

State Rescaling and Water Governance:
The South-to-North Water Transfer Project in China

Jenn-Hwan Wang¹

Shuwei Huang²

¹ Chair Professor, Director of Center for China Studies, National Chengchi University

² Post-doctoral Researcher, Center for China Studies, National Chengchi University

Abstract

This paper uses the South-North Water Transfer Project to discuss the transformation of water governance by the Chinese state and its related scalar politics. China's water management system has transformed from command and control mode in the 1950s to a chaotic local competition stage in the post-Maoist reform era when local states were assigned the responsibility for promoting economic development. This paper intends to analyze how the Chinese state re-constructs cross-boundary and cross-regional governance system on water management through the building of the Water Transfer Project. We will also use Beijing city as an example to show how the new governance system has been made via the project.

Keywords: Beijing, Water governance, Political Ecology, Scale Politics

1. Introduction

Governing water is one of the most important administrative works for the state, ancient or contemporary. Taming water in ancient worlds was regarded by empires as a sacred work for its utilization of water and prevention of flood in order to survive from natural disasters and build agricultural civilization. By doing these hydraulic works, as Wittfogel (1957) argued, ancient empires developed sophisticated bureaucracies to rule the society which he called hydraulic despotic regime. Similar to ancient regimes that had to use state power to regulate water, states in contemporary world also have to develop related technologies to fully utilize water in order feed the increasing demand due to rapid industrialization and urbanization. Indeed, governing water has become a similar ‘sacred’ work for the contemporary state as its counterpart in ancient world (Worster, 1985; Reisner, 1993; Wehr, 2004; Swyngedouw, 2007).

China’s management of water resources has evolved from the control and command mode in its initial stage of the Maoist era in which the construction of dams and irrigation system was one of the major parts of the state formation process. As China began its market reform since 1978, local states have competed fiercely on water resources due to their dynamic economic growth that even led some parts of the Yellow River to dry up many times in the late 1990s. Water wars which occurred often among local states were salient political sceneries in China during that period. A call for cross-boundary and national level of water governance had been emergent. This paper will deal with the state’s role in water management, using the case of grant South-North Water Transfer Project (SNWTP) to illustrate the rescaling process.

Indeed, China has experienced very rapid economic development since it opened its door to the world, with per capita gross domestic product increasing from less than US\$ 100 in 1978 to over US\$ 4000 in 2010 (National Bureau of Statistics, 2012) — an 8 percent annual rate of growth over the three decades. One consequence of this growth, together with its rapid industrialization in the coastal areas, is that Chinese living standards have improved substantially. Accompanying with this achievement, however, is a significant increase of the country’s total volume of water consumption. Between 1980 and 2010, total water use increased from 443.7 billion cubic meters to 602.2 billion cubic meters, with the increase of water demand coming mostly from urban and industrial sources (Ministry of Water Resources, 2011). This

increase of water consumption has led to significant water supply problems in China. It is estimated that that an aggregate demand and supply gap will reach to 201 billion cubic meters by 2030, approximately one quarter of the total demand (Rong, 2011:19), which was shown especially severe in the Northern part of China where the Capital city, Beijing, is located.

The deterioration of water supply in the north has also largely been influenced by the natural environment of China. Affected by the monsoon climate's uneven rainfall distribution, 60% to 80% of rainfall is concentrated in four months, and most of the water resources are located in southern China. According to a national research on water distribution, from 1956 to 1979, Southern part of China (refers to the south of the Yangtze River Basin) accounted for 81% of the national total water resources, whereas the Northern part accounted only for 19%. The situation has worsened from 1979 to 2005, the southern part accounted for 84%, whereas the northern part only accounted for 16% (Wang, 2010). In accounting for per-capita water resources, it is estimated that people in northern part of China have much lower level of share in terms of water resources, for example, Heibei and Shanxi Provinces have merely 201 and 251 cubic meters respectively as compared to absolute scarcity level of 500 cubic meters per person in the world average in 2009 (Rong, 2011:14). The SNWTP is the central state's response to the water scarcity problem of the north in the post-Maoist ear as to feed the continuous and growing demand of the northern part, especially the Beijing Municipality. Along with this infrastructure construction, however, has been the building of a new water governance system that had to deal with the problem of local state's competition on water supply.

Beijing is located in the dry northern part of China where water resources are relatively short of supply. The Chinese state has used many methods, including building dams, channel water from nearby provinces to supply the demand of the city since it established its rule in 1949. Nevertheless, in the past 60 years, Beijing as one of the most developed and crowded cities in China has expanded massively its urban areas in a very rapid manner, especially in the post-Maoist era, which thus requested more and more water resource from its adjacent rural areas to fulfill its needs. Beijing in fact has been competing with other provinces for water resources. How to solve the water demand from the Capital City has been an urgent problem that both Beijing and

central governments have sought for. SNWTP was of course a solution to meet many purposes, not only for Beijing but also for the north in general.

This paper deals with the state's rescaling on water control. We will show that the Chinese central state has re-centralized the power of water control in order to solve the water war problem generated from local states' severe competition on economic development. However, different from the former command and control mode, this time, the new mode is much based on cross-provincial and cross-boundary collaboration. We will use the state-created SNWTP and Beijing's collaboration with water supplying provinces as case to show the emergence of this new governance structure.

2. State rescaling and water governance

This paper adopts a political-ecological perspectives on water governance, which presupposes that there is a close correlation between the transformations of the hydrological cycle in the natural world and power relations in sociopolitical sphere. As Swyngedouw (2009:56) maintains, "hydro-social research envisions the circulation of water as a combined physical and social process, as a hybridized socio-natural flow that fuses together nature and society in inseparable manners". Hydraulic environments in this perspective thus tend to be regarded as socio-physical constructions in which water is organized through a combination of social historical and metabolic-ecological processes. Because hydraulic environment is a social-physical construction, the enhancement of water supply of one area or a city may lead to change of other places' physical condition and their water supply. Therefore, water regulation is not environmentally neutral, neither is it a neutral sociopolitical process. Governing water involves political power of various levels of spatial scale in terms of utilization and controlling of natural water flows (Conca, 2006; Feitelson and Fischhendler, 2009; Swyngedouw, 2007; Bakker, 2002; Norman and Bakker, 2009). "All socio-spatial processes are invariably also predicated upon the transformation or metabolism of physical, chemical, or biological components" (Swyngedouw 2004:23).

From this perspective, water supply since ancient time has been involving the sociopolitical processes that intended to conquer natural water flows. On the national scale, one of the major tasks for every state is to use their power to control and regulate water flow in order to generate resources for sustaining living condition and build its political power (Worster, 1985; Reisner, 1993; Wehr, 2004; Swyngedouw, 2007; Wester, 2008; Molle et al, 2009). In the process of water control, the state gained even more power from the society due to its increasing administrative capacity in controlling the flow of water to cover massive areas. This is the thesis that Wittfogel (1957) has written in his thesis of oriental despotism.

The relationship between the state and its water control mechanisms formed the fulcrum of Wittfogel's (1957) inquiry into hydraulic societies. Wittfogel proposed that the strong bureaucratic regimes of East Asia were rooted in their reliance on massive irrigation works, which conditioned the rise of highly centralized and despotic regimes. Water held such politically transformative power, Wittfogel claimed, because it lay between two extremes of agricultural inputs: regional climatic conditions and soil composition. Water, a production factor thus created a "technical task which is solved either by mass labor or not at all." Therefore, Wittfogel's central argument is that the capital investment and labor coordination required for substantial water control on big rivers demand the rise of a strong and hierarchical power center which he called the 'despotic' states of the Orient (Imlay and Carter, 2012).

Wittfogel's thesis had generated heated scholarly debates, especially the linearity he suggested between irrigation development, state formation and centralized power, and whether this evolution necessarily leads to a despotic state (Steward, 1978; Bray, 1994). Given the hot debate, nonetheless, it is still evident that there is a tendency of centralization of state power in water control on the national scale especially in the initial stage of state formation in many different parts of the world. As Bakker (2002) observes in the post-Franco Spanish case, the development of new and large-scale water resources implemented in the agricultural sector by the state during the Franco dictatorship was essential to the modernization and mechanization after the civil war. The state assumed the key role in the development of hydraulic capability, through which water resources were regulated to cover most of the farm land and redirect

water for the need of Spanish industrialization. This close relationship between state formation and water control also shows in the Chinese case as we will show later.

In this state formation stage, water regulation is always controlled by the power alliance of state bureaucrats (such as water development agencies) and engineers, they tend to propose wider scale of water governance to include multiple surface and groundwater basin by framing the issue as adequacy of national water supply. Through this alliance, a water governance regime in a nation-wide level has been established (Feitelson and Fischhendler, 2009: 730). The centralization of power at the national level can be increased and facilitated by the improvements of technology that are supposed to have the capability to reduce the cost and enhance wider economies of scale. The water agencies and engineers' discourses have reinforced the national scale of water works. As Feitelson and Fischhendler (2009:730) suggest, 'The centralization of management and the associated construction of large-scale water works in modern times have been largely legitimized by a managerial discourse that justifies the redirection of water away from its natural courses'.

Nevertheless, the geographic scale of water governance is not static, it is always changing along with economic, political and social processes. Especially in the process of industrialization and urbanization, the state has to reallocate water resources in order to sustain the pace of its domestic economic development. In this process, however, the state has to negotiate or command local governments to re-build the governance system. This transformation of water control system thus indicates the state's power is being rescaling to meet the new demands generated from various sociopolitical and economic processes.

As it is commonly understood in the social sciences that scale is "socially constructed, historically contingent and politically contested" (Reed and Bruyneel, 2010), this transformation of environmental governance nowadays in the democratic societies tend to involve not only governmental agencies and social groups, but also the engagement of NGOs in the operational procedures in key issues, so as to gain legitimacy in democratic decision making (Barak, 2002; Reed and Bruyneel, 2010). Therefore, current social scientists in the West find that decision making process on environmental governance has been changing from *government* to *governance* modes, indicating the transformation from one that exercising power by formal, hierarchical,

and centralized authority to one that is based on mutually agreed upon coordination made by multiple horizontal, decentralized political and social actors. Water governance thus becomes decentralized, de-territorialized, and re-territorialized.

The Chinese case on water governance nonetheless has its own specific features. Following the economic reform logic, in which local states were granted the power to develop the economy by their own interpretation of central state policies (Oi, 1995). Local states thus tend to exploit the natural environment, especially land and water, in order to boost local economies and which was fully supported by the central state.

Indeed, as the local state corporatism thesis (Oi, 1995; Edin, 2003) has found that local governments had very strong incentive to develop local economies, especially in the initial stage of economic reform in which many local cadres were pioneers in leading the local economies to develop away from decadence. In the 1990s, because of the central state's tax-sharing reform (Oi, 1995), local cadres had very strong incentive to create 'extra-budgetary fund' (mainly by selling the land development right to real estate developers) for local authorities and develop the local economies. This strong economic activism of local bureaucrats has deeply related to the Chinese Communist Party's evaluation system in which economic development is assigned as a hard target that local cadres have to pursue for (Edin, 2003). Tilt (2009: 144) also finds that the concept of sustainability has been interpreted differently at different levels of the government's environmental agency. The higher the administrative level is, the idealist the bureaucrat's attitude toward environmental sustainability. Interestingly, at the township and village level, the concept of sustainability is regarded by environmental agency as promoting social and economic development as to provide local jobs and to increase income and taxes.

As local states' incentives are strong in keeping their rapid economic growth, water is channeled from rural areas to satisfy the metabolic ecological environment of big cities. Local states are competing among themselves for water supply. All the neighboring provincial and municipal city governments intend to reserve cross-provincial river's water flow in order to feed the demands of city and industry within their own territory. On the other hand, the central state also aims to maintain water supply to feed and balancing regional needs at the national scale; while in doing so, it may change water supply of the natural course and create tensions among

various levels of state authority. In fact, water conflicts among local states beget the central state to step in so as to solve the water supply issue. Water governance thus is never a conflict-neutral process, it is in fact a multi-scaled articulation of institutions and actors with varying degrees of power conflict and negotiation. In the process, water is de-territorialized and re-territorialized by various levels of state power.

We will argue in this paper, China's water governance has changed from mainly central state's command and control mode to a local competitive mode. Now, because of the draught situation in the north has been worsening, and the water wars among local states become severe, the central state launched its SNWTP in order to solve the water supply problem and especially for the need of Beijing. In the process of the construction, a new collaborative governance mode has been in developing, in which central state has re-centralized its power as to work with local states to facilitate the formation of a new water governance structure in order to ease the tensions among local states, as well as to solve the problems of water supply and water pollution, which we discuss as follows.

3. Building the national water hydraulic system in China

The building of a national hydraulic system in China has been a long process and has proceeded in a fluctuated and rocky manner in the past few decades since 1949 when the CCP took over power. This construction processes can be roughly divided into three periods: the initial command and control stage, from 1949 to 1978, when China faced serious floods and shortage of hydraulic infrastructure, the Chinese state, by the help of Russian engineers, intended to solve those problems by ways of implementing big hydraulic projects. In the second stage, from 1978 to 2000, when local states pursued for their economic interests disregarding environmental pollution and created water wars among provinces. In the third stage, from 2000 till now, the new water management system has been gradually emerged and a new national governance system has gradually established. The central state now has become actively establishing negotiation and coordination mechanisms to solve the conflict problems generated from large scale cross-boundary hydraulic infrastructures.

3.1 The initial command and control stage, 1949-1978

Water management was one of the toughest problems that the newly established Chinese central state encountered in its initial stage after 1949. The lacking of irrigation system and shortage of hydraulic system nation-wide during that time was a serious problem for agricultural production. In addition, the constant floods of Yellow River created disastrous consequences to northern China. By the assistance of Russian engineers, building big dams to tame big rivers became the key hydraulic strategy, in which “governing Yellow River” became the policy priority of Chinese central state in the north, while establishing Dangjiangkou Dam was another big project in the south (Su, 2013).

In order to prevent constant floods of Yellow River, the Chinese central state had done a series of studies in the early 1950s. In 1954, a team of 120 members, composed by both Chinese and Russian engineers, proposed to the Chinese state that building a large dam which could combine flood prevention, hydropower, and irrigation functions together was necessary. This was the Sanmenxia Dam (with height at 360 meter), which was designed by Russian, that began construction in 1957 and started to function in 1962. This dam however created serious problems due to sand sedimentation that had resulted in its rebuilding by Chinese engineers afterward.

The same pattern happened in the construction of Danjiangkou Dam. In order to prevent Han River from flooding every year, the Chinese central state began the studies in 1952, again with the assistance from Russian engineers, and started to build the dam in 1958. In 1968, with height at 162 meter, the dam began to perform its hydropower function. It was the largest reservoir in China during that time. A new city, Danjiangkou was created, populated mainly by those resettled migrants.

The Russianization of hydraulic system was based on engineering thinking that intended to solve the irrigation and water supply problem by construction more dams with little thought on the establishment of appropriate management infrastructure and improvement of governance. Therefore, there was no legal framework to regulate water in corresponding to those big hydraulic infrastructures. This situation was worsen in the period of cultural revolution, during which the central state was ceased functioning in managing hydraulic system nation-wide. Small scale, autonomous small hydraulic system became the main feature during this era, with little or no financial resources being injected into the maintenance of the hydraulic system.

3.2 The local competition era, 1980s-1990s

The post-Maoist era in China has the characteristics of local state corporatism (Oi, 1995) in which local states used every possible approach to pursue for economic development. However, the autonomy of local state in pursuing for development has made the cost of coordination among different authorities extremely expensive and highly inefficient. In terms of water management, due to the fragmented water management structure, the whole country was subject to unsustainable water use and worsening of water pollution (Peng, 2012). In addition, because local states now paid much attention to the needed water to satisfy their demands for economic development, a competitive stage for water supply emerged.

Indeed, as discussed, there was no law in China before 1980s to regulate water quantity supply along major rivers. Many government authorities could arbitrarily interfere water supply, with no single government authority was directly responsible for nation-wide water affairs. In 1988, the central state promulgated the Water Law (SCNPC, 1988), which stipulated that water resource authorities at various levels of governments were responsible for water management. In order to stop water quality from deteriorating even further, the State amended the Water Pollution Act 1984 in 1996 (SCNPC, 1996). During this period, the state's attention was paid to the efficient use of water to facilitate economic growth. The laws thus only made the situation even worse because local authorities were still competing for water for the sake of economic development.

It was also during this stage that the issue of water shortage came to the fore because of rapid economic development. The coastal provinces and cities wanted to have enough supply of water, they not only unlimitedly abstracted underground water but also competed ground water for their own industrialization and urbanization. Moreover, the interior provinces and cities during this time also began to take off and wanted to keep water flows from major rivers. Tensions had been created among provinces and cities. In order to solve the water competition problems, the central state now began to promote a series of small-scale “transferring water” projects across geographic areas, such as diversion water from Luan River to Tianjin(引|灤入津),

from Yellow River to Shanxi Province(引黃入晉), from Yantze river to Thai Lake (引江濟太), as well as similar project in Central Yunnan province (Ma, 2004). These cross-boundary water transfer projects however were merely based on engineering consideration, relative little endeavors were put to the improvement of governance mechanisms.

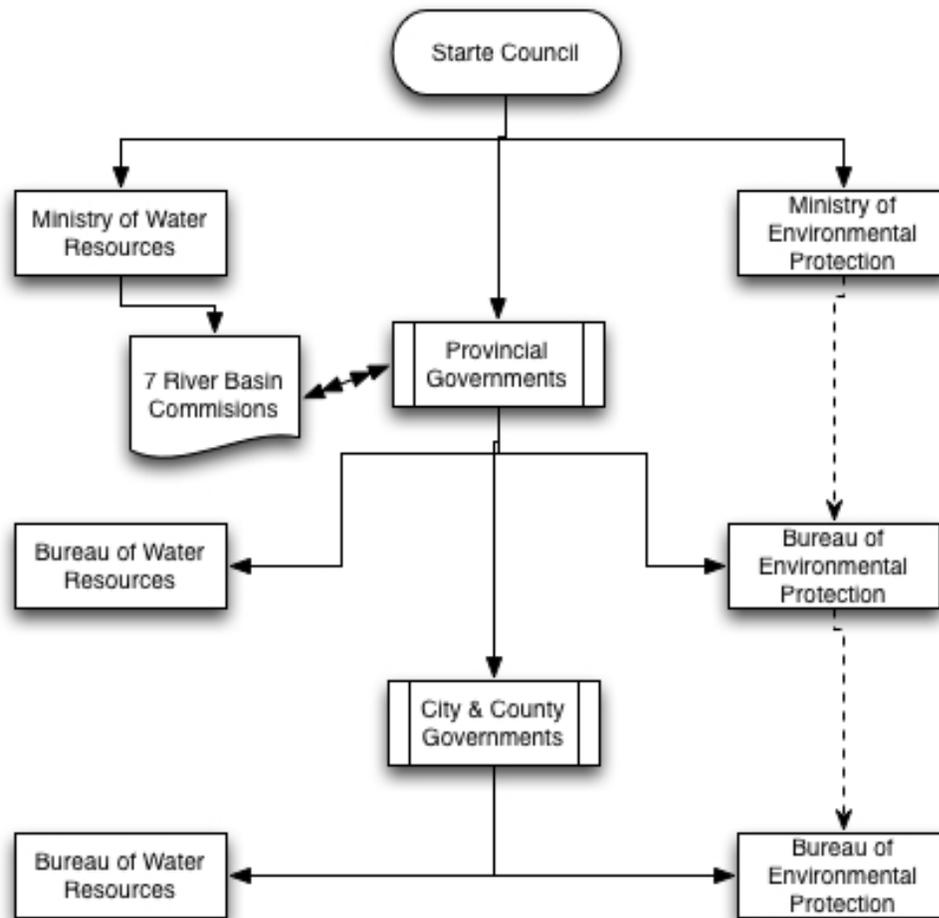
3.3. Building up a governance mechanism (2000-NOW)

In this stage, China's water resource management has increasingly become more integrated after a series of policy reforms and institutional restructuring. One example is the revised Water Law of 2002, which aims to extend the Ministry of Water Resources' (MWR) powers and to change the status quo. The government began to take a more holistic attitude toward water management by trying to achieve a balance between economic growth and preservation of the environment. According to the Water Act 2002, the power of water management in China is shared by the MWR and local (provincial level) governments. The Ministry is responsible for overall water management across the country; seven large river/lake Basin Commissions (six river basin management commissions, and the Tai Lake Basin Management Agency) are responsible for the daily administration of water management within their scope of power delegated by the MWR (figure 1). As a result of this legal reform, the power of water management has been increasingly centralized in the hands of the MRW (Peng, 2010). Moreover, much more power now was given to River Basin Management Commissions (RBMCs), which were responsible for preparing basin-wide water allocation plans and providing technical direction and guidance to local governments within the basin.

However, given these above amendments, the real operation of the system in recent years still had the features of ministerial fragmentation and friction. It was because there were many ministries that were related to water management, such as agriculture, energy, forest, etc., MWR did not have the power to do the final decision. Vertically, local provincial states still regarded economic development as their priority, they did not have the incentive to collaborate with MWR to control water usage and the MWR did not have coercive power to force them to abide by the

instructions (Peng, 2010). Moreover, because cross-boundary RMBCs in China had no representatives from the affected provinces and municipalities, they had difficulty to coordinate with related provinces/municipalities and other stakeholders (Rong, 2011: 26). For example, the Yellow River Basin Commission oversaw the allocation of withdrawal quotas among provinces, but it had no power to prevent a province from withdrawing water exceeding its allocation quota.

Figure 1. Chinese Water Management System



Source: Peng, 2012

In order to amend the above administrative fragmentation problems, the Chinese central state intended to build a better and sound governance system to be more effectively allocating water resources. The system includes features such as: to establish a new water right regime in order to build a more rational water price

mechanism as to facilitate efficient water usage; to establish a more effective cross-boundary collaboration system in order to coordinate stakeholders along river basin, including resettlement issues. Many of the above ideas have been implemented into experiments in some areas. The SNWTP was a big hydraulic project that the Chinese state wanted to do experiment as to create a new water governance system, as will be shown in the SNWTP case.

4. The “South-to-North Water Transfer Project”

The SNWTP is a vast and unprecedented water project in human’s history and costs as high as nearly \$100 billion (USD). The SNWTP was first proposed by Mao Zedong in the early 1950s, Mao said: “The Southern has more water than the northern, if possible, it would be good to borrow some water from south to north.” Therefore, since 1953, the Yangtze River Water Resources Commission and the authorities began a comprehensive study of the SNWTP. After five years of research, the MWR proposed three water diversion routes: The Western Route diverted water from upper Yangtze tributaries in difficult and remote terrain in the Sichuan and Qinghai mountains. This project has been suspended due to serious debates and concerns about environmental damage. The Middle Route started at Danjiangkou reservoir on the Han, a major left-bank tributary of the middle Yangtze to reach Tianjin and Beijing in the north. The Danjiangkou dam was built in the 1960s that had 162 m height, it was planned to be raised up to 176.6 m height in order to increase its storage capacity. This route was planned to start to provide clean water to the north before the Beijing Olympic Game in 2008, however it was not able to accomplish this mission and now was suspended to October of 2014. The Eastern Route takes water from the Yangtze about 100 km south of Nanjing and 250 km westward from the sea, by using the existing Grand Canal and some parallel riverbeds. This physical construction of this route has been completed and will begin transferring water to the north in the end of 2013. China formerly launched the mega-project in December 2002 and set up the SNWTP Construction Committee directly under the State Council in August 2003. Details of the three routes are shown in figure2, and table 1:

Figure 2. South-to-North Water Transfer Project



Source: The New York Times, 2007

Table 1: The Comparison among the Three Routes of China's South-to-North Water

	Eastern Route	Central Route	Western Route
Water transfer capacity (billion m ³)	14.8	13	17
Length of diversion canal (km)	1,156 (main canal) plus 740 (branch line)	1,241 (main canal) plus 142 (branch line)	>300 (all via tunnels)
Dam construction	N/A	Existing dam heightened by 15 m from 162 to 176.6	New dam >200 m in height
Water transfer method	Pumping stations	Flow by gravity	both
Construction schedule	Started in 2002; Water was expected to begin flowing in 2007, but was later delayed to 2013	Started in 2003, water was expected to begin flowing in 2010, but was later delayed to 2014	Under planning
Water flowing areas	Jiangsu, Anhui, Shandong, Hebei, and Tianjin	Hubei, Henan, Hebei, Beijing, and Tianjin	Qinhai, Gansu, Shannxi, Shanxi, Ninxia, and Inner Mongolia
Major challenges	Poor water quality Ecological impacts of lake impoundment	Resettlement Discharge reduction of the Han River	Geological disasters Impacts on the ecosystems of the upper Yellow River

Source: Adapted from Zhang (2009) and Rong (2011)

For the purpose of this paper, we will mainly discuss the central route that starts from Danjiangkou reservoir to Beijing in the north. The total length of this route is 1230 km, with a branch to Tianjin, and the water will supply mainly to 22 cities along the waterways of three provinces. Natural channels were rejected in favor of a new canal to preserve water quality and command the full area by gravity. The first stage will divert 9.5 to 13 billion cubic meter/yr of water or 25 -35% from Han River flows at Danjiangkou, though the new heightened dam will also have important flood and water control benefits for the downstream Han River areas and to the city of Wuhan (Peng, 2012). Although the central route is designed to meet the need of the north in general, nonetheless, the final destination of this route is the most important one--- to feed the capital city, Beijing. In the first stage, Beijing is expected to receive 1 to 1.2 billion, whereas Henan province is 3.5 billion, Hebei is 3.3 billion, and Tianjin is 1 billion cubic meter of water.

5. Beijing and SNWTP

Beijing, located in northern China, has been the political center of China for much of the past seven centuries and is currently the capital of China. It is one of the most populous cities in the world with the size of population in 2012 was over twenty million. Located in dry northern China, Beijing has two major rivers flowing through the municipality, the Yongding River and the Chaobai River, and flow in a southerly direction. Historically, these rivers were the sources of major water supply to the city. After the revolution, the central state built up Guanting and Miyung reservoirs to provide water to Beijing and adjacent areas in Hebei province. As Beijing continued to expand its size, these two reservoirs recently supplied water only to Beijing.

At the same time, the Beijing municipal government used every possible measure to increase water supply and to reduce water consumption. Since the 1990s, the city has been implanting an industrial structural adjustment project that moved heavy industries out of the city and promoted instead those high tech industries. To avoid overuse of water, Beijing Municipal Government also adjusted water prices many times (Banchongphanitha et al, 2008). In addition, the city Government also

tried other measures, such as persuade people to change their habits on water use, promote the use of recycled water by building more sewage treatment plants, in order to achieve water conservation.

Table 2. Water Resource in Beijing (2001-2008)

(Unit: One hundred million cubic meter)

	Water Resource	Surface Water	Ground-water	Water Consumption	Surface Water	Ground-water	Recycled Water	Transfer Water
2001	19.2	7.8	15.7	38.9	11.7	27.2	-	-
2002	16.1	5.3	14.7	34.6	10.4	24.2	-	-
2003	18.4	61	14.8	35.8	8.3	25.4	2.1	-
2004	21.4	8.2	16.5	34.6	5.7	26.8	2.0	-
2005	23.2	7.6	18.5	34.5	7.0	24.9	2.6	-
2006	24.5	6.0	18.5	34.3	6.4	24.3	3.6	-
2007	23.8	7.6	16.2	34.8	5.7	24.2	5.0	-
2008	34.2	12.8	21.4	35.1	4.7	22.9	6.0	0.7
2009	21.8	6.8	15.1	35.5	3.8	19.7	6.5	2.6
2010	23.1	7.2	15.9	35.2	3.9	19.1	6.8	2.6
2011	26.8	9.2	17.6	36.0	4.8	18.8	7.0	2.6

Source: Beijing Statistic Bureau, 2010

Through those efforts, Beijing's consumption of water has largely decreased (table 2, 3), in which the use of ground water has been largely reduced whereas the consumption of recycled water has increased rapidly. In addition, now the domestic usage of water becomes the largest share of water supply, replacing agricultural irrigation and industrial uses. However, due to the increase of population, it still suffered from serious water shortage problem. Beijing constantly is in thirsty condition. In the past decade, the shortage in some years reached as high as 2 billion cubic meter (table 3). Transferring water from the south to meet the demand of Beijing, especially for the drinking water, is a policy that the central state has to adopt. The new project creates tensions among regions and cities that call for the central state to step in to solve the conflicting water supply problem.

Table 3. Water Consumption in Beijing

(Unit: One hundred million cubic meter)

	Water Consumption	(One billion cubic meter)			Water Resource	Water Shortage	Population (100000)
		Agricultural Irrigation	Industrial Use	Urban Domestic Use			
1980	50.54	31.83	13.77	4.94	26	24.54	904.3
1985	31.71	10.12	17.2	4.39	38	-6.29	981
1990	41.12	21.74	12.34	7.04	35.86	5.26	1086
1991	42.03	22.7	11.9	7.43	42.29	-0.26	1094
1992	46.43	19.94	15.51	10.98	22.44	23.99	1102
1993	45.22	20.35	15.28	9.59	19.67	25.55	1112
1994	45.87	20.93	14.57	10.37	45.42	0.45	1125
1995	44.88	19.33	13.78	11.77	30.34	14.54	1251
1996	40.01	18.95	11.76	9.3	45.87	-7.86	1259
1997	40.32	18.12	11.1	11.1	22.25	18.07	1240
1998	40.43	17.39	10.84	12.2	37.7	2.73	1382
1999	41.71	18.45	10.56	12.7	14.22	27.49	1257
2000	40.4	16.49	10.52	13.39	16.86	23.54	1382
2001	38.9	17.4	9.2	12.3	19.2	19.7	1383
2002	34.6	15.5	7.5	11.6	16.1	18.5	1423
2003	35.8	13.8	8.4	13.6	18.4	17.4	1456
2004	34.6	13.5	7.7	13.4	21.4	13.2	1493
2005	34.5	13.2	6.8	14.5	23.2	11.3	1538
2006	34.3	12.8	6.2	15.3	24.5	9.8	1581
2007	34.8	12.4	5.8	16.6	23.8	11	1633
2008	35.1	12	5.2	17.9	34.2	0.9	1695
2009	35.5	11.4	5.2	18.9	21.8	13.7	1755
2010	35.2	11.4	5.1	18.8	23.1	12.1	1961.9
2011	36	10.9	5	20.1	26.8	9.2	2018.6

Source: Beijing Statistic Bureau, 2010

5.1 Beijing vs water-supply provinces

The SNWTP is a water transfer project, which intends to transfer not only water but also *clean* water to the north, which necessarily affects the economy of the provinces located in the water supply area, including Henan, Hubei and Shaanxi provinces. Some of the most salient ones were:

First, the expansion of the Danjiangkou Reservoir would flood even more farmland and evacuate tens of thousands of farmers from their homeland. According to the plan, Henan and Hubei provinces have to move out a total of 330,000 people. Most of them are farmers, and most of these farmers have to migrate to the neighboring counties. Although these farmers in the relocation process can be

partially compensated (each person can get RMB \$600 per year for 20 years)(Ching, 2010), and can be assigned to a small piece of farmland in the new residential areas, but they have lost local connections and have difficulty to find job in the new cities, not to mention that the resettlement costs are far more than that local governments could have afforded (Lu, 2010).

Second, local governments along the canal of the SNWTP areas also have been severely affected in terms of economic development. It is because of the SNWTP that the local government on the one hand has lost a lot of farm land to develop local agriculture, and on the other hand are forbidden to promote industrial development which may cause water contamination. As a result of both factors, the fiscal revenue of those affected local governments are becoming worsened (Yang, 2010).

Third, similar damages on economic development have affected the local governments that located around the dam areas. Danjiangkou reservoir is so big that has 4,700 km in circumference, which covers parts of three provinces of Hubei, Henan, and Shanxi. Many local states in those areas use water resource as sites to develop tourist or other industries that have resulted in the deterioration of water quality of the reservoir. In other words, reservoir has been the source of their economic development (Wu, 2009). As the date of water transfer is approaching, it is obvious that these industries have to be shut down.

In fact, the affected provincial governments, such as Henan and Hubei, already complained that the project has cost too much for their own provinces, because the project places too much financial burden on environmental protection at the expenses of local economic development. Especially that the closure of polluting enterprises already reduced local governments' fiscal income and those laid-off workers also caused social problems.

In addition, for the relocation of affected rural migrants, although the costs will be paid by "Central Line Water Transfer Company", local governments still have to pay the administrative expenses. Therefore, the local governments in water-supply area always ask more financial subsidies from the company. According to local immigration authorities, an immigrant' relocation probably needs to spend RMB \$70,000, including resettlement housing, infrastructure and transportation. Although

the central state (the company) has transferred monetary payments each year to local governments, the latter still faced the double increase of administrative expenditure and reduction of income. In the four related provinces, Hubei and Henan especially hope to get more financial subsidies and compensation that creates tension between Beijing and those provinces.

5.2 An emergent governance mechanism

The above features emerged in the process of constructing the SNWTP have created tensions between Beijing and other provinces. The central state tries to build up a new governance mechanism to reduce the tension on the above issues, which may largely reduce the phenomenon of fragmented state authorities and enhance the regional collaborations among state actors and provincial governments. This especially shows in the following features:

First, the state enhances the existing administrative frameworks and functions. The State Council set up the Water Diversion Project Construction Committee Office in 2003, to be responsible for the administration of construction projects in the process of the construction of the SNWTP. This Committee has the Deputy Prime Minister of the State Council as its Director, and has other members such as the director of the National Development and Reform Commission, the governors of the People's Bank and the Development Bank, Ministers of relevant ministries, and also related provincial governors. The main duties of this office included drafting relevant laws and regulations; supervising the total investment and construction of the project; coordinating issues regarding immigration, environmental protection and ecological construction of the project, etc. (CSNWTPC, 2010). Besides the construction, recently, the central government also announced the “Danjiangkou reservoir area and upstream water pollution control and soil conservation implementation assessment methods” to ask local government officers to protect the water from pollution, otherwise their career paths will be affected by the quality of water (Jiang, 2013).

Second, the central state coordinated provincial and municipal government to share the financial burden of the construction fee. The central state established a “Water Transfer Company” (調水公司) in order to solve the problems of financing,

which requested each water-receiving province and municipal city invest in proportion equivalent to the amount of the water they want to transfer. Take the “Central Line Water Transfer Company” as example, as a state-owned company, its total capital is shared by the central and local governments, including Hubei, Henan, Hebei, Tianjin, Beijing. By the end of 2009, Beijing already invested RMB \$4.07 billion to the transfer project, Tianjin invested RMB \$886.5 million, Hebei invested RMB \$ 499.1 million, and Henan has invested RMB \$542.5 million (CSNWTPC, 2010). According to the plan, the Water Transfer Company is responsible for the main project’s financing, construction, operation, management, and repayment. In addition to the Water Transfer Company, there are also provincial and municipal water companies (水務公司) who buy the water from the water transfer company and sell it to the citizen. On the other side, the Water transfer Company would buy water from the Water Resources Company (水源公司) which set up by the central government and cooperate with the local governments in water-supply areas to manage and protect the water resources (Yang, 2011).

Third, ecological compensation mechanisms are established to alleviate financial burden of those water supply areas. On the one hand, the water-receiving areas should help the water-supply areas to solve its economic problem. Thus, the central state asks the water-receiving areas to donate money directly to the water-supply area for economic compensation. For example, Beijing contributed RMB 5.4 billion to the central state for the construction of SNWTP, RMB 2 billion for resettlement, all those funds were redirected to the water supply areas via the central state. In this process, the major tasks of the main office of the SNWTP were to analyze the situations and provided information for the corresponding partners. Besides, in 2012, the Beijing Municipal Government provided RMB\$ 50 million funding to Henan Provincial Government as compensation (Jia, 2011; Kim, 2012). Furthermore, the Beijing Municipal Government also signed cooperation agreement with Henan Provincial Government and promised that it would invest as high as RMB\$120 billion in Henan’s agriculture and tourist industry (Li, 2013; Liu, 2013). This is called ‘corresponding partners’ (對口協作) in which water receiving Beijing in the north collaborated with water sending provinces so as to mutually develop local economies by more ecologically friendly approaches in the reservoir area. Beijing

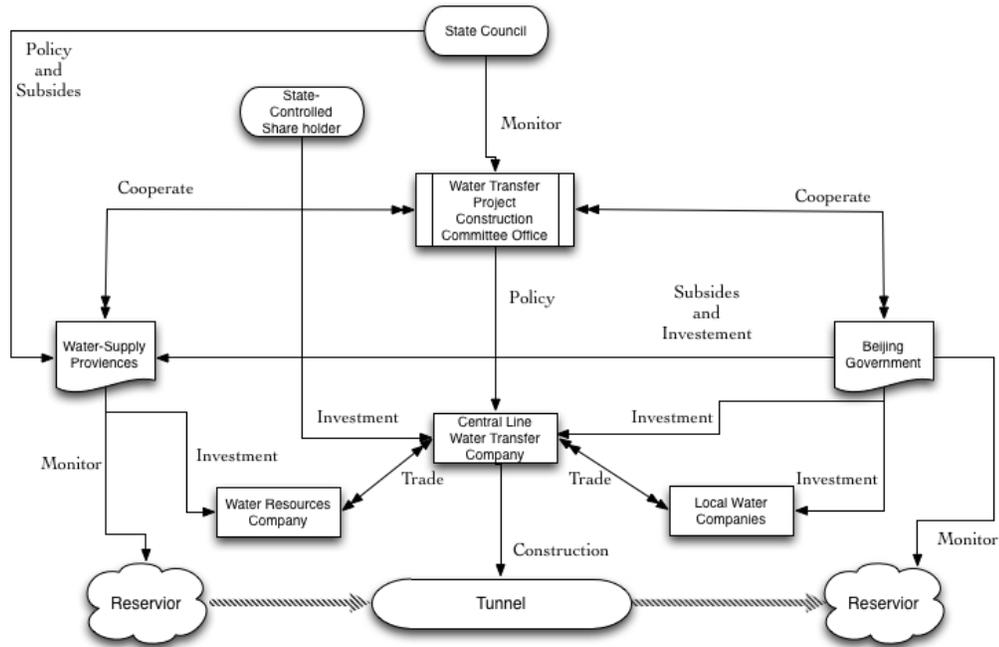
municipal government has the incentive to invest into the areas in order to divert polluting industries away from the reservoir area and to protect water from industrial and agricultural pollution.

On the other hand, market-oriented compensation, via the adjustment of water price, is also installed. Through which, the water resource company receive more income from the water transfer company as to invest more money into the water resource protection. The above approaches have been developing to ease the tension between Beijing and the water supply provinces in which the central state plays an important role in the negotiation process. Nonetheless, all the processes that have gone through are directing waters to the needs of Beijing municipality.

In fact, we have found that the role of the central state has become increasingly important again due the competition among water receiving and water supply areas. For Hubei and Henan provinces, they cannot resist from the state's demand on transferring water to the north, because according to Water Law, the property right of water belongs to the central state. What they can do therefore was to ask the central state to give more economic compensation and subsidies. The central state thus transferred the requests to those better economically developed water receiving areas to share the financial burden. For Beijing, it still needs the central state to help to maintain the water quality sending from Danjinkou Reservoir, because Beijing has the same administrative status as other provinces, it cannot order other provinces to check water quality for the city. Beijing can only ask the central state for help. In other word, Beijing cannot solve the clean water supply problem by its own territorial power, no matter it is the issue of water quality or water pollution prevention, it instead needs the central state to be more actively to engage in cross-boundary governance mechanism that is based upon coordination power in a much larger geographic scale.

In sum, the central state has changed its command and control mode of governance of water to a collaborative type in which various levels of governments are cooperating to construct the SNWTP in order to solve the water shortage problem in the north; whereas the north also made their effort in compensation for the economic loss of the south by providing financial and economic assistance to the affecting water sending areas. The governance mechanism can be shown in figure 3.

Figure 3. Governance mechanisms of SNWTP



Source: Made by the authors

6. Conclusion

Water governance in China has been in the wave of transformation. This paper uses the case of SNWTP to illustrate the transformation. We show that the rapid urbanization and industrialization in the north, plus the already water scarcity condition, has created severe water wars among local states. The realization of SNWTP was the central state's project to ease the tension generated from water shortage and from multi-scalar water wars. However, in contrast to the command and control mode of water governance in the past, this time the central state has built the governance based on a collaborative type that involved both central and local states, as well as the collaborations among local states.

The state's rescaling on water governance shows in its technological capability in constructing such a large scale water transferring project, in terms of de-territorializing and re-territorializing the water from southern to northern China. It

also shows in its power in building political alliance that regulates the water flows as to ease the competition among stakeholders. The combination of these two capabilities shows that, as Feitelson and Fischhendler (2009:730) argue, “the ability of state agents to centralize water management at the national level was facilitated by improvements in technology, which reduced the cost of water abstraction and conveyance and hence allowed wider economies of scale”. Therefore, the governance mechanisms that go through the state-created Water Diversion Project Construction Committee Office, on the one hand creates bureaucratic cooperation among state’s different department, and on the other hand build alliance between central and local states as well as among local states. Indeed, the chaotic water wars begot the central state to re-centralize its state power in water regulation, however, this is done by collaboration rather than command and control modes, which is different from the former pattern of water control.

Having studied the above state rescaling on water governance, shall we expect the emerging type of water regulation on this SNWTP is the future of China’s water governance? The answer is both Yes and No.

China’s environmental crisis has become exacerbated in recent years, especially on air and water pollution. It is therefore an emergent issue that every local government has to face. However, environmental issue is beyond border, it has to involve intergovernmental collaboration to be effective. It is because of this environmental crisis that the Chinese central state, under the leadership of Jin ping Xi is promoting ecological development, or ecological civilization, in his new state policy. In this sense, we can expect that collaborations between and among different levels of government will increase rapidly. In fact, the case of Beijing has shown that the city not only made its own effort in reducing water consumption and changing citizen’s life style, it also help remote water supplying areas to develop more ecologically friendly industries in order to assure Beijing’s citizen can drink the clean water sending from the south.

Nonetheless, what we have observed in the SNWTP case is the lacking of non-governmental organizations (NGOs) in either the decision making or the implementation processes. Different from other parts of the world, where environmental NGOs always play important role in environmental governance

mechanisms, the Chinese case mainly involves governmental agencies. However, as more and more NGOs are engaging in major environmental protection actions or sometimes in decision making in contemporary China, the Chinese central and local states seem to have much more degree of tolerance than they did before on those organizations (Lu, 2007; Zhong and Mol, 2008), a new type of governance mechanism that involves the participation of NGOs and citizens may emerge to become dominant pattern in the future.

References

- Bakker, K. (2002) From state to market: Water mercantilización in Spain. *Environment and Planning A* 34: 767 – 790.
- Banchongphanitha, Latdaphone, Chunxiao Chena, and Shinji Kaneko. 2008. “Urbanization and water issues in Beijing.” P. 396 in *ConAccount* 2008.
- Beijing Statistic Bureau. 2010. *Beijing statistical yearbook*. Beijing: China Statistic Press.
- Bray, Francesca. 1994. *The rice economies: technology and development in Asian societies*. University of California Press.
- Ching, Zheng. 2010. “The ‘South-to-North Water Transfer Project’ have to move 345 thousand people to other places in 2 years. It’s more difficult than the ‘Three Gorges’.” *Want Daily* Retrieved September 26, 2013 (<http://news.chinatimes.com/wantdaily/0,5253,11052101x112010063000514,00.html>).
- Conca, Ken. , 2006, *Governing Water: Contentious Transnational Politics and Global Institution Building*. Cambridge, MA: MIT Press.
- CSNWTPC (China South-to-North Water Diversion Project Construction Yearbook Compilation Committee). 2010. *China South-to North Water Diversion Project Construction Yearbook*. Beijing: China Electric Power Press.
- Edin, Maria. 2003. State Capacity and Local Agent Control in China: CCP Cadre Management from a Township Perspective. *The China Quarterly* 173: 35-52.

- Feitelson, E., Fischhendler I. 2009 Spaces of water governance: the case of Israel and her neighbors. *Annals of the Association of American Geographers* 99:4,728 — 745.
- Imlay, Samuel J., and Eric D. Carter. 2012. “Drainage on the Grand Prairie: the birth of a hydraulic society on the Midwestern frontier.” *Journal of Historical Geography*. 38(2): 109-122.
- Jia, Yue. 2011. “Beijing’s official response to water shortages, and the south-to-north water diversion project.” Retrieved March 19, 2013 (<http://society.people.com.cn/GB/86800/14747468.html>).
- Jiang, Han. 2013. “The water quality of the central route of the South-to-North Water Transfer Project will included into the consideration of local government officers.” Retrieved September 12, 2013 (http://big5.xinhuanet.com/gate/big5/news.xinhuanet.com/politics/2013-07/12/c_116509099.htm).
- Kim, Yu. 2012. “Receiving area of Beijing, Tianjin will offer the compensation to the Water Source Area of South-to-North Water Diversion Project.” Retrieved March 19, 2013 (<http://news.sina.com.tw/article/20121025/8135077.html>).
- Li, Shaofei. 2013. “Ecology and economy in parallel: the South will become a scenic corridor along the.” Retrieved March 19, 2013 (http://www.gd.xinhuanet.com/newscenter/2013-01/06/c_114262265.htm).
- Li, Wei. 2011. “Market failure or governmental failure? A study of China’s water abstraction policies.” *The China Quarterly* 208:pp 951–969.
- Liu, Huan. 2013. “The Miyun Reservoir will have the water from south next year.” Retrieved March 19, 2013 (<http://news.sina.com.cn/c/2013-01-09/021925987800.shtml>).
- Liu, Yiliang. 2013. “Mu Weimin discuss with the Beijing Municipal Government about the counterpart support of the South-to-North Water Diversion Project.” Retrieved March 19, 2013 (<http://www.0377888.com/news/13/0312/151505.shtml>).

- Lu, Yang. 2010. "The 'South-to North Water Transfer Project' makes the immigration's life difficult." *Voice of America*. Retrieved September 26, 2013 (<http://www.voachinese.com/content/article-20100426-china-south-north-water-diversion-project-make-migrant-life-difficult-92092104/466872.html>).
- Lu, Yiyi. 2007. Environmental civil society and governance in China. *International Journal of Environmental Studies* 64 (1): 59-69.
- Ma, Jun. 2004. *China's water crisis*. Norwalk, Conn: EastBridge.
- Ministry of Water Resources. 2010. *China Water Statistical Yearbook 2011*. Beijing: China Water Publication.
- Molle, François, Peter P. Mollinga, and Philippus Wester. 2009. "Hydraulic bureaucracies and the hydraulic mission: flows of water, flows of power." *Water Alternatives* 2(3):328–349.
- Norman, Emma S. and Bakker, K. 2009. Transgressing Scales: Transboundary Water Governance across the Canada – U.S. Border. *Annals of the Association of American Geographers*. 99 (1): 99- 117.
- Oi, Jean C. 1995. "The role of the local state in China's transitional economy." *The China Quarterly* 144(1):1132–1149.
- Peng, Shugang. 2010. "China's Legal System for Water Management: Basic Challenges and Policy Recommendations." *Water Resources Development* 26(1):3–22.
- Reed, Maureen G. and Bruyneel, Shannon, 2010, Rescaling environmental governance, rethinking the state: A three-dimensional review, *Progress in Human Geography*, 1–8, doi: 10.1177/0309132509354836
- Reisner, Marc. 1993. *Cadillac desert: the American West and its disappearing water*. Penguin Group USA.
- Rong, Fang. 2011. *Governing Water in China: Implications From Four Case Studies*. Laboratory on International Law and Regulation, School of International Relations and Pacific Studies, University of California, San Diego.

- Standing Committee of the National People's Congress (SCNPC). 1988. "Water Act." Retrieved March 19, 2013 (<http://baike.baidu.com/view/39059.htm>).
- Standing Committee of the National People's Congress (SCNPC). 1996. "Water Pollution Amendment Act." Retrieved March 19, 2013 (<http://baike.baidu.com/view/250547.htm>).
- Steward, Julian H. 1978. "Initiation of a research trend: Wittfogel's irrigation Hypothesis." *Society and History*. Essays in Honor of Karl August Wittfogel, La Haya, Mouton Publishers 3–14.
- Swyngedouw, Erik. 2004. *Social Power and the Urbanization of Water: Flows of Power*. Oxford University Press, USA.
- Swyngedouw, Erik. 2007. "Technonatural revolutions: the scalar politics of Franco's hydro-social dream for Spain, 1939–1975." *Transactions of the Institute of British Geographers* 32(1):9–28.
- Swyngedouw, Erik. 2009. "The Political Economy and Political Ecology of the Hydro-Social Cycle." *Journal of Contemporary Water Research & Education* 142(1):56–60.
- Su, Xiaokang. 2013. *The Era of Dragonslayer*. Taipei: INK Literary Monthly Publishing Co.
- Tilt, B. 2009. *The struggle for sustainability in rural China: Environmental values and civil society*. NY: Columbia University Press.
- Wang, Hao. 2010. *Chinese water resource issues and sustainable development strategy*. Beijing: China Electric Power Press.
- Wang, Yi. 2012. "China's Water Issues: Transition, Governance and Innovation." *The Management of Water Quality and Irrigation Technologies* 117.
- Wehr, Kevin. 2004. *America's fight over water: the environmental and political effects of large-scale water systems*. Routledge.
- Wester, Philippus. 2008. *Shedding the waters: institutional change and water control in the Lerma-Chapala Basin, Mexico*. Wageningen University Wageningen.

- Wittfogel, Karl August. 1957. *Oriental despotism: a comparative study of total power*. Vintage Books ed. N. H: Yale Univ. Press.
- Worster, Donald. 1992. *Rivers of empire: water, aridity, and the growth of the American West*. New York ; Oxford, England: Oxford University.
- Wu, Hai-Feng. 2009. *Construction of ecological megalopolis and coordinated development of regions*. Beijing: Social Sciences Academic Press (China).
- Yang, Ming. 2010. "The 'South-to-North Water Transfer Project' faces the challenge of immigration resettlement and environmental impact." *Voice of America*. Retrieved September 26, 2013 (<http://www.voacantonese.com/content/article-20110607ambitious-plan-for-china-water-crisis-123344738/930663.html>).
- Yang, Yun-Yan. 2011. *The research on the south-north water diversion project and social-economic sustainable development of central China*. Beijing: Economic Science Press.
- Zhong, Li-Jin, and Arthur P. J. Mol. 2008. Participatory environmental governance in China: Public hearings on urban water tariff setting. *Journal of Environmental Management* 88 (4): 899-913.