province	Shandong Province	Jiangsu Province
Ninth Five-Year WPPCP for HRB	Discharge quantity in the baseline year □ 1993 □	150.14	38.04	37.76	47.76	26.38
Ninth Five-Year WPPCP for HRB	Maximum allowed discharge quantity for 2000	36.80	12.74	7.70	9.89	6.47
SEPA's Report on the Progress of WPPC in HRB/ State Council office [2001]46	Achievement of total quantity control in 2000	368*	Discharge reduction targets achieved	* 472×10^4 t reduction mission not achieved	Discharge reduction targets achieved	Discharge reduction targets achieved
Page 178 in Environmental Yearbook 2001, based on data monitored and reported by the four provinces	Discharge quantity in 2000	40	12.68	12.42	9.0	5.88
Tenth Five-Year WPPCP for HRB	Discharge quantity in 2000	105.9	30.3	15.5	25.4	34.6

Note: The data were derived from SEPA's document and some mistakes were found, for example, 368×10^4 tons should be 36.8×10^4 tons, and 472×10^4 tons should be 4.72×10^4 tons.

^[27] Office of the State Council. Document (2001)No. 46, Notice of Forwarding the SEPA's Report on the Progress of Water Pollution Prevention and Control in the Huai River Basin. June 26th, 2001

^[28] Miao Hong. When will the Huai River Get Clear?, Oriental Outlook. 2006(7):47

There were altogether five official sources for the COD quantity discharged in HRB in 2000:

-- According to the Progress Report 2001 released by SEPA in 2001, Anhui Province had not achieved the required 47,200 tons of reduction in emissions, but the other three provinces had achieved their reduction targets, and the whole basin had achieved the total quantity control targets set in the 9th Five-Year WPPCP.

-- Yearbook 2001: the COD discharge data of the four provinces indicated that except Anhui province, the other three provinces had achieved their discharge reduction targets. In the whole basin 400,000 tons of COD entered the rivers, which was 32,000 tons higher than the figure in the Progress Report 2001.

-- Tenth Five-Year WPPCP for HRB: The discharge quantity of COD in 2000 was 1.059 million tons, and 0.812 tons entered into the river. All the four provinces discharged more quantities of COD than the total quantity control targets, and the figures were also higher than the statistical data. Especially in Jiangsu Province, the quantity of COD discharged into the rivers in 2000 increased from 58,800 tons as in Yearbook 2001 to 304,000 tons.

-- Deputy director general of SEPA, Mr. Wang Jirong: the quantity of COD discharged into the Huai River in 2000 was 480,000 tons.^[29]

-- Ministry of Water Resources: the quantity of COD discharged into river in 2000 was 94.33×10^4 t.

Initial analysis of the difference of these data reflected the following points:

- (1) Different statistical methods led to different statistical results. Due to the consideration for performance inspection, it was possible for the local governments to falsify the data which were less than the actual discharge. The data from Environment Report 2001, Yearbook 2001 may demonstrate this kind of situation, though the two sources of data were not exactly the same. The credibility of such official statistical data as "Environment Yearbook" was seriously challenged.
- (2) The COD discharge data for the baseline year of the Tenth Five-year WPPCP for HRB were also reported by the local government, but another consideration might lead to the swollen figures. Because the local governments were required to reduce their pollution discharge based on the level in 2000, they had the motivation to report larger discharge quantity for the 2000 level in order to lighten the pressure of discharge reduction tasks during the Tenth FYP.
- (3) Although the data from different sources were quite different, it was still convincing evidence that the total quantity control targets of the Ninth Five-year WPPCP for HRB had not been achieved.
- (4) No matter what considerations the local authorities might have for under-reporting or over-reporting, SEPA, as the national department, failed to identify the huge difference between different statistical data for one pollutant in one basin for the same time period, and did not verify or check the data before reporting them to the State Council and taking them as the

^[29] Ou Zhengtao. A Secret Visit to the Huai River, Xinhua Press, Beijing. January 2005:52

basis of planning. This indicated that SEPA not only lacks the ability to obtain real discharge data about pollution sources but also lacks basic ability of data identification and verification. Decision making based on seriously distorted information would inevitably have huge risks.

3.2.2 Implementation of the Tenth Five-Year WPPCP for HRB

The Tenth Five-year WPPCP for HRB prescribed that the discharge amount of COD should be controlled at 643,000 tons per year by the end of 2005, reduced by 39.3% compared with the 2000 level, and the NH₃-N discharge amount should be controlled at 113,000 tons, reduced by 25.7% compared with the 2000 level.

The data to evaluate the fulfillment of the Tenth Five-year WPPCP for HRB came from the China Environment Yearbook from 2000 to 2005.

The pollutant discharge situation in the Huai River Basin in the last few years is shown in Table 3-4.

Table 3-4 Wastewater and main pollutant discharge in the Huai River Basin

Year	Waste water ($\times 10^8$ t)			COD ($\times 10^4$ t)			NH ₃ -N ($\times 10^4$ t)		
	Total	Industry	Domestic	Total	Industry	Domestic	Total	Industry	Domestic
2000		13.3		105.9	29.0	76.9	15.2		
2001		13.4			30.3			3.4	
2002	36.8	13.4	23.4	102.8	25.8	77.0	13.9	3.7	10.2
2003	35.7	13.2	22.5	96.4	23.7	72.7	12.3	3.4	8.9
2004	36.5	13.1	23.3	99.1	24.1	74.9	12.5	3.7	8.8
2005plan				64.3			11.3		

Data source: Chinese Environment Yearbook 2001 □ 2002 □ 2003 □ 2004 □ and 2005.

According to the data, the total discharge amount of COD was 991,000 tons for 2004. In other words, the amount has only been reduced by 68,000 tons during four years, and 348,000 tons of COD still need to be reduced in order to achieve the total quantity control targets within only one year!

It can be seen that it is very difficult to achieve the COD reduction targets. The discharge amount of NH₃-N was 125,000 tons in 2004, which still demonstrated a gap between the actual discharge and the targets.

3.3 Implementation situation of treatment projects

3.3.1 Implementation of the Ninth Five-Year WPPCP for HRB

The Ninth Five-year WPPCP for HRB selected 303 treatment projects, with a total investment of 16.6 billion yuan.

The data for evaluating the implementation results came from two sources:

- (1) Tenth Five-Year Plan WPPCP for HRB

(2) Report on the Progress of the Water Pollution Prevention and Control in the Huai River Basin, released by SEPA in 2001 (referred to as Progress Report 2001 below) by SEPA

According to the Tenth Five-year WPPCP for HRB, among 59 sewage treatment plants to be built during the Tenth FYP, 12 plants have been completed and put into operation, 32 plants have been in construction and the remaining 15 plants have not been built yet by the end of 2000.

According the Progress Report 2001, by the end of 2000 sewage treatment plants with a total capacity of 31.25 million tons/day had been built or in construction, accounting for 86% of the total planned capacity.

Progress Report 2001 also indicated that, among 380 projects to be built (most of which were drinking water projects, industry restructuring, cleaner produce and centralized sewage treatment projects, etc.), 311 projects had been finished, accounting for 82% of total planned projects. The percentage of projects finished by the four provinces was 83% for Henan Province, 73% for Anhui Province, 87% for Shandong Province, and 79% for Jiangsu Province. There were still 37 projects in construction and 32 projects not started.

The implementation situation of the projects in the Ninth Five-Year Plan reflects that:

- (1) The Tenth Five-year WPPCP for HRB and the Progress Report 2001 gave different statistical data about the construction of urban sewage treatment plants.
- (2) Though the statistical results were not consistent, they all indicated that the treatment projects of the Ninth Five-year WPPCP for HRB have not been completed.
- (3) Because the Ninth Five-year WPPCP for HRB did not describe the pollution reduction capacity of each project, and the Tenth Five-year WPPCP for HRB also did not mention the achievement of pollutant reduction amount about each implemented project, it can be seen that the current evaluation about implementation of projects only focused on whether the funds have been invested, and whether the projects have been built. The actual pollutant reductions through implementing the projects have not been given enough attention.
- (4) The high level of discharge amount of COD in 2000 also indicated that the operating rate of the treatment projects completed was likely very low. If it was true as described in Progress Report 200 that 82% of the treatment projects have been finished, the COD discharge amount could not be three times the planned targets in 2000.

3.3.2 Implementation of the Tenth Five-Year WPPCP for HRB

The Tenth Five-Year WPPCP for HRB proposed 488 projects in nine categories, with a total investment of 25.59 billion yuan, including 211 projects belonging to the Plan of Pollution Control for the East Route of South-to-North Water Diversion with a total investment of 10.83 billion yuan. It was expected that after all the projects were finished, COD discharge in the whole basin would be reduced by 550,000 tons and NH₃-N by 460,000 tons.

Data for the assessment were from three sources:

1. SEPA Summarized Data of projects implementation progress in Huai River Basin until January 2005 (see Table 3-6);
2. SEPA, Bulletin of projects implementation progress until April 2005;
3. The Implementation Situation of The Tenth-Five-Year Plan of Water Pollution Prevention and Control for the Key Basins, released by NDRC on July 18th, 2005. (Referred to as NDRC's Implementation Situation below)

Table 3-6 Implementations of projects in Huai River Basin until January 2005

Projects	Total	Finished	Ratio (%)	Under Construction	Ratio (%)	Not Started	Ratio (%)	Planned Investment (Billion Yuan)	Actual Investment (Billion Yuan)	Ratio (%)
Sewage Treatment Plants	161	38	23.6	52	32.3	71	44.1	14.89	5.31	35.7
Industrial Structure Adjustment	131	72	55.0	41	31.3	18	13.7	2.43	1.54	63.4
Industrial Point-source Pollution Abatement	116	52	44.8	49	42.3	15	12.9	1.73	1.09	63.0
Integrated Treatment Projects and Ecological Demonstration Projects	29	1	3.4	18	62.1	10	34.5	3.14	1.78	59.0
Sewage Interception and Diversion	15	0	0.0	1	6.7	14	93.3	1.25	0.074	5.9
Drinking Water Projects	3	0	0.0	3	100.0	0	0.0	0.28	0.084	30.4
Municipal Garbage Treatment Plants	14	3	21.4	4	28.6	7	50.0	0.89	0.23	25.6
Agriculture Non-Point Pollution Prevention	6	2	33.3	3	50.0	1	16.7	0.39	0.12	31.1
Capacity Building	13	1	7.7	7	53.8	5	38.5	0.59	0.10	16.9
Total	488	169	34.6	178	36.5	141	28.9	25.59	10.33	40.4

According to the SEPA's bulletin on the implementation of water pollution prevention projects in HRB until April 2005, 228 projects have been finished and 174 projects were under construction, among which 114 projects would be finished at the end of 2005 and 86 projects have not been started yet.^[30] Comparing the figures of finished

^[30] Editorial Department of Population, Resources and Environment of China, SEPA Notified the Progress on

projects in January and April, it can be assumed that projects were carried out smoothly in the three months.

According to the NDRC's Implementation Situation, only sewage treatment plants projects were publicized. It mentioned that in the Huai River Basin 168 sewage treatment plants should have been built by the end of 2005 at a total investment of 15.57 billion yuan and treatment capacity of 6.365 million tons per day. It stated that, up to now, 140 sewage treatment projects have been completed, with an investment of 12.86 billion yuan and total treatment capacity of 5.8225 million tons per day, accounting for 83%, 83% and 91% of the planned figures respectively.

When comparing the data of SEPA and NDRC on the implementation of sewage treatment projects, once again inconsistency was found. (See Table 3-7)

Table 3-7 Sewage treatment plants construction before 2005 from different data sources

	SEPA	NDRC
Total Sewage Treatment Plants Projects	161	168
Total Planned Investment (billion Yuan)	14.89	15.57
Projects Finished	38	140 (projects being carried out)
Projects Under Construction	52	
Total Actual Investment (billion Yuan)	5.31(35.7%)	12.86(83%)

Through assessing the implementation of projects in the Tenth Five-Year WPPCP for HRB, the following problems were found:

1. There was conspicuous difference between the results of SEPA and NDRC in assessing the implementation of sewage treatment plants of the Tenth Five-Year WPPCP. Generally speaking, the NDRC results about actual projects and investment were much higher than those of SEPA.
2. In the NDRC results, the number of sewage treatment plants and total investment didn't conform to that of the Tenth Five-Year WPPCP for HRB. In addition, the description of projects being carried out was not clear enough to distinguish between projects finished and projects under construction.
3. The unconformity of results from different authorities reflected that official assessment was not as credible and accurate as expected. In fact, under the pressures of responsibility assessment for different departments, different self-assessing bodies sometimes provided equivocal and false information in the assessment. Only by enhancing the independence and neutrality of assessment, can we avoid such kinds of embarrassment in the self-assessing process.

4. The State Council approved the Tenth Five-Year WPPCP for HRB in January of 2003, when the Plan had been carried out for two years. Some governmental departments proposed that the Tenth Five-Year WPPCP for HRB should have an extension of two years, which meant that the projects can be implemented by the end of 2007. As a result, it can not be concluded whether all the projects have been implemented or not, especially taking into consideration that some projects would take quite long time to implement^[31]. According to the SEPA's statistical data until April of 2005, the speed of projects being carried out was accelerated towards the end of the Tenth Five-Year Plan, which reflected the imbalance of investment and time distribution during the implementation period. What needs to be pointed out here is that the explicit period of the Tenth Five-Year Plan is from 2001 to 2005.

3.4 Implementation of Supervision and Management Measures

3.4.1 Implementation of the Ninth Five-year WPPCP for HRB

There is no assessment on the supervision and management implementation of the Ninth Five-year WPPCP for HRB in the Tenth Five-year WPPCP for HRB. The assessment in this report is based on several references collected.^{[32][33]}

In preparing for basin management and plan implementation, HRWRPB launched a joint program for pollution prevention in the Huai River and the Shaying River together with local Water Resources departments and local EPBs, and established the restricted discharge program on pollution sources based on the environmental capacity of the rivers in dry seasons. Also the HRWRPB continued to monitor water quantity and quality in 31 sections at provincial boundaries along 30 major trans-boundary rivers in the whole basin, to investigate the variation of water quality and main pollutants in the rivers flowing out of different provinces and report to related governmental departments and the four provinces in the basin.

There are also many management systems and special policies in HRB. Ever since the State Council launching of Regulation on Water Intake Permit System (RWIPS) on 1st Sep. 1993, the Water Resources Department of Henan Province transmitted a series of regulations concerning water intake permit management issued by the State Council and MWR. Under the requirements of RWIPS and regulations of MWR, more than 53,000 permits were handed out in the efforts of water resource management authorities at different levels in the whole province. However, due to disturbance from a few other departments^[34], the permit system was carried out slowly in planned and built-up areas of several municipalities. In addition, the Total Pollutants Discharge Control System

^[31]According to the requirements of Municipal Sewage Treatment Plants Construction Criteria issued by Ministry of Construction and National Planning and Reform Committee, the construction period of sewage treatment plants with the daily capacity of 50,000 to 100,000 tons should be 24 to 28 month. Considering that the preparation period for such a project is normally around one year, in the condition of sufficient capital investment, the rational construction period should be at least three to four years.

^[32]Cheng Xushui, Wang Chaohui, Water Resource Protection and Pollution Prevention in Huai River Basin, 21st Nov, 2001, <http://www.cws.net.cn/CWSNews/011121/112602.html>

^[33]Water Resource Protection Bureau of Huai River Basin (HWEPB), Key floodgate pollution prevention coordination plan tasks, Passing first trial of Huai Water Association, 30th Nov. 2005, <http://www.hrc.gov.cn/hhsbj/www/news/zhxw/2005113042031.htm>

^[34]Henan Water Resources Net. Water Resources Management, June 20th, 2006, http://www.hnsl.gov.cn/look0/law.php?L_Type=3&id=214

(TPDC) was not implemented satisfactorily during the Ninth FYP, besides that, the TPDC generally focused on the total pollutants control at the district scale, yet not at the scale of individual enterprise.

3.4.2 Implementation of the Tenth Five-year WPPCP for HRB

The fifth chapter of the Tenth Five-year WPPCP for HRB regulated obligations of different departments, and supervision and management measures together with guarantee measures. Assessment of the implementation of supervision and management measures in this section is mainly based on the WPPCPs and implementation programs of different provinces, and typically based on the references of Henan Province and Zhengzhou City.

3.4.2.1 Implementation of environmental management for new projects

In examining and approving construction projects, all the four provinces along the Huai River explicitly tailored implementation plans to comply with the Environment Impact Assessment Law (EIA Law) and required projects to implement EIA. Each province also required that authorities should examine and approve construction projects according to the environment quality targets and total pollutant control targets strictly. Ever since 2000, the Huai River branch in Henan Province denied 72 projects that failed to meet the requirements of industrial policies to restrain repetitive construction, and controlled new discharges by strict examination and approval of 267 new renovation projects.^[35]

No information was available for evaluating the management of sewage treatment plants without properly equipped pipeline systems.

3.4.2.2 Promotion of Cleaner Production

Since 2003, Henan Province has closed all the lime pulping production lines, straw chemical pulping production lines with annual pulping capacity lower than 34,000 tons and waste paper pulping production enterprises with annual production capacity lower than 10,000 tons, including 526 production lines in HRB. In 2005, 978 enterprises and production lines were closed due to their outdated technology and heavy pollution in Henan Province, including 107 water-related enterprises in HRB. In Anhui Province, 146 enterprises were closed and 96 accomplished cleaner production audit, while the water consumption per ton of product in papermaking, brewery, distillery and ammonia industry was reduced by more than 5 percent.^[36]

Structural pollution remains the dominant cause of pollution in Huai River Basin. Dominant industries in the basin, such as papermaking, brewery and distillery, chemical, pharmacy, and leather remained primary pollution sources, especially some small-scale and heavily-polluting enterprises in lime pulping, chemical pulping, yellow paperboard, paper-making with waste paper, distillery. In April 2004, the simultaneous monitoring results of 533 key enterprises in normal operational conditions in Huai Rive basin

^[35]People Website. Henan: Tell the Truth of the Control of the Huai River, March 20th, 2006, People Website, <http://www.people.com.cn/GB/huanbao/1073/2695217.html>

^[36]Jiang Wenlai, A long-term task--Huai River Pollution Prevention Project, 20th Mar. 2006, <http://www.jwater.cn/luenw/Huaizhiwu.htm>

showed that 28% of enterprises had excessive discharge, mainly in papermaking, chemical and leather industries.

3.4.2.3 Navigation pollution control

There is no detailed information about the implementation of shipping pollution control in the documents and reports of NDRC, SEPA and the four provinces related to the implementation of the Tenth Five-year WPPCP. Besides that, the supervision and management measure for shipping pollution prevention itself seemed not relevant to the emphasis of water pollution prevention in HRB.

3.4.2.4 Total amount control and discharge licensing system

The four provinces all established discharge declaration and discharge licensing systems. Local governments and EPBs of different levels launched regulations to strictly enforce the discharge declaration system and promote the discharge licensing system, as well as enhanced environmental supervision and stricter enforcement.

In Henan Province, EPBs at provincial, city and county levels checked and issued discharge permits to enterprises with different discharge amounts. In Zhengzhou, the Discharge Declaration Leading Panel was established in November 2003, and the Discharge Declaration Checking Section, formed by skilled employees, was established in March 2004. By August 2004, more than 1800 enterprises had obtained discharge permits in Henan Province in HRB. Nevertheless, the monitoring frequencies were very low for enterprises, and some environmental monitoring stations only monitored enterprises once a year, which could not reflect the actual discharge condition of enterprises and could not enable effective enforcement of standard levels of discharge by the polluting enterprises.

It was also found in the research that there was no unified regulation to the monitoring of estuary discharge sources, even though the WWPCP regulated the discharge amount to the rivers. Besides that, the measuring methods of SEPA and MWR were not consistent, SEPA relying on declared amounts, adding partial monitoring results, while MWR depended on monitoring data to obtain the total discharge amount, which was obtained by Water Environment Monitoring Centre of HRWRC and local water resource organizations of the four provinces executing monitoring to discharge source of estuary in an intensive period. Due to different practices, unconformity in statistical methods and standards, data of pollutants discharged to the rivers differentiated significantly.

Both regulations and provision documents on pollutant discharge monitoring and the Tenth Five-year WPPCP for HRB focused on monitoring for point source pollutants, such as industrial enterprises and municipal sewage treatment plants, neglecting monitoring for non-point pollutants such as agricultural pollutants. Among the 13 monitoring capability building projects in the Tenth Five-year WPPCP for HRB, there was only one project aiming exclusively at non-point agricultural pollution monitoring. Non-point and point pollution control are equally important for the improvement of the Huai River. Without monitoring non-point pollution sources, accomplishing the goal of improving the water quality in the Huai River cannot be guaranteed.

3.4.2.5 Responsibility investigation system

According to the Tenth Five-year WPPCP for HRB, SEPA signed the Accountability Documents of Water Pollution Prevention Goal with the four provinces in HRB, the four provinces also signed corresponding accountability documents with local municipal and county governments, and the latter signed with enterprises. Different levels of authorities launched temporary assessment methods and would punish the entities who failed to fulfill the goals according to law.

SEPA stipulated the Method of Evaluating the Implementation of the Accountability Documents (2005-2010) on Water Pollution Prevention and Control for HRB (Trial), and the Method of Water Environmental Status Bulletin of Cities in the Huai River Basin (Trial). The four provinces also put forward detailed regulations, and launched the local Tenth Five-year WPPCP for HRB and other implementation plans successively. Municipalities and counties also approved and released local implementation plans. In addition, governments and EPBs at different levels established and approved annual targets and annual implementation programs.

Taking Henan Province as example, in November 2003, Henan EPB and Henan Supervision Department jointly introduced the Temporary Methods on Administrative Responsibility Investigation for Violation of Environmental Regulations, which sets out several hierarchical punishments, including forced correction for limited period, public criticism, warning, demerit record, blunder record, degrading and dismissal according to the seriousness degree of the violation of the direct responsible person, direct leading responsible person, and indirect leading responsible person of government, departments and enterprises. Ever since the Tenth FYP, Henan Province has organized special actions to investigate environmental violations in consecutive three years, and named the year 2003 as Special Action Year of Water Pollution Prevention. Also Henan Province has implemented an accountability system for water quality at sections where the rivers flow out of the province for seven years, and issued a regulation stating that if the quality of water flowing out of a city's territory exceeded standards twice it would be warned, and if it was found three times, it should halt approval of construction projects that would discharge water pollutants, until the water quality standards were reached. Because the flowing-out-water exceeded standards consecutively in 2002, two cities were deprived of the right to approve construction projects with water pollutants discharge for one year. Since 1994, Henan Province has investigated 2,719 environmental regulations violating cases in Huai River basin, of which 2,239 with have resulted in punishment, 144 enterprises halted production for pollution abatement and 22 closed. Zhengzhou established the flowing-out-water responsibility and finance pegging system, taking the accomplishment situation of water quality goals as an important element in administrative promotion and environment as a veto.

Zhengzhou city was taken as a case for the assessment. Ever since the launching of the Tenth Five-year WPPCP, Zhengzhou stipulated many corresponding regulations in order to facilitate the accomplishment the objectives of the Tenth Five-year WPPCP, including the Tenth Five-year Plan of Water Pollution Prevention and Control for the Huai River Basin in Zhengzhou, Water Environment Function Zoning of Zhengzhou City, Responsibility Agreement on Environmental Protection Goals Between Zhengzhou and the Governments and Related Department of Districts and Counties (2001-2005), Assessment Methods for Environment Protection Performance of Villages, Towns and

Enterprises of Zhengzhou, and Notice of Zhengzhou Municipal Government on Finance Pegged Responsibility for Water Quality Targets at Boundaries leaving the City .

According to the Outline of Progress Report on the Main Environmental Supervision Work during the Tenth FYP by the Environment Supervision Detachment, from 2000 to 2004, there were about 90,000 person-time on-site inspections, 12,000 person-time on-site inspections to construction projects, and 25,000 person-time on-site inspections to abatement projects in limited periods. The Detachment participated investigations for more than 200 pollution accidents and pollution conflicts, and more than 500 cases with complaint letters and visits.

To ensure the implementation of environment targets responsibility agreement, Xinmi City, which is at county level administrated by Zhengzhou City, established an integrated treatment plan for papermaking enterprises. For example, with regard to industrial pollution prevention, Xinmi launched a supervision responsibility system to arrange special environment supervision employees responsible for main polluting enterprises, and publicize the list of the main enterprises, corporations and supervision personnel.

In addition, SEPA routinely investigated the water pollution prevention and control work in HRB and publicly reported implementation results. Until the end of 2004, HRWRC had launched three large-scale investigations into the quality of Projects for the Huai River, and according to the results, HWC notified the four provinces to enhance administration and following-up supervision management. Henan Provincial government together with relevant departments established investigation groups, and carried out eight on-site investigations into the enforcement situation of environment targets responsibility agreements and integrated treatment tasks in the key basins and regions. The People's Congress of Henan Province organized Century Environment Protection Campaign in the Central Plain for the next ten years, and launched an inspection of the enforcement of Water Pollution Prevention Law, Interim Ordinance of Water Pollution Prevention and Control in the Huai River Basin.

3.4.2.6 Establishment of effective investment, operation, charging and pricing mechanisms in water pollution prevention and control

The establishment of effective investment, operation, charging and pricing mechanisms is an important guarantee for the sustainability of WPPCPs. Only by this way can social capital be attracted to the implementation of WPPCPs. What is more important, after the investment of the plans is finished, projects can keep on operating, and producing long-term environmental benefits.

According to the supervision results of construction and operation of municipal sewage treatment plants in Anhui and Henan Province in HRB by the City Construction Division of Ministry of Construction between June 13 and 17 in 2004^[37], there were many problems referring to sewage treatment projects in all the places of different scales. The following are several pervasive problems:

^[37]MOC, Supervision on Huai Pollution Prevention Project, Construction and Operational Condition of Municipal Sewage Treatment Projects in Huai River Basin, 23rd Jun. 2004, <http://www.h2o-china.com/report/HaiheSullage/chulixiangmu.htm>

1. Lack of operating funds. All the sewage treatment projects in Henan Province, except Wangxinhuang Sewage Treatment Plant in Zhengzhou City, were facing the obstacle of inadequate operational funding. Some were operated in debt, while others were relying on financial subsidies. What is worse, a few individual projects could not carry out trial operations because of lack of operational investment.
2. Unconformity of sewerage systems. For instance, for one sewage treatment plant, the design capacity was 40,000 tons, while the actual treatment volume was only 5,000 to 6,000 tons. The reason was that of the four pollution sources, only one connected with the pipes of sewage treatment plant, while the effluents of other three discharge outlets flowed directly to the river.
3. Insufficiency of emission charge collection in local cities. Among several surveying cities, the average collection rate of emission charge was low, especially in Changge where the rate was as low as 36%. Most of the funding for operations of local sewage treatment plants came from the emission charge; nevertheless, the actual emission charge collected could not support the normal operation of plants, with a major part from governmental subsidy.

In conclusion, from the above results, investment, operation, charging and pricing mechanisms are far from being perfect and still need to be improved according to the Notice of the State Council on Enhancing Water Pollution Prevention in Huai River Basin.

Chapter 4 Findings and Analysis

4.1 Findings

4.1.1 Water Quality Targets not fulfilled

Since the ninth five-year plan period, water quality targets have been the utmost objectives of WPPCPs for HRB. As a key indicator for evaluation, the water quality targets for both the mainstream and branches have always been definitely prescribed in the WPPCPs for HRB. In the Trial Methods for Evaluating the Implementation of Target Responsibility Documents for Water Pollution Prevention and Control in HRB during 2005-2010, the water quality indicator accounts for 40% of a total score of 100, which again exemplified the significance and predominant role of water quality targets. It also manifests the utmost desire of the central government to control water pollution and improve the water environment in HRB.

However, according to the above facts, the set water quality targets have not been achieved through the implementation of the Ninth and Tenth Five-Year WPPCPs for HRB. Water quality for both the mainstream and branches did not meet the planned targets in general. The sections that once met the water quality targets failed to keep a good record later.

Since the water quality targets set in the Ninth Five-year WPPCPs had not been fulfilled, the water quality targets were loosened in the Tenth Five-Year WPPCPs. Though the mainstreams were required to meet same quality level, the targets for branches were lightened. Some sections in branches were required to meet Class V standards or even worse. It showed that the planner had realized the difficulty of water quality improvement for HRB. Nevertheless, the loosened water quality targets have not been met either.

Comparing the Tenth Five-Year WPPCP for HRB in Henan Province and the Tenth-Five-Year Plan for Environmental Protection of Henan Province, inconsistency was found in sections setup, control units and water quality standards. Similar problems were also found in the WPPCPs compiled by environmental protection departments and the plans for water resource use compiled by water resources departments.

4.1.2 Total Pollutant Discharge Control Targets not fulfilled

The total discharge control targets, also the main targets in the Ninth and Tenth Five-Year WPPCPs for HRB, have not been realized.

In the Tenth Five-year WPPCP for HRB, the total discharge control target for COD was 643,000 tons, while the targets for COD entering the rivers were 466,000 tons. It is worth noticing that the two targets are much higher than the control target in the Ninth Five-year WPPCP, which was 368,000 tons. The huge difference between the total discharge control targets for the two five-year periods illustrated the infeasibility of the target set by the Ninth Five-year WPPCP.

To further investigating the achievements of total discharge control targets of the Ninth Five-Year WPPCP for HRB, the available data were extremely confusing. There are five different sources of official data for COD discharge in HRB in 2000 and the data are inconsistent. The disparity of data that related to the completion of total discharge control targets of the Ninth-Five-Year WPPCP is so large that the largest estimates could be about 2-3 times as big as the smallest. For example, the COD discharge quantity in 2000 described in the Tenth-Five-Year Plan was 1.87 times of the one in SEPA's reports and 2.65 times of the one in China Environment Yearbooks.

Agricultural non-point pollution sources have not been included in total discharge control targets. The agricultural non-point pollution sources were excluded from COD pollution sources of the total discharge control targets in the Ninth-Five-Year WPPCP for HRB and from COD and NH₃-N pollution sources as well in the Tenth-Five-Year WPPCP for HRB, though the non-point pollution sources have been regarded as one of the main pollution sources in all levels of WPPCPs.

The discharge of domestic wastewater was underestimated in the Ninth Five-Year WPPCP of HRB. The Ninth Five-Year WPPCP of HRB estimated that domestic wastewater discharge could take 32.8% of the total, and that domestic COD discharge could also be 32.8%.^[38] However, the facts proved that it was a low estimate. At the end of the year 2000, domestic COD discharge was 671,000 tons, accounting for 63% of the total and twice the target set by the Plan.

The definitions of the discharge quantity and the input into the river are unclear. In the Ninth-Five-Year WPPCP for HRB, the total discharge control targets referred to the maximum permitted discharge quantity, while in the Tenth-Five-Year WPPCP for HRB, the total discharge control targets included both discharge quantity and the input into the river. Neither the Ninth or Tenth Five-Year WPPCPs for HRB clearly defined the discharge and the river input. In theory, the ratio of river input and discharge can reflect pollutants' degradation during the progress that pollutants are discharged from the end of pollution sources (e.g. enterprises) to the river input outlets. According to the base-year discharge, final discharge and river input in the Tenth Five-Year WPPCP for HRB, it was found that the ratios of COD or NH₃-N river input and discharge varied for different sections, and even for the same section, the ratio of the year 2000 was different from the one of the year 2005. Taking the 19 cross-sections in Henan Province as an example, the number of the sections whose ratio errors of COD discharge in 2000 and 2005 are more than 5%, is 12; the number of the cross-sections whose ratio errors are more than 10%, is 9; and the largest ratio error is 53%. The same problem was also found in the data of NH₃-N discharge. The ratios vary in sections and greatly in provinces. For example, in the year 2000, the ratio of Henan Province is 0.726, Shandong Province 0.646, and Jiangsu Province 0.879. Among the ratios of different provinces exists a surprisingly largest margin of 0.236.

4.1.3 Planned investment and treatment projects not fully accomplished

The two WPPCPs for HRB have cost 42.2 billion yuan, but the projects prescribed in both plans were not fully completed by the end of the planned time limit. An expert of

^[38]Editor Team. The Ninth Five-Year Plan of Water Pollution Prevention and Control for the Huai River Basin.1996

SEPA said that the investment for water pollution control of Huai River only amounted to 19.3 billion yuan by the year 2004. According to the Ninth Five-year WPPCP, 59 municipal sewage treatment plants were to be built, however, by the end of 2004, only 12 plants have been in operation, while 32 plants still in construction and 15 plants have not been built at all. By early 2005, completed projects only took 34.6% of the planned total.

The projects of the Ninth and Tenth Five-Year WPPCPs for HRB have not been fully implemented due to ambiguous funding sources. It could be found that the expected funding sources were quite different in various levels of plans for prevention and control of water pollution.

- ① The total fund of the Ninth Five-Year WPPCP for HRB was 16.6 billion yuan. Approximately 1.3 billion yuan came from the Central Government by loan, and most of the rest was provided by local governments and enterprises in term of “PPP” (Polluter-Pays-Principle).
- ② The total fund of the Tenth-Five-Year Plan was 25.6 billion yuan. Besides 10.8 billion yuan for pollution control investment in the South-to-North Water Transfer Project, the rest was raised by local governments, with appropriate support from the Central Government.
- ③ The total fund of the Tenth Five-Year WPPCP for HRB in Henan Province was 5.6 billion yuan. According to the Henan Plan, the local governments and related enterprises were obligated to provide financing, and the Central Government and the Henan Provincial Government would give appropriate support. The situation was similar in Anhui Province. The provincial governments here also supply policy support.
- ④ However, in the Tenth Five-Year WPPCP for HRB in Zhengzhou City, the first funding source was stated as “resorting to the national investment planned for the Tenth FYP by arranging large environmental improvement projects into the investment plans of NPDC in order to guarantee the funds for environmental improvement projects”.

4.2 Analysis

There might be very complicated reasons for unfulfilled targets of water quality, total discharge control and projects for water pollution prevention and control in HRB. This research analyzed the underlying reasons from planning, implementation, policy and institutional aspects in order to put forward advices for further improvement.

4.2.1 Problems in planning

4.2.1.1 Complexity and difficulty of water quality improvement seriously underestimated

Based on the functions of the river, water quality is clearly the ultimate target for water pollution prevention and control. It is the basis for establishing the total pollutant discharge control targets and taking relevant abatement and management actions.

Due to the impact of human activities, at least seven factors affect the water quality in the river.

- ① The discharge level of industrial pollution sources;

- ② The discharge level of urban domestic pollution sources;
- ③ The discharge level of agricultural non-point pollution sources;
- ④ Method and level of manual flux regulation in the river;
- ⑤ Natural precipitation;
- ⑥ Background water quality;
- ⑦ Self-purification of the water body.

Among the factors listed, the first four depend on human activities while the rest are determined by natural conditions. The WPPCPs for HRB mainly controlled the first four factors under full consideration of natural conditions and environment limits.

The discharge level of agricultural non-point pollution sources is out of control. The Ninth and Tenth Five-Year WPPCPs for HRB actually aimed at controlling industrial and urban domestic pollution sources. But the pollution status of agricultural non-point pollution sources is still out of reach.

In various WPPCPs, no specific data about the contributions of agricultural pollution sources to the water pollution in HRB. The Henan Plan stated that domestic wastewater and agricultural pollution sources were among the main reasons for ammonia nitrogen pollution in the rivers and lakes. The Zhengzhou Plan recognized that non-point pollution sources took 17.5% of the total pollution loads of the Huai River in Zhengzhou, but had no planned projects and investment arrangements for non-point source control. In the Tenth Five-year WPPCP, the total discharge of COD was divided to 63% and 37% for domestic and industrial sources respectively, without mentioning non-point sources. However, it was the same plan that required to invest 390 million yuan in 6 projects of combating the non-point source pollution in the Nansi Lake. It demonstrated that rural non-point sources could not be neglected.

Flux regulation is always difficult. In HRB, rainfall amounts apparently change with the seasons so that many dams and sluices have been built up to contain water for agricultural irrigation. According to the statistics of MWR, there were 5,427 sluices in HRB by the year 2002. [39] To relieve seasonal water shortage, the discharge quantity of some sluices for preventing pollution in certain reaches of the Huai River, was to be regulated according to the Ninth Five-Year WPPCP for HRB. The Tenth Five-Year WPPCP for HRB has prescribed MWR's responsibilities, which included reinforcing the regulation of the sluices for preventing pollution and increasing eco-environmental water utilization, but not all the measures actually took effect. In consideration of feasibility, the Tenth Five-Year WPPCP for HRB did not prescribe the requirements for water quantity regulation. The variation of flux could affect the impact of water quality improvement measures, so setting water quality targets without flux regulation will not permit flexible adaptation of regulations to changing hydrological and other circumstances.

Among the seven factors determining water quality, only industrial and domestic pollution sources are controlled according to the current WPPCPs. It is difficult to achieve water quality targets through implementing such plans, not to mention that the capability for industrial and domestic pollutants control are still far from adequacy.

[39] Ou Zhengtao. Investigate Furtively into Huai River. Xinhua Publishing House, Beijing. Jan, 2005. P37.

Therefore, it is not surprising to see the fact that water quality targets in HRB have not been achieved.

The total discharge control targets set by the Ninth Five-year WPPCP were too ambitious, reflecting that the governments at all levels and research institutes underestimated the time-consuming, tough, complex and difficult features of water pollution prevention and control in HRB. It has to be admitted that the over optimistic objective of turning the Huai River clean by the end of 2000 was rather a political goal than a decision based on sound scientific studies and accurate statistical investigation.

4.2.1.2 Information basis for planning distorted

The statistical data were often confusing and distorted, which made it difficult to make rational and feasible plans. For example, the total discharge data in the Tenth Five-year WPPCP were 1.87 times of the SEPA's report about the completion status of the Ninth Five-Year WPPCP for HRB, and 2.65 times of China Environmental Yearbook 2001. The data distortion embarrassed the Central Government and all local governments when making decisions and created many difficulties when making the Tenth Five-Year WPPCP for HRB.

The failed targets and confusing data for the Ninth Five-year WPPCP for HRB posed a serious question on how to evaluate the Tenth Five-year WPPCP and implement the Eleventh Five-year WPPCP. The reasons for the huge disparity of statistical data may include the following factors:

First, the confusion of data related to total discharge control revealed the fact that all levels of EPBs, and especially for SEPA, had lost control of the information about pollution sources in HRB. Also, the provisions of pollution source management and reporting in the Law on Prevention and Control of Water Pollution have not been carried out.

Second, the domestic wastewater discharge was seriously underestimated, which could cause data distortion. It was estimated that the domestic COD discharge would take up a third of the total domestic COD discharge at the end of the Ninth FYP. However, the actual domestic COD discharge has soared to two thirds by the end of the Tenth FYP, almost twice the Ninth Five-Year WPPCP for HRB and with an increase of over 300,000 tons.

In addition, the plans did not accurately define the discharge and the river input. The calculation of river input lacked precision and reliability and SEPA has been unable to completely monitor the river input so that the river input reduction target was impractical.

Finally, as mentioned before, the plan targets have only focused on industrial pollution sources and domestic pollution sources. The non-point pollution sources, whose contribution to the total discharge is still unknown, have not been included in the total discharge control targets, and lack powerful regulation and control.

The fact that some official publications released the inauthentic data greatly impaired the credibility of the official statistical data, and impaired the Government's authority.

4.2.2 Problems in implementation and evaluation

The monitoring sections set by the plans and those for evaluating the water quality after implementing the plans were not consistent in quantity and location, so the water pollution status could be reflected, but the performance of implementing the plans could not be easily deduced.

The capacity building Part in the Tenth Five-Year WPPCP for HRB requires the automatic monitoring of key industrial enterprises, inter-provincial sections and mainstream sections, information capacity building and so on. Based on the projects' progress in Jan 2005, fully funded projects for capacity building took up only 16.9%. These projects should have been given priority and the fund sources for these projects should have been secured in order to implement them timely and completely.^[40]

Water quality is regarded as a key indicator for implementation assessment in both the Ninth and Tenth Five-Year WPPCPs for HRB. However, no specific water quality evaluation method, such as frequency of monitoring, statistical methods and so on, has been adopted so that there have been different ways to assess fulfillments.

The Method of Evaluating the Implementation of Responsibility System (2005-2010) of Prevention and Control of Water Pollution of Huai River Basin (Trial)^[41] and The Method of Notifying the Water Environment Situation of Cities in Huai River Basin (Trial)^[42] by SEPA in 2005 specifically prescribed the evaluation method for evaluating cross-sections of urban water quality, including the method for estimating the influence of input water quality.

The evaluation method offered a specific basis for assessment. But according to the method, the data from monthly monitoring inter-provincial sections without automatic monitoring stations cannot be representative so that they may affect assessment results. Besides, the requirements for evaluating the attainment of standards set by the Method are not stringent.

The evaluation method prescribes the scoring method for a pollution control project (10 points), water quality (40 points), total discharge control (10 points), synthetic control (20 points) and environmental management (10 points). The standards for evaluating the attainment of the objects seems available, but the difficulty in operating such standards will still exist. First, it is a problematic to get reliable and credible data about the amount of pollutants discharge and river input. Secondly, due to the inconsistency and irrelevant of the targets of water quality and pollution reduction failure to take water quantity into consideration, even if the targets of water quality are not attained, it is difficult to determine who should take the responsibility, so the accountability is likely unclear.

The supervision and administration system in the Tenth Five-Year WPPCP for HRB still follows a top-down model, which means that superior governments supervise lower

^[40] SEPA. The Water Pollution Tenth-Five-Year Plan of Prevention and Control of for the Huai River Basin, A Collection of the Tenth-Five-Year Plan of Water Pollution Prevention and Control for "Three Rivers and Three Lakes", Chemical Industry Press. September, 2004

^[41]SEPA. The Method of Evaluating the Implementation of the Responsibility Documents (2005-2010) on Water Pollution Prevention and Control for the Huai River Basin (Trial), December 12th, 2005.

^[42]SEPA. The Method of Water Environmental Status Bulletin of Cities in the Huai River Basin(Trial), December 12th, 2005.

level ones, and superior supervision authorities supervise lower levels. In the situation of asymmetric information, it is hardly effective to carry out top-down supervisions. Focusing attentions on environmental status of the Huai River, the public and the media will exaggerate doubts for government implemental ability when no accurate and credible information is announced.

Public participation should be stressed in formation and implementation of WPPCPs for HRB. Procedures have to be established to ensure that the public can participate in the whole process of planning and implementation and reach consensus on planned targets. Public supervision for the implementation of the plans can effectively reduce the supervision costs of the Government and improve the performance.

4.2.3 Planning should be a measure of policy implementation

4.2.3.1 Relationship between policies and plans

It is necessary to clarify the different roles of policies and plans of water pollution prevention and control and the relationship between policies and plans in order to better implement WPPCPs and realize the objectives of water pollution prevention and control. The policies concerning water pollution prevention and control in China, including the laws, regulations and rules, usually give general and simplified provisions and requirements, seldom prescribing specific measures and detailed provisions about how to implement them. Although WPPCPs are governmental decisions, they are about implementing policies rather than making policies. Policies pose requirements and principles while plans are implementation measures which extend and specify the laws, regulations and rules. If plans remain to be general policies, only repeating the principles and requirements of policies and lacking operational instructions, they can not function well and hence the planned targets can not be fulfilled.

The Ordinance issued by the State Council restated the all-round requirements for water pollution control in HRB as stated in the laws, without any specific provisions for how to implement them. The WPPCPs for HRB made by the central and local governments should play an important role in providing specific measures for implementing those laws and regulations, unfortunately, they failed to put forward practical and operational measures.

4.2.3.2 Policy choice and improvement

Through several years of development, the policy systems for water pollution prevention and control have taken shape. However, facing numerous policy options, one should choose the most effective policies and highlight them in the plans, and stipulate specific measures for implementing them with assistance of other instruments. This research suggests that discharge permitting, fiscal investment and price policies based on total discharge control might be the pivotal policy alternatives.

Both the Law of Water Pollution Prevention and Control and the Ordinance stipulated clear requirements for total discharge control and discharge permit. In the WPPCPs, total discharge control is also one of the most important targets. Considering the fact that pollution source control is and will be the most important and tough task for water pollution prevention and control in HRB, discharge permitting scheme would be

the core policy in the WPPCPs and should be the most important measure for implementing the plans.

There are reasons for emphasizing discharge permitting scheme in WPPCPs. First, it directly targets the pollution sources. Second, it can only function well based on division and allocation of total discharge control targets. Third, its implementation relies on the support of other policies, such as environmental impact assessment, discharge levy, industrial restructure and so on. These policies should be based on and supportive to the discharge permitting scheme, rather than isolated instruments.

Fiscal investment policy is another policy that needs to be clarified in WPPCPs. In the current WPPCPs, although the total demand of funding for water pollution prevention and control was estimated, there were still something missing: (1) Amount and ratio of fiscal funds and commercial funds were not clarified; (2) Amount and ratio of fiscal funds of various levels of Governments were not clarified; and (3) There was no provisions about how to inspect the fiscal investment. Compared to commercial funds, fiscal funds should be more accountable, more rigid, and playing double roles in correcting market failure and creating new markets. Fiscal funds are of significance also because they secure public services. If fiscal investment can not be guaranteed, one can not expect adequate public services solely supported by commercial funds which are always profit-oriented.

To attract commercial funds for water pollution treatment, the Sixth Provision of Supervision, Administration and Measure in the Tenth Five-Year WPPCP for HRB refers to establishing sewage and garbage treatment levy systems in the four provinces, increasing the prices for sewage and garbage treatment levy, promoting industrialization of sewage and garbage treatment, and attracting social funds for municipal sewage and solid waste treatment facilities. The Tenth Five-Year WPPCP for HRB also required enterprises to raise funds by themselves for industrial pollution source treatment.

As discussed before, WPPCPs should not repeat the requirements and principles of relevant laws and regulations. Instead, they should function through stipulating specific operational levy policies to promote market oriented sewage and solid waste treatment.

4.2.4 Problems in administrative institution

The objectives of WPPCPs for HRB failed to be accomplished, thus exposing the problems in the administrative institution for water pollution management of the central and local governments. Researches have suggested that administrative institutional reform for basins would be the fundamental solution. Our research argued that administrative institutional reform for basins was important, but very time consuming and difficult. In fact, under the current institution, through preparation and implementation of WPPCPs, relationships within the governmental administrative institution could be better coordinated so that progress could be made for water pollution prevention and control.

4.2.4.1 Relationship between the Central Government and Local Governments

The central government should play an important role in managing such a transboundary river basin as HRB. As early as in January 1988, the State Council approved to establish the Leading Group of Water Resource Protection for HRB. The Ordinance stipulated that the Leading Group takes responsibility for the coordination and

settlement of major issues concerning water resource protection and water pollution control in HRB. It is also responsible for supervision and inspection as well as other duties authorized by the State Council. The organizations as group leaders are SEPA and MWR, while the governments of four provinces are vice group leaders. The office of the Leading Group has been set up in HRWRPB.

The establishment of the Leading Group not only reflected the leading role of the central government, but also reflected the relationship between the central and local governments. However, during the process of plan making and implementation, the role of the Leading Group seemed be confined to providing general guidance and inspection. For example, the Tenth Five-Year WPPCP for HRB prescribes that SEPA and related departments of the State Council will annually organize assessment in order to ensure the completion of the targets and tasks, but there are no provisions for how to deal with the situation that the local governments fail to complete their tasks.

The Ordinance regulated that the provincial governments were responsible for water environmental quality in their jurisdiction. The Tenth Five-Year WPPCP for HRB also stated the responsibilities and obligations of the provincial governments. However, this principle was not translated into corresponding provisions, measures and binding requirements in the plan. Actually, the provinces delegated the responsibility to municipal and county governments, who had more motivation to pursue self-interest.

4.2.4.2 Coordination between environmental protection and water resource departments

Though there are several departments involved in water pollution prevention and control for HRB, it is apparent that environmental protection departments and water resources departments are the two most direct players. It can explain why SEPA and MWR are the two leader organizations of the Leading Group. However, the two players seem not in harmonious relationship. The water quality monitoring is a good example.

Water Quality Monitoring in HRB and Coordination between Public Sectors

The water quality monitoring for HRB is mainly the responsibility of the environmental protection sector and water resource sector. Due to inconsistent setting of monitoring sections and different monitoring frequency of the two sectors, lack of information sharing, and conflicting sectoral interests, the water quality information is in chaos, embarrassing the evaluators and policy makers. The Law on Water Pollution Prevention and Control regulates that water resource protection authorities for the key river basins identified by the State are responsible for monitoring the water quality status at the provincial boundaries and reporting the monitoring results to the environmental protection administrative department and water administrative department under the State Council. If there are water resource protection leading organizations for the basins, the monitoring results should also be reported to the leading organizations timely. The Water Law stipulates that water administrative departments and basin management authorities above county level should be responsible for water quality monitoring for water functional regions. If the total discharge amount is found exceeding the control targets, or the water quality does not reach the required standards for prescribed functions, the information should be reported to related governments and actions be taken to control the situation. The information should also be reported to the environmental protection

administrative departments. The sixteenth item in the Ordinance stated that HRWRPB is responsible for monitoring the water quality at the boundaries of the four provinces and reporting the monitoring results to the Leading Group. According to the above mentioned laws and regulations, HRWRC is responsible for water monitoring in HRB and reporting the monitoring results to SEPA. However, the setting of water quality monitoring sections in WPPCPs did not involve HRWRC. SEPA basically does not use the monitoring data of HRWRC, instead, it builds up its own monitoring capacities. Lack of cooperation between the sectors not only causes waste in public resources, but also causes confusion of information.

It is also apparent that successful water pollution prevention and control for HRB relies on sincere cooperation between environmental protection and water resource departments, because the basin management authority is responsible for water quality monitoring, and the water resource departments are responsible for water resource regulation, which has direct impact on water quality. Without the participation of the water resource departments, it is impossible to achieve water quality targets. On the other hand, if the water quality can not be improved, the function and value of water resources could be decreased remarkably. Therefore, there are mutual interests between the two sectors.

In the Ninth and Tenth Five-Year WPPCPs, water resource regulation was touched upon but without concrete operational measures, especially without serious collaboration between the two sectors.

4.2.4.3 Coordination between environmental protection departments and general departments

Due to the special nature of planning, it is also very important that the environmental protection departments coordinate with the general departments, especially the development and reform departments and fiscal departments. First, all the investment and construction projects in WPPCPs have to be approved by related departments according to the arrangements of governmental functions. Second, the price and levy policies in WPPCPs should be approved by development and reform departments. Third, the funds for implementing WPPCPs should be approved by fiscal departments.

The preparation and implementation of WPPCPs needed full participation of the general departments.

The Case of Wangxin Zhuang Wastewater Treatment Plant^[43]

Wangxin Zhuang Wastewater Treatment Plant (WWTP) along Jialu River, can demonstrate that unsynchronised operation of pollution control projects can lead to the failure of water quality improvement. WWTP, located in the southeast part of Zhengzhou City, mainly treats the municipal wastewater (also the industrial wastewater discharged into the sewer system) in the southeast area of the city and new district of Zhengzhou city and discharges treated water into the Jialu River, a secondary tributary of the Huai River.

^[43] School of Environment and Natural Resources of Renmin University of China, and Norway Econ Institute. Main Report on Economic Assessment of Environmental Impact, SEPA and Norway Development and Cooperation Programme. May 2005

The Jialu River joins the Shaying River in Zhoukou City, Henan province. As one of the biggest wastewater treatment plants and in Huai River Basin, WWTP was operated in 2001. Its wastewater treatment capacity reached 110 million tons a year in 2003. COD concentration of input water was 499.86mg/l and COD concentration of output water was 41.90mg/l. It meant that it could annually dispose 50,833 tons COD. WWTP is the project built according to the Ninth-Five-Year Plan and well operated as planned at present. With no natural runoff and the upper stream blocked, the Jialu River actually has no clean water source. As a result, the Jialu River has effectively become the drainage of municipal wastewater of Zhengzhou City, with the water quality inferior to level V. Even through secondary treatment, the water quality is still worse than level V, Environmental Quality Standard for Surface Water. It manifests that if wastewater in other reaches of the Jialu River have not been treated, the pollution discharge control targets for Jialu River can never be achieved solely by the operation of WWTP.

Chapter 5 Recommendations

According to the comprehensive evaluation and analysis, a few recommendations are given below for improving the preparation and implementation of water pollution prevention and control plans for HRB.

1. Formulate Water Pollution Prevention and Control Strategy for HRB and Set up Targets for Different Stages

The analysis on the preparation and implementation of WPPCPs for HRB manifested that water quality improvement is unlikely to be accomplished in a short period of time; rather, it takes time and efforts to achieve the goal. This research suggests that, before incorporating water resource management into integrated water pollution prevention and control systems, total discharge control should be taken as the enforceable targets for WPPCPs, while water quality only be taken as reference targets. It is no doubt that after the pollution sources are under control and integrated water pollution prevention and control systems established, water quality could be an enforceable assessment targets for WPPCPs. Detailed suggestions are as follows:

- (1) Since the Eleventh FYP, not only five-year plans, but also Water Pollution Prevention and Control Strategy for HRB (hereinafter referred to as HRB Strategy) for the period 2006-2020 are to be prepared.
- (2) In the whole HRB Strategy, uniform water quality targets should first be defined consistently, including the targets for the mainstream, branches, reservoirs and drinking water sources. Second, degressive total discharge control targets should be applied. Third, discharge permitting should be taken as the key measure. Finally, objectives and focuses for each FYP should be clarified.
- (3) In the Eleventh Five-Year WPPCP, as non-point source pollution control and flux control could not be integrated into water pollution prevention and control for the whole basin, it is not realistic to use water quality targets as enforceable assessment targets for implementing the plans. Instead, they can still be taken as reference indicators. The main objective during this period is to realize total discharge control targets for point sources, including industrial and domestic sources.
- (4) In the Twelfth Five-Year WPPCP, non-point source pollution prevention and control can be incorporated, and meanwhile water regulation can be taken into consideration. The main objective for this period is to realize total discharge control targets for all the pollution sources, including non-point sources, industrial and domestic sources. Water quality targets can still serve as reference indicators.
- (5) In the Thirteenth Five-Year WPPCP, integrated water pollution and water resources management is to be established and water quality will become enforceable assessment targets for WPPCPs.

2. Recommendations on plan making

- (1) The main role of WPPCPs should be defined as implement and enforce national laws and policies on water pollution prevention and control. WPPCPs should be

operational.

- (2) It should be stressed that discharge permitting based on total discharge control is the main measure to implement WPPCPs. The WPPCP issued by the State should allocate the total discharge control targets to the main pollution sources in the basin through discharge permits, including municipal sewage treatment plants, industrial discharges and industrial restructure projects.
- (3) In each five-year WPPCP, straightforward relevance should be built between the targets for total discharge control, abatement (projects), funds, institutions (discharge licensing system), and supervision in the plans. That is, total discharge control targets should be determined by the construction investments and operational costs which can be secured; each pollution source shall discharge pollutants according to the requirements set by discharge licensing; and environmental protection departments at all levels should have the capacity of obtaining accurate information about pollutant discharge and supervising and checking the pollution sources.
- (4) The current total discharge control targets are only set for the last year on a five-year basis, while no targets are available for the reduction in each year. Since total discharge targets are better to be met by successive efforts made year by year, it might be sensible to set total discharge control targets for each year to avoid harsh efforts made towards the end of the five-year.
- (5) After the plans stipulated the total discharge control targets for each year, targets for shorter periods may still be necessary taking into account of flux variation in dry and wet seasons and seasonal production features of some enterprises so that aggregated discharge from pollution sources can be controlled at lower risk level. Correspondingly, discharge permits based on total discharge control targets should keep consistency with the targets at the same time scale. It needs to be pointed out that, at present, total discharge targets are set for the last year of every five-year period, which is not in parallel with monthly or more frequent monitoring for water quality and pollution sources. It is an institutional failure causing inability of total discharge control to meet water quality targets.
- (6) Due to lack of capacity for monitoring pollutants entering the rivers, the targets for controlling pollutants flowing into the rivers are not feasible. Whereas discharge from pollution sources determines the amount of pollutants entering the rivers, as long as discharge is reduced, the amount flowing into the rivers is certainly reduced. It is suggested that inflow pollutant amounts should not be taken as control targets, while they can serve as a reference indicator extrapolated according to discharge amounts. Efforts should be focused on the control of discharges to realize total discharge control targets.
- (7) Taking total discharge control targets as enforceable targets will facilitate the assessment of plan implementation and can avoid the ambiguity when using water quality to assess the effects of implementation, which means that when water quality targets are not met, one can not tell who should assume responsibilities. For environmental protection departments, the total discharge control targets highlight the emphasis of current water pollution prevention and control in the whole basin and clarify responsibilities.

3. Recommendations on Funding Sources and Use of Funds

Availability of funding determines whether the plans can be implemented. At present, the plans at different levels do not clarify the financing sources. For example, the Tenth Five-year WPPCP for HRB required a total investment of 25.59 billion yuan. 10.83 billion yuan was stated to be for those projects listed in the plan for diverting water from south to north, and the remaining 14.76 billion yuan was to be raised by the local governments with “appropriate” support from the State. However, it was not clear which level should be responsible for raising the funds, and what degree of support the State might give. Besides, the statement seems to exempt the enterprises from abatement responsibilities, which is contradictory to the mention that “the abatement funds for industrial enterprises should be mainly raised by themselves”. Therefore, this research gives the following suggestions:

- (1) In each five-year WPPCP, fund demand should be estimated according to the planned water pollution control targets and annual targets.
- (2) In WPPCPs, the sources of funds should be clearly stated according to abatement responsibilities of different levels of governments, enterprises and individuals.
- (3) The governmental funds of central, provincial, municipal and county levels should give support to those projects with the nature of public services. In addition, they should be used to accelerate and perfect the establishment of market-based mechanism and coordinate the differentiated abatement capacities between the upstream and downstream, as well as between different regions. Fiscal funds should be given to the projects which have outstanding public impacts and where raising funds is particularly difficult, but this support should be confined within a certain period of time.
- (4) Water pricing and levy policies should be improved and perfected to reflect the responsibility of enterprises and consumers and raise money for water pollution prevention and control.
- (5) In each five-year WPPCP, the following five indicators should be specified for annual assessment: (1) Appropriation rate of funds; (2) Project construction rate; (3) Project completion rate; (4) Operational rate; and (5) Discharge compliance rate.

4. Recommendations on Institutions

It has been a controversial topic about water pollution prevention and control administrative institution for HRB. This research argues that it would be more practical to take advantage of current policies, institutions and functions and bring the water pollution in HRB under control as soon as possible than endlessly debating the reform of administrative institutions.

- (1) To ensure authority, the national and local WPPCPs should be jointly prepared by the environmental protection administrative departments and the development and reform departments, and approved by the government at the same level.
- (2) Before incorporating water resource management into integrated water pollution prevention and control, the plans should specify the environmental protection

administrative departments at various levels as the main executive organizations, and authorize them the power of enforcement.

- (3) The plans should clarify the functions of HRWRC and HRWRPB, especially the functions concerning water quality monitoring and other functions relevant to water pollution prevention and control.

5. Recommendations on Implementation of the Plans

In order to gradually realize the objectives of water pollution prevention and control, strict enforcement is the most important. Historically and currently the WPPCPs are lack of supervision and management for enforcement. This research poses the following suggestions.

- (1) Design abatement projects according to the water pollution prevention and control targets for various periods.
- (2) Supervision and management on the enforcement of the plans should be strengthened.
 - (i) Planners and implementers must have the capacity of oversee pollutant discharge through pollution source monitoring systems and water quality monitoring systems, and
 - (ii) Discharge registration and permitting schemes should be established and implemented based on total discharge control targets as soon as possible.
- (3) It is urgent to allocate funds to promptly strengthen the capacities of integrated water pollution monitoring, which include: (i) the establishment of main pollution source inventory; (ii) online monitoring of main pollution sources; (iii) set-up of automatic monitoring stations on trans-boundary and key sections while taking full use of the current water quality monitoring capacities of water resources and environmental protection departments; (iv) strengthen the supervision and inspection capacities in the environmental departments at all levels. It should be clearly recognized that strengthened supervision and management of pollution sources is fundamental for whether the planned targets can be fulfilled and a very important component of law enforcement of environmental protection departments. Without pollution sources monitoring and control, it is nonsense to talk about either law enforcement and supervision, or the inspection of the implementation of the plans.
- (4) A complete and detailed discharge licensing system should be quickly established and seriously enforced. A pollutant discharge licensing system is the safeguard for total amount control, while the technical foundation of this system is still based on monitoring capacities. The environmental protection departments should strictly fulfil the basic duty of law enforcement and supervision. Based on solid pollution source monitoring and total amount control, they should ensure that the projects implemented bring about real discharge reductions and finally bring about the improvement of water quality in the whole basin.

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