

# The Present State and Challenges of Watershed Governance in China: A Study of Cases in the Taihu Lake Basin

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## 1. Water Pollution in China

China is faced with serious pollution of the water environment. The amount of industrial and household effluents has increased sharply as a result of economic growth, and the water pollution is preventing the adequate use of water resources. While the Northwest China suffers particularly from the shortage of river water, the drying of lakes and the desertification of land, the sustainable development of economy in the Southern China is restricted by the shortage of water due to the worsening of water quality. The solution of water pollution is taken as the most important challenges addressed by the environmental policies in the 11th Five-Year Plan for National Economic and Social Development that China prepared for the five-year period from 2006. Seeking the ideal of sustainable economic development, the Chinese Government implemented various institutional reforms and succeeded to a certain degree in controlling pollutants. However, the problem of pollution is still serious in China.

This paper discusses the water resource and environmental policies of China from the perspective of watershed governance with a particular reference to the Taihu Lake Basin. In this context, “watershed” is a general term used in reference to all kinds of land-based water circulation systems, which include not only river basins but also water catchment areas and lake basins. Watersheds, in this context, are characterized by the presence of a wide variety of natural and man-made water systems, such as of rivers, lakes, dams, irrigation water and underground water, and also by a hierarchical structure, extending from the upstream to the downstream, of various land-use patterns such as riverhead areas, agricultural areas, industrial areas, urban areas and coastal areas. Each watershed bounds a habitat of fish and other biological species or of a group of ecosystems, and thus, constitutes an independent unit addressed by environmental conservation policies. In relation to human activities and watershed communities, each watershed also bounds production activities. Industrial effluents from the upstream implant water quality in the downstream. The pumping of irrigation water in the upstream intensifies competitions over water resources in the downstream. Economic activities in human communities are closely interrelated through water circulation. Therefore, it is important that the upstream and the downstream are managed as inseparable parts of a single grouping of environmental resources.

According to a conclusive statement by Taniuchi (2009), the term “watershed governance” refers to a new form of watershed management

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(1) Taniuchi (2009) *Environmental Policies and Watershed Management* in Eitaro Wada (editorial supervisor) *Watershed Environmentology: Theory and Practice of Watershed Governance*, pp. 3-9; Kenji Otsuka (ed.) (2008) *Watershed Governance: Challenges in China and Japan and an Outlook on International Cooperation*, pp. 9-14

that combines a governance-oriented approach with a basic management approach for sustainable development. More specifically, this suggests that the pursuers of watershed management, such as residents, administrators, corporations, NGOs and researchers, are expected to share an overall vision concerning the soundness of water circulation and the acceptable environmental limit as macroscopic restrictive factors that need to be respected in order to ensure the sustainable development of the entire watershed. Combining this vision with perspectives on bottom-up initiatives from regional communities and autonomous initiatives, the pursuers of watershed governance try to establish the long-term sustainability of watershed communities through the effort to support the uniqueness and strength of each community and the effort to negotiate myriad interactions between human life and the environment, patiently trying to solve various problems. The concept of watershed governance, therefore, is built upon the concept of “watershed” as a reasonable unit of geographical expanse to be addressed by management policies, the concept of “sustainability” as something important to the perspective and objective of management, and the concept of “governance” as something related to the approach chosen by the pursuers of management.

Based on the result of a case study that targeted the Taihu Lake Basin, which serves as a hinterland for the eastern coastal region that holds Shanghai as one of the fastest developing cities in China, this paper analyzes and discusses various issues, such as institutional reforms concerning watershed management, vertical administration systems characterized by the independency of departments, conflicts and cooperation among regional governments in the watershed and the mechanism for the participation of stakeholders, to clarify the present state and challenges of watershed governance in China. There is a hypothesis that assumes an inverted U-shaped Kuznets

curve in the relationship between environmental degradation and economic growth. In the early stage of economic development, the environment is likely to degrade with the economic growth. However, the environmental degradation stops when the economy has developed to a certain degree, and the further economic development improves the environment. Communities in the Taihu Lake Basin seem to have just arrived at this turning point from environmental destruction to conservation as the growth of income has triggered a rapid strengthening of initiatives for preventing the further worsening of environmental issues.

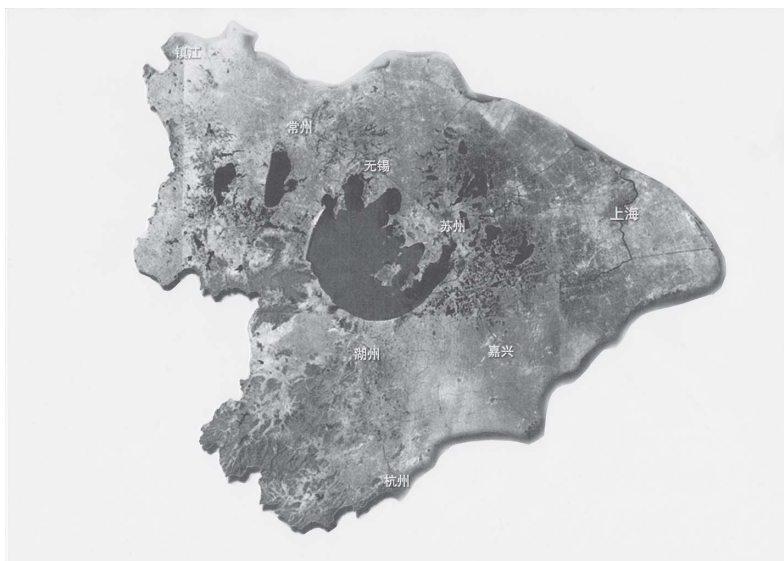
## 2. Outline of the Taihu Lake Basin

### (1) Rapid economic growth and related changes in the Taihu Lake Basin

Taihu Lake is a large shallow lake that forms a part of stream networks in the Yangze River Delta plain. This is the third largest freshwater lake in China, and is one of the five large freshwater lakes in the midstream and downstream sections of the Yangze River. The shoreline around the lake has the total length of 405 km. The average depth is 1.89 m. The lake bed is shaped like a shallow dish with an inclination from the east to the west. The Taihu Lake serves as a natural water reservoir, the most important source of water for surrounding regions. Around the lake, there are many scenic spots that attract tourists as well as many spots of cultural importance (Figure 1).

In terms of administrative divisions, the whole area of the Taihu Lake Basin is divided into three provinces and one city: Jiangsu Province (52.6%), Zhejiang Province (32.8%), Shanghai City (14.0%) and Anhui Province (0.6%). The Taihu Lake Basin holds major cities in the Yangze River Delta, and constitutes one of the most economically developed areas in China. The total population in the Taihu Lake Basin was 49.17 million in

Figure 1 The picture of Taihu lake basin



Source: Documents of Taihu basin authority of ministry of water resources

2007, which was only 3.7% of the population of China, but contributed to 11.6% of the country's GDP, and the per capita GDP amounted to 58 thousand yuan (approx. US\$7,500), which was 3.1 times higher than the national average.<sup>(2)</sup> The economic growth since the 1980s, however, brought about serious degradation of the environment. As the industrial structure changed greatly with the shifting of weight from the primary industry to the secondary industry and to the tertiary industry, people, with larger income, began to prefer the lifestyle of massive consumption. Regional communities went

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(2) Reference: *Taihu Lake Health Report 2008* compiled by the Taihu Lake Basin Management Bureau of the Ministry of Water Resources, Jiangsu Provincial Department of Water Resources, Zhejiang Provincial Department of Water Resources and the Shanghai Water Authority

through great transformations as a result of road construction, factory construction, housing land development, and so on. Such changes in the socio-economic systems adversely impacted ecosystems and the environment, degrading the quality of water in the Taihu Lake.

According to the water quality classification system used in China, the water quality degraded from Class II in the 1980s to Class III in the 1990s. The water quality further degraded from Class IV to Class V and even to Below Class V (worse than Class V) in the period from the end of the 1990s and to the early 2000s, and the water quality continues to be ranked Below Class V since 2003.<sup>(3)</sup> With heavy pollution, particularly of water in bays, the Taihu Lake is included in the list of most seriously polluted rivers and lakes in China.<sup>(4)</sup> The water in the Taihu Lake is found to be at the medium level of eutrophication. A massive appearance of algae in May 2007 degraded the quality of water at the drinking water intake spot for Wuxi City in the Meiliang Bay, causing a shortage of water supply (reported as “Wuxi Water Crisis”).<sup>(5)</sup>

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(3) The Environmental Quality Standard for Surface Water revised in 2002 (GB3838-2002) classifies the quality of surface water into the following five classes: Class I—water quality to be maintained at source areas and in nature conservation zones designated by the national government; Class II—water quality to be maintained in areas where the first class quality is expected from water for drinking and living use; Class III—water quality to be maintained in areas where the second class quality is expected from water for drinking and living use; Class IV—water quality expected from industrial water; and Class V—water quality expected from agricultural water, etc. “Below Class V” refers to water quality that does not even meet the criteria for Class V.

(4) Together with the Huai River, Hai River, Liao River, Chaohu Lake and Dian Lake, the Taihu Lake is in the list of most seriously polluted rivers and lakes (often referred to as “the Three Rivers” and “the Three Lakes”).

(5) Ping Xie (2008) *Historical Development of Cyanobacteria with Bloom Disaster in Lake Taihu*, pp. 114-130

- (2) Three aspects of watershed management—flood control, water utilization and environmental conservation

Thanks to warm and mild climate, the Taihu Lake Basin has been known from a long time ago by the abundant production of fishery products and rice. The spacious and shallow water areas of the Taihu Lake has served as an excellent habitat for a variety of fish to migrate, lay eggs and grow up. The Taihu Lake Basin is one of the most important freshwater fishery bases in China, and the output from fish farming has been growing in the area since the 1990s. The Taihu Lake plays an important role in the irrigation of the entire watershed, contributes also to the supply of water for living use and industrial use. The area, however, often suffered from floods in the past. Particularly serious were damages from floods in 1954, 1991 and 1999. The flood in 1999 flooded houses and buildings in a wide area that included major cities such as Huzhou, Jiaxing, Hangzhou and Suzhou, and reportedly caused the economic loss of 13 billion yuan.<sup>(6)</sup> Like river management in Japan, watershed management in the Taihu Lake Basin has the three objectives of flood control, water utilization and environmental conservation. Even though administrators have become more successful in meeting the objective of flood control, the problems of water quality degradation and water flow shortage tended to become more serious in recent years. The remaining part of this paper discusses the pollution of the Taihu Lake mainly from the perspectives of water utilization and environmental conservation.

- (3) Major causes of pollution

The control of pollution sources in the Taihu Lake Basin still faces many

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(6) This was mentioned at a hearing at the Taihu Lake Basin Management Bureau on September 2, 2009.

problems. The industrial effluent treatment ratio in the entire Taihu Lake Basin has reached 70% by 2006, but the household effluent treatment ratio remains at the level of 20%. Moreover, the rapid economic growth has been producing a sharp increase in the amount of industrial and household effluents. According to statistics of 2006 from Jiangsu Province, the discharge intensity of industrial and household effluents in the province is 9 times higher than the national average, while the discharge intensity of COD is 6.1 time higher and the COD ratio as against the water resource availability is 3.6 times higher. Since the 1980s, a rapid increase in the average amount of pesticides and chemical fertilizers used by farmers improved the productivity of agriculture, but caused a major flow of nutrient salts (nitrogen, phosphorus, etc.) and organic substances that serve as nutrients for photo planktons. Similarly, while the employment of innovative techniques by the fish farmers (e. g. for the raising of crabs) brought much profits to them, but the chaotic and excessive pursuit of fish farming activities has gone beyond the acceptable environmental limit and seriously harmed the water resources of the Taihu Lake.<sup>(8)</sup>

### 3. Challenges to Water Resource Management and the Need for Institutional Reforms

- (1) Vertical administration systems, administrative overlaps  
and regional protectionism

Water resource management requires holistic and general perspectives.

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(7) COD (chemical oxygen demand) is an index based on the chemical measurement of organic substances in effluents.

(8) Reference: Shenquan Huang, Lachun Wang, Chao Gao and Yunliang Shi, et al. (2008) *Study of Water Resources and Water Environment in the Taihu Lake*, Chapters 5, 6 and 7



In reality, however, the watershed management in the Taihu Lake Basin is complicated by overlaps and blanks of administrative authorities held by different regional governments and administrative departments, and made more difficult by various harms from vertical administration systems, administrative overlaps and regional protectionism. Typical harms from vertical administration systems and administrative overlaps, the division of authority on the basis of various distinctions (e. g. cities vs. rural areas, surface water vs. underground water, flood control vs. water utilization, different purposes of water utilization, water quantity vs. water quality) has served as a cause of conflicts among different departments and also of inconsistencies among the policies of different departments. The discharge of pollutants, for example, is controlled by many authorities including the Taihu Lake Water Pollution Prevention Committee, Jiangsu Province Environmental Protection Bureau, environmental protection bureaus of Suzhou City, Wuxi City and Changzhou City, and the environmental protection bureaus of larger county-municipality level administrative bodies that govern these three cities, presenting the typical problem of administrative overlaps. The discharge of pollutants by boats is controlled by the municipal maritime bureaus of the three cities, presenting the problem of vertical administration systems.

Even in other administrative domains, there are many conflicts and inconsistencies of policies between a department of the national government and a similar department of a regional government. It has been reported, for example, that the environmental protection bureau of a regional government, in pursuit of profits for the region, sometimes has ignored or violated the policies of the Ministry of Environmental Protection of the Republic of China. In China, people say, “Policies from the above are met with counter-

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(9) Reference: Maohong Bao (translated into Japanese under the supervision

policies from the below”. Thus, each regional government tends to attach a higher value to economic profits to the region from the economic growth than to the conservation of the environment and the prevention of pollution in the entire Taihu Lake Basin.

(2) Initiatives around specific issues

The national and regional governments are equally eager to prevent water pollution and have begun to implement various projects. However, in the face a rapid socioeconomic development, it is hard to deny that the governments have been rather slow in strengthening the control of water pollution because they have been fully occupied with the administration of cures to existing problems. For example, a document titled “On the State Council’s Decisions about Some Environmental Protection Issues,” produced by the State Council in August 1996, announced the policy of “One Target for Reduction and Two Targets for Achievement”. The “One Target for Reduction” referred to that each province, autonomous region and provincial capital should reduce the gross output of major pollutants to a level within the quota established by the national government by the end of 2000. The “Two Targets for Achievement” referred to that, also by the end of 2000, the gross output of pollutants from all industries should be reduced to meet the national or regional standard, and that the air and surface water quality should be improved to meet the national standard at 47 designated environment-protected cities.<sup>(10)</sup> Jiangsu Province achieved the industrial pollutant re-

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of Hideki Kitagawa) (2009) *Environmental Governance in China and Environmental Cooperation in the Northeast Asia*

(10) These include direct-controlled municipalities, provincial capitals, municipalities with a special economic zone, coastal open cities and major tourist cities.

duction target by the end of 1997 in the Huai River Basin, by the end of 1998 in the Taihu Lake Basin, and by June 1999 in the Yangze River Basin. However, the total quantity of effluents including household effluents has hardly decreased. Combined with the impacts of worsening of water pollution in the upstream, this has caused the water quality in the Taihu Lake to go on worsening even after 2000.<sup>(11)</sup>

Another example is a project for bringing water from the Yangze River to the Taihu Lake. The purpose of this project, which began in September 2001, was to bring the less-polluted water of the Yangze River to the Taihu Lake via the Wangyu River. This was expected to speed up the exchange of water in the Taihu Lake and increase the mobility of water, strengthening the self-purification capability of the lake and increasing the supply of water to the downstream and to the surrounding regions and improving the water quality and environment in the Taihu Lake and the stream networks along the watershed. Even though that this project reportedly has contributed to the purpose of increasing the water supply, it is also reported that the project caused the worsening of water quality as far as the quantities of certain organic substances are concerned.<sup>(12)</sup> Moreover, the project was implemented without considering much about its impacts on the entire ecosystem, and the actual impacts remain unknown.<sup>(13)</sup>

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(11) Masayoshi Nakao, Xin Qian and Yuejun Zheng (ed.) (2009) *Issues around the Water Environment in China: Water Shortage as a Result of Development*, pp. 89-98

(12) Ping Xie (2008) *Historical Development of Cyanobacteria with Bloom Disaster in Lake Taihu*, pp. 92-113

(13) This was mentioned at a hearing conducted on September 2, 2009, at the Taihu Lake Basin Management Bureau in Shanghai, a local branch of the Ministry of Water Resources of the People's Republic of China.

- (3) Amendment of the Water Law and the initiatives toward harmony among administrative departments for watershed management

Faced with a number of problems that complicate water resource management like those mentioned above, China has been making various efforts for institutional reform. In 2002, the Chinese government amended the Water Law of the People's Republic of China (1988; hereinafter referred to as "the Water Law") that established the basic rules of water resource management, and reestablished the laws and legal frameworks for watershed management, covering topics such as the development, utilization and protection of water resources. As the first important change, collective agricultural and economic organizations that owned reservoirs and dams used to claim the ownership of water resources held in them, but the ownership of all such water resources came under the national ownership after the amendment. Representing the nation, the State Council of the People's Republic of China exercises the ownership of water resources, which, as a general rule, is not transferred to regional governments. This is meant to serve as a restraint to the regional protectionism.

As the second important change, the amendment facilitated the combination of watershed management with administrative division based management. Before the amendment, under the earlier scheme known as *regional and national department based management*, various regional governments at different orders and each administrative department of the national government had their own authorities. This caused the split of the watershed into administrative divisions, as well as inconstancies among the measures taken to address different administrative issues. After the amendment, watershed management became easier because a watershed management organization was established for each of the important rivers and lakes designated by the

national government, and each such organization became responsible for management and supervisory duties in the area that came under its jurisdiction. However, the problems of vertical administration systems still remain because each of these watershed management organizations is only a local branch of the Ministry of Water Resources, and is not given an authority to negotiate the conflicts of interests in the watershed. During the planning for the amendment, some people asserted that there should be an organizational framework for unified management of the entire watershed. The idea was to establish a committee for general management of water resources in the watershed, which should be staffed by representatives from different administrative departments of the State Council, representatives from the concerned regional governments, and representatives from major water user organizations. However, this idea was rejected, and in this sense, the institutional reform was rather incomplete. Under the new scheme of the administrative division based management, on the other hand, management organizations and authorities are assigned to different layers in the vertical structure, from the national government to county-level governments, to facilitate the implementation of governmental control (by the water administrative department) in each administrative division under the jurisdiction. Before the amendment, various harms from vertical and horizontal splits in administration systems came from the division of authority on the basis of various distinctions (e. g. cities vs. rural areas, surface water vs. underground water, flood control vs. water utilization, different purposes of water utilization, water quantity vs. water quality). The amendment triggered initiatives toward unified management by an integrated water administrative organization.

In addition to these reforms of legal and institutional structures, a system for requiring permission for the intake of water, a system for payment

against the use of water resources, and the concept of ecological-environmental maintenance water were introduced to promote the efficient use of water resources and environmental conservation. The amended law enabled the paid transfer of a water intake right acquired by a governmental permission. This new system is intended to allow the paid transfer of water intake rights among water users under the governmental supervision of water utilization. Each water user is allowed to use water according to an annually produced water utilization plan and has to pay a progressive penalty for any excess to the plan. While the imposition of penalty promotes modesty in the use of water, the control over water intake and the system for paid transfer of water intake rights promote the redistribution of water resources. In addition, the amended Water Law requires that the need for ecological-environmental maintenance water is well considered when planning the development and use of water resources. Specifically, this aims at the prevention of problems such as the loss of river water and serious damages to the ecosystem, the maintenance of adequate flows in rivers, the sustenance of adequate water levels in lakes, dams and groundwater systems, and the protection of self-purification capability of water bodies.

(4) Amendments of the Water Pollution Prevention Law  
and the strengthening of environmental regulation

Apart from the amendment of the Water Law, the Chinese government amended the Water Pollution Law of the People's Republic of China (hereinafter referred to as "the Water Pollution Prevention Law") in 1996 and 2008. These amendments introduced the concepts of watershed manage-

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(14) This is similar to the concept of river maintenance water in the context of river management in Japan.

ment and resident participation. To facilitate the solution of the problem of river pollution, these amendments emphasized the importance of watershed management, and authorized the environmental administrative department of the State Council to establish, with supports from the water administrative department and the concerned provincial governments, the standards concerning the water environment at the border of each province.

In addition, the amendments of the Water Pollution Prevention Law led to the establishment of an environmental impact assessment system,<sup>(15)</sup> a system for “Three Simultaneous Implementations”,<sup>(16)</sup> a system for payment against pollution,<sup>(17)</sup> and the following systems for strict environmental regulation:

- ① A system for responsibility over environmental protection targets and a system for examination and assessment. (Article 5)

Upon the determination of targets concerning the quality of water environment, a promissory letter must be produced and signed by responsible individuals as a means for strengthening their sense of responsibility. Each regional government and each responsible representative thereof should strive to achieve the water environment protection targets as an important part of their duties. The level of

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(15) The environmental impact assessment system ensures that a construction project is preceded by the assessment of environmental impacts from the project and the process for judging the acceptability of the project from the viewpoint of environmental protection.

(16) The “Three Simultaneous Implementations” refer to the need for simultaneous designing, construction and commissioning of the main facilities and associated environmental facilities in all new construction projects and in all construction projects for expansion or renewal.

(17) Payments are imposed as penalties against the violation of the standard, fines and other forms of charges. The payments made against pollution are saved to a special fund and are used for providing loans to corporations for use in pollution prevention measures.

achievement is examined and considered as one of the indicators used for assessing the performance of each regional government and each responsible representative thereof.

- ② A system for requiring permission for the discharge of pollutants. (Article 20)

Any corporation that directly or indirectly pollutes rivers by the discharge of pollutants must obtain permission for such discharge. This system is implemented under two different schemes. Under the first scheme, which concerns the discharge quantity, the maximum allowable gross discharge quantity is calculated based on the self-purification capability of the given water space, and this gross quantity is divided for distribution to corporations. Under the second scheme, a control target is determined without any direct reference to the self-purification capability, and the maximum allowable gross discharge quantity based on this target is divided for distribution to corporations.

- ③ A system for natural selection. (Article 41)

This is a system for accelerating the disuse of technologies, facilities, materials, products, etc., that seriously pollute the water environment, as if by the process of natural selection. The law prohibits the production, import, sales and use of such technologies, facilities, materials, products, etc., that are destined for disuse by natural selection.

- ④ A system for requiring action by a time limit. (Article 74)

This system is used to require an action against pollution by a certain time limit to a corporation that failed to meet the national standard on pollutant discharge. If the corporation fails to take a corresponding action before the time limit, the government may order it to close



down the factory, discontinue production activities or switch to different production activities.

#### **4. New Initiatives from Regional Governments, Corporations and Citizens**

Regional protectionism is strong in China. Regional governments often do not pay much respect to the environmental protection laws of the national government and the long-term environmental benefits for local residents, and they have even gone against laws in certain cases. Also in the domain of watershed management, executive organs of regional governments pursue various initiatives with strong discretionary powers. Therefore, our understanding of the reality of watershed governance in the Taihu Lake Basin will remain incomplete if we stop after learning about institutional reforms. We must proceed to study the reality of various initiatives pursued at the regional government level.

- (1) The relationship between economic development and environmental protection, and initiatives toward sustainable development

As one of the most prospering region in China, the Taihu Lake Basin maintained its economic growth at the sacrifice of the environment. This caused various cases of water pollution, which developed into major social issues. For example, the Wuxi Water Crisis in May 2007, temporarily rendered the tap water undrinkable to five million citizens of Wuxi City due to odors from the massive appearance of algae at the water intake, and all drinking water supplies in PET bottles reportedly disappeared from supermarkets.<sup>(18)</sup> In February 2009, in Yancheng City, the chemical pollution of wa-

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(18) Ping Xie, *op. cit.*, pp. 114-130

ter due to industrial waste caused the suspension of water supply to 200 thousand citizens for more than 60 hours, producing the economic loss of 11 million yuan (Yancheng Water Pollution Case)<sup>(19)</sup>. Apart from such cases, there are still many rivers that are cluttered with garbage, heavily polluted and produce odor.

Faced with such cases that developed into social issues, the chiefs of regional governments have begun to change their ideas about the relationship between economic development and environmental protection. The national government, under the administration of Hu Jintao, has already shifted from the earlier policy, which gave the highest priority to economic development, to the policy of sustainable development based on the Scientific Concept of Development and the concept of Harmonious Society. However, it is said that environmental protection policies are still often rendered powerless in the implementation stage due to regional protectionism. In the Taihu Lake Basin, some chiefs of regional governments have gradually begun to accept the concept of sustainable development. For example, Mao Xiaoping, National People's Congress member and Mayor of Wuxi City, stated as follows based on his conviction that economic development is not opposed to environmental protection: "Wuxi City makes much effort for protecting the environment because it seeks sustainable economic development, which involves economic development, higher income for citizens, environmental protection, modesty in the use of resources, and so on."<sup>(20)</sup> To accelerate the sophistication of industrial structure, Wuxi City ordered the closure (or relocation) of many factories that did not meet the expected standard. In addi-

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(19) Article dated June 26, 2009, on People's Daily Online (<http://env.people.com.cn>), accessed on September 20, 2009

(20) Mao Xiaoping's remark during a press interview as reported by an article dated March 14, 2008, in China Environment News.

tion, to revive the damaged ecosystems of the Taihu Lake, Wuxi City ordered the discontinuation of some fish farming businesses and has been trying to turn the water space, once used for fish farming, back into marsh.

(2) Committed efforts by regional governments

① Legislation by regional governments

In the Taihu Lake Basin, there are many environmental bylaws established by the initiatives of regional governments. Such local bylaws often complement national laws by stricter control or expanded scope, and therefore, are more demanding than provisions in the Water Law and the Water Pollution Prevention Law established by the national government.<sup>(21)</sup> For example, the Jiangsu Provincial Bylaw for the Prevention of Water Pollution in the Taihu Lake (Article 31) establishes provisions concerning the payment against the right of pollutant discharge in the Taihu Lake Basin and the mechanism for discharge trading. In August 2008, the first convention in China for discharge trading took place in Wuxi City under the arrangement of the Ministry of Finance, the Ministry of Environmental Protection and the Jiangsu provincial government. Five corporations concluded contracts respectively with the chiefs of environmental protection bureaus of five cities (Nanjing, Wuxi, Changzhou, Suzhou and Zhenjiang) concerning the pollutant discharge indices for the fiscal 2009.<sup>(22)</sup> Such an arrangement for dis-

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(21) This was mentioned at a hearing at the Wuxi City Water Resource Bureau on September 4, 2009. Examples of such environmental bylaws include the following: the Jiangsu Provincial Bylaws for the Prevention of Water Pollution in the Taihu Lake (amended on September 27, 2007; effectuated on June 5, 2008), the Jiangsu Provincial Bylaws for the Protection of Lakes (promulgated on August 20, 2004; effectuated on March 1, 2005), and the Wuxi Municipal Bylaws for River Management (promulgated on July 29, 2009; effectuated on October 1, 2009).

charge trading is expected to reduce the discharge of pollutants. The Wuxi Municipal Bylaw for River Management ensures that general directors of river management (“river masters”) are designated for each river to assume responsibility over the improvement of ecosystems and water environment along the river.

② River master system

Under the river master system, a chief governmental representative from each administrative layer is designated as “river master” to assume responsibility over the pollution of rivers under his or her jurisdiction. This is meant to strengthen long-term efforts for river pollution prevention and environmental conservation. The idea of the river master system was produced by the Wuxi municipal government after the Wuxi Water Crisis. The system ensures that the results of water quality sampling, conducted on the cross-sectional river profile, is taken as one of the indicators of the political performance of chief governmental representatives, obliges them to regularly report the water quality sampling results, and provides for thorough investigation on the accountability for any delay or refusal of reporting, or the reporting of false sampling results. Since the implementation of the river master system, the acceptability ratio of the results of water quality sampling, conducted on the cross-sectional river profile at 79 points in Wuxi City, improved from 53.2% in the beginning to 71.1% by March 2008.

Learning from the river master system of Wuxi City, Jiangsu Province introduced “two river masters system” to 15 rivers that run through the prov-

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(22) Article titled “Farewell to ‘Free Meal Service’: a New Arrangement for Payment against the Pollutant Discharge Right Begins in the Taihu Lake Basin” on China Jiangsu Online (<http://www.jschina.com.cn>), accessed on December 10, 2008

ince. Under the two river masters system, two river masters are selected for each river, one from the provincial government and another from the municipal government, and the two river masters cooperate with each other in different roles while sharing the task of solving the pollution of the Taihu Lake. Following the appointment of each river master, the reality of pollution of each river is studied and analyzed, and relevant measures toward the solving of pollution are planned. This process has already produced some positive results. The river master system has begun to spread by now to the watersheds of other rivers as well.<sup>(23)</sup>

### ③ Roles of the jurisdiction

In May 2008, exactly after one year from the Wuxi Water Crisis, a signboard, on which was written “Environmental Protection Trial Court,” appeared at the Wuxi City Intermediate Court (district court). The Environmental Protection Trial Court was opened based on the idea that, because the victims of environmental pollution tend always to be socially vulnerable citizens who lack an ability to protect their interests on their own, stronger initiatives for starting up lawsuits for the protection of the public interests in the domain of environmental protection would contribute to the conservation of unpolluted environment for ecosystems and to the protection of the legal rights of citizens. The number of environmental lawsuits has grown rapidly in Wuxi City during recent years, suggesting serious damages from environmental pollution suffered by the citizens. After the water crisis caused by the massive appearance of algae, the Wuxi municipal government committed itself to the solving of pollution problems as one of the most im-

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(23) Materials available at the web site of the Ministry of Environmental Protection (<http://www.mep.gov.cn>), accessed on September 20, 2009

portant challenges for the city, and approved the opening of the Environmental Protection Trial Court promptly after receiving a corresponding application from the Wuxi City Intermediate Court. While this is the second of such a court established in China,<sup>(24)</sup> this Environmental Protection Trial Court in Wuxi City is unique in expanding, for the first time in the country, the list of entities qualified to become a plaintiff in environmental lawsuits to include nonprofit organizations. The opening of such an Environmental Protection Trial Court is expected to contribute positively to the correction of the regional protectionism and to the honest execution of environmental protection responsibilities by administrative officers.<sup>(25)</sup>

In the court trial held over the Yancheng Water Pollution Case mentioned earlier, the court found the defendants guilty of the Crime of Releasing Hazardous Substances. This was the first time in China that a violator in an environmental pollution case was sentenced guilty of this crime. Immediately after the incident, Hu Wenbiao, Chairman of Biaoxin Chemical Company in Yancheng City, and Ding Yuesheng, Factory Director of the same, were arrested by the public security (police) on the charge of the Crime of Serious Environmental Pollution. However, the investigation by the prosecuting organ revealed that the suspects were well aware that the factory effluent contained toxic substances but continued to discharge it to a river without any treatment. Therefore, the two were rearrested on the charge of the Crime of Releasing Hazardous Substances. They were sentenced to penal servitude in prison, ten years for Hu and six years for Ding. In connection with this case, seven governmental officers were found guilty and each received

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(24) The first of such a court was established in November 2007 at the Guiyang Intermediate Court (district court).

(25) Article dated May 8, 2008, on People's Daily Online (<http://env.people.com.cn>), accessed on September 20, 2009

a corresponding sentence. In addition, four chief officers at the Yandu District Environmental Inspection Bureau and the Yancheng Municipal Department of Environmental Inspection for the Yancheng City Drinking Water Source Protection Area were prosecuted on the charge of the Neglect of the Occupational Duty of Environmental Inspector. This was the first time the prosecuting organ of Jiangsu Province filed a case on the charge of the Neglect of the Occupational Duty of Environmental Inspector. In addition to the severe punishment of concerned officers, the Yandu District government ordered the closure or relocation of 34 chemical companies in the district.<sup>(26)</sup>

#### ④ Initiatives of Shanghai City

Shanghai City is going to host a World Exposition from May to October of 2010. Since this is another major international event to be held in China after the Beijing Olympics, this is a major incentive, given the worldwide attention to China's environmental efforts, for the Shanghai municipal government to apply all means to improve the environment. Many environmental conservation projects are in progress to solve the pollution of the Suzhou River that run through Shanghai City and to control the eutrophication of the Dianshanhu Lake and restore the ecosystem. The water environment in Beijing City, was greatly improved by various initiatives that came along with the Beijing Olympics, such as the construction of effluent treatment plants, expanded use of recycled water, improvement of river management infrastructures, and stricter control of plane-source contaminants, garbage and drainages. This not only improved the city's environment to the Olym-

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(26) Article dated September 21, 2009 on the People's Daily Online, accessed on September 25, 2009

pics standard, but also prepared excellent water environment infrastructures beneficial to the city's further development in the future. We may expect a similar environmental benefit from the World Exposition (“Expo Effect”)<sup>(27)</sup>. While the national government has not yet achieved unified management by an integrated water administrative organization, the Shanghai municipal government has achieved unified management by the newly established Shanghai Water Authority. This is expected to resolve conflicts and overlaps among different water administrative departments of regional governments.

### (3) Introduction of scientific technologies

#### ① Construction of algae treatment plants

To remove large quantities of algae deposited on the bottom of the Taihu Lake, Wuxi City, located at the northeast of the lake, has developed technologies for separating and treating algae, and is now operating several algae treatment plants. Many algae collection teams have been organized in coastal communities around the Taihu Lake. Every day, the teams collect large quantities of algae from the lake and bring them to the treatment plants. After two treatment stages, algae are separated from water and processed into solids that can be recycled as fertilizers, etc. The water extracted from algae is purified and brought back to the lake or rivers.

These technologies for the separation and treatment of algae seem to be rather efficient measures for the massive treatment of algae that had multiplied in the past and for preventing harms in the future. Still, this is a very long project because it is expected to take at least 18 years before ecosys-

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(27) Reference: Maohong Bao (translated into Japanese under the supervision of Hideki Kitagawa) (2009) *Environmental Governance in China and Environmental Cooperation in the Northeast Asia*, p. 150



tems are restored to earlier conditions.<sup>(28)</sup>

② Construction of pump stations

To prevent the recurrence of the Wuxi Water Crisis, Wuxi City required additional sources for emergency use. Therefore, combining the aim of decreasing pollution by increasing the mobility of water in the lake and river with the aim of preparing additional sources of drinking water, Wuxi City constructed several pump stations at different locations. As a result, Wuxi City can now pump drinking water from both the Taihu Lake and the Yangze River.<sup>(29)</sup>

Besides the technologies mentioned above, many other new technologies have been introduced such as the use of dredgers and new technologies for the restoration of ecosystem.

(4) Roles of information disclosure and the mass media

To increase the effectiveness of environmental policies, governments have taken initiatives toward information disclosure and citizen participation. For example, Zhenjiang City in Jiangsu Province established a system for the disclosure of information on corporate environmental activities. As the indicators of corporate environmental activities, the levels of pollution control as against the effluent standards for major pollutants and as against the gross discharge control standard, evidences of illegal actions and pollution incidences, situations with ISO 1400 qualification and the employment Cleaner Production practices, etc., are assessed according to a five-point

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(28) This is according to a comment heard during a field trip to the Wuxi City's algae treatment plant in the Yangwan Bay on September 4, 2009.

(29) This was mentioned at a hearing at the Wuxi City Water Resource Bureau on September 4, 2009.

scale represented by five colors (black, red, yellow, blue and green). The municipal government makes the assessment results available through press releases, which are then broadcasted on TV, newspapers, radio, etc., with information on the names of corporations. The corporations labeled black, red or yellow face criticisms from citizens, and are obliged to strengthen their pollution control.<sup>(30)</sup> Wuxi City, which has established a system to take account of environmental indicators in the process of evaluating the performance of concerned personnel, discloses, on newspapers, the results of such evaluation performed in seven districts and two counties under its jurisdiction.<sup>(31)</sup>

Many environmental problems were reported by the mass media. This made many citizens aware of such problems for the first time, and these problems developed into major social issues. In some cases, the reporting of pollution by a citizen using an internet bulletin board, for example, draw people's attention to the problem as a social issue and accelerated its solution. Changzhou City in Jiangsu Province had improved the quality of water in many of the rivers in the city by implementing various anti-pollution measures, but citizens were aware of abnormal odors of water at the San Shang Gang Port and along the Gexin River, for example. An anonymous citizen pointed this out on an internet bulletin board. This was read by the chief of the Changzhou City's environmental protection bureau, who went to the sites and conducted investigations. After extensive hearing and water quality inspections, they could finally identify the corporation that was responsible for the pollution. Officers at the city's environmental protection

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(30) Kenji Otsuka, *China's Environmental Policies and Local Governance* in *Ajiken World Trend*, No. 148, pp. 18-20

(31) Mao Xiaoping's remark during a press interview as reported by an article dated March 14, 2008, in *China Environment News*.

bureau quickly reported the progress of their investigation on the internet bulletin board to strengthen their partnership with the citizens. Since the company that was responsible for pollution was located in the upstream of the river, the Changzhou City's environmental protection bureau reported the case to the Jiangsu Province Environmental Protection Bureau with a request for coordinated actions with the concerned counties and cities in the upstream for early solution of the problem.<sup>(32)</sup>

(5) Participation of corporations and citizens

Since 2005, the World Bank and the Ministry of Environmental Protection, with an assistance from the Center for Environmental Management and Policy of the Nanjing University, have been continuing an initiative called "environmental information round table consultation system." An advisory team was established at the Jiangsu Province Environmental Protection Bureau for experimental administration of the round table consultation system. The purpose is to promote environmental actions by corporations and governments by convening round table meetings as opportunities for face-to-face negotiations among local corporations, governments and citizens.

## 5. Creating the Mechanisms for Watershed Management

(1) Legislation activities

As mentioned earlier, during the planning for the amendment of the Water Law, some people asserted that there should be an organizational framework for unified management to the entire watershed. The idea was to es-

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(32) Article dated August 11, 2009 on People's Daily Online, accessed on September 20, 2009

tablish a committee for general management of water resources in the watershed, which should be staffed by representatives from different administrative departments of the State Council, representatives from the concerned regional governments, and representatives from major water user organizations. However, this idea was rejected, and therefore, the Taihu Lake Basin Management Bureau (watershed management organization) remains being only a branch office of the Ministry of Water Resources. The Taihu Lake Basin Management Bureau does not have any representative from regional governments, and is not authorized to negotiate the conflicts of interests in the watershed. Toward the solution of this weakness, the Taihu Lake Basin Management Bureau, Jiangsu provincial government, Zhejiang provincial government and Shanghai municipal government have been conducting studies for the proposed legislation of the Taihu Lake Management Bylaw since 2006. The Ministry of Water Resources and the Ministry of Environmental Protection held two sessions in 2008 to discuss the proposed legislation of the Taihu Lake Management Bylaw, and the legislation of the bylaw was listed in the State Council's legislation schedule for 2009.

The purpose of the Taihu Lake Management Bylaw is to create an integrated organization for unified management of the entire watershed.<sup>(33)</sup> As a challenge to be addressed, the gross annual quantity of water resources available in the Taihu Lake Basin is in shortage by more than 10 billion cubic meters. Many regional governments along the watersheds of seven important rivers in China (e. g. regional governments in the watersheds of the Yangze River and the Yellow River) have requested for the legislation of a

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(33) *Taihu Lake Health Report 2008* compiled by the Taihu Lake Basin Management Bureau of the Ministry of Water Resources, etc.

similar bylaw. The activities toward the legislation of the Taihu Lake Management Bylaw have been drawing attention of many experts as the first attempt in China toward water shed legislation,<sup>(34)</sup> are expected to influence the management of other important watersheds.

(2) Coordination between the national government and regional governments

After the Wuxi Water Crisis in 2007, Wen Jiabao, Premier of the State Council, visited the site and acknowledged the importance of solving pollution problems as a policy issue of the highest priority. In May 2008, the State Council officially ratified the General Plan for Unified Management of Water Environment in the Taihu Lake Basin, and agreed to set up a system for the joint meetings of representatives from the national government and regional governments for unified management of the water environment in the Taihu Lake Basin. The meetings are attended by representatives from national governmental organizations, such as the National Development and Reform Commission, Ministry of Finance, Ministry of Environmental Protection and Ministry of Water Resources, and representatives from three regional governments including the Jiangsu provincial government, Zhejiang provincial government and Shanghai municipal government. In the first meeting, the members agreed about early legislation of the Taihu Lake Basin Management Bylaw and also about the readjustment and improvement of the functional division of water areas in the Taihu Lake Basin.

Furthermore, the Ministry of Water Resources, Jiangsu provincial government, Zhejiang provincial government and Shanghai municipal govern-

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(34) Article dated March 31, 2006 on HWCC Online (<http://www.hwcc.com.cn>), accessed on September 20, 2009

ment established a water resource control group for unified management of water environment in the Taihu Lake Basin, created a framework for coordinated actions among the four, completed basic preparatory works for information sharing, etc., and jointly produced the “Taihu Lake Health Report <sup>(35)</sup> 2008.”

(3) Coordination among regional governments

Regional governments have been aware that the coordination between the upstream and the downstream are required for the solution of water pollution problems. As early as in 2002, Jiaxing City in Zhejiang Province and Suzhou City in Jiangsu Province established a water pollution prevention system that addressed the quality of water on the borderline between the two cities and a system for the exchange of water environmental information. After the Wuxi Water Crisis in 2007, chief representatives from the Jiangsu provincial government, Zhejiang provincial government and Shanghai municipal government began to meet regularly for the exchange of opinions, as an attempt to share information beyond the walls of conflicting interests between the upstream and downstream governments, and have worked toward the joint formulation and implementation of common policies in pursuit of co-prosperity in the watershed. The three regional governments have common interests in the same watershed that goes along the Yangze River from the Taihu Lake to the Hangzhou Wan Bay, and face similar problems from pollution.

In August 2009, as the first step toward the coordination of the three regional governments for environmental protection, the environmental protec-

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(35) Up to 2007, the Taihu Lake Basin Management Bureau alone annually produced “Official Bulletin on Water Resources in the Taihu Lake Basin and Rivers in the Southeast China.”

tion bureaus of Jiangsu Province, Zhejiang Province and Shanghai City jointly promulgated the Standard Concerning Information Disclosure and Assessment for Corporate Environmental Activities in the Yangze River Delta (Draft). The standard establishes a system somewhat similar to the earlier-mentioned system devised by Zhenjiang City for the disclosure of information on corporate environmental activities. Every year, before the World Environment Day (June 5), each regional government discloses results from the assessment of corporate environmental activities in the area under its jurisdiction. The information is made available to the public by means such as governmental web sites, newspaper and radio broadcast. The standard stipulates the use of 11 indicators of corporate environmental activities, including the levels of pollution control as against the effluent standards for major pollutants and as against the gross discharge control standard, evidences of illegal actions and pollution incidents. With each indicator, an assessment is made according to a five-point scale (very good, good, fair, bad, and very bad), represented by five colors (green, blue, yellow, red and black). Such disclosure of corporate assessment results is expected to strengthen the environmental awareness of corporations and help establish models of good environmental practices, and moreover, contribute to better management of the entire Yangze River Delta by facilitating the sharing of information on corporate environmental activities.

As a result of various initiatives, the worsening of water quality in the Taihu Lake remains under control after 2007. However the pollution is still serious because the water quality remains Below Class V at many points. The effort will have to be continued over a long period in the future.

## **6. Challenges of Watershed Governance in China**

This paper has described how the regional protectionism, which gave the

highest priority to economic development, is being overcome in the Taihu Lake Basin as many initiatives have begun to address water environmental issues with a sign of progress toward the solution of water pollution problems. These initiatives toward watershed governance in the Taihu Lake Basin can be expected to serve as an advanced model for China. However, it must be noted that China began to pursue the concept of watershed management with efforts addressing the entire watershed only after the amendment of the Water Law in 2002. Their efforts are still in an experimental stage and the level of their governance appears to be still lower when compared with watershed governance practices in advanced countries such as the United States, Canada and Japan.

The concept of watershed governance emphasizes the importance of encouraging the participation of various organs and stakeholders in the watershed, including residents, administrators, corporations, NGOs and researchers, and also the importance of perspectives that respect bottom-up initiatives from regional communities and autonomous initiatives from residents. In the Taihu Lake Basin, the preparation of legal and institutional frameworks by the initiatives of governments have produced a shift from “human control” to “legal control,” bringing about positive changes with regards to aspects such as the efficiency of administrative procedures, the active intervention of the jurisdiction, information disclosure and citizen participation. However, in the process of policy making at the national and regional governments, corporations and local residents are considered as passive entities covered by laws rather than active entities involved in watershed management. Similarly, experts and NGOs appear unable to sufficiently influence the process of policy making. As a future challenge, it will be needed to establish a system that ensures that, in addition to administrative and legislative organs, various stakeholders (such as major water user



organizations and local residents), experts and NGOs are invited to participate in the process of policy making.

Environmental initiatives in the Taihu Lake Basin relied so far mostly on two policy measures: one is the regulatory measure, which consists in controlling the activities of various entities by laws and bylaws; another is the technological measure, which was employed for the separation and treatment of algae. These measures have contributed to a certain degree to the lessening of pollution by household and industrial effluents. In recent years, the growing awareness of the insufficiency of these policy measures along has led to the introduction of the economic measure. This refers to an approach that gives economic incentives to corporations and citizens as a way to have them motivated toward environmental conservation by reasonable judgments on economic advantages. The discharge trading system is an example of such an approach. Nevertheless, as shown by the Biwa Lake environmental conservation activities in Japan, it is vitally important that local residents become the chief leaders of environmental conservation activities in the given region. A policy measure to develop and support such leaders is also needed.<sup>(36)</sup>

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(36) See Eitaro Wada (editorial supervisor) (2009) *Watershed Environmentalogy: Theory and Practice of Watershed Governance*, p. 38. In this book, the author calls this policy measure “the social/cultural measure.”

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