

The Construction Management of South-to-North Water Diversion Project of China

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Abstract: China's water resources are quite unevenly distributed with the south much richer than the north. In order to alleviate the water shortage problems in north China, the Chinese government decided to construct the South-to-North Water Diversion Project (SNWDP). According to the principle of “water saving prior to water diversion, water pollution control prior to water transfer and environmental protection prior to water use, three routes, i.e., the east route, middle route and west route, have been planned for SNWDP and they will be constructed in phases. The first phase of the East Route and Middle Route Project were formally put into construction in 2002. Because SNWDP will have both public welfare and business benefits, its investment sources will be raised through multi-channel sources. It will be constructed and operated according to the mechanism of “government's macro-regulation, quasi-market's operation, modern enterprise's management and water user's participation”. Considering the characteristics of SNWDP, project management will be an innovation over the traditional water resources project management model. Four project corporations have been established in charge of construction of major projects, and three models, namely, direct management, agent construction and consigned management, are implemented respectively for project management of SNWDP. The managerial system for SNWDP land acquisition and resettlement has been adopted that under the leadership of State Council SNWDP construction committee, the provincial governments assumes responsibility of the work with counties as their work basis and participation of project corporations.

Key Words: Water Resources; SNWDP(South-to-North Water Diversion Project); Construction Management; Project corporation; Land Acquisition and Resettlement

1 Status quo of China's water resources and construction of SNWDP

1.1 Unevenly distributed water resources with the south much richer than the north

China's total water resources are rich with a total volume about 2800 billion m³, being the six in the world, but the amount of per capita water resources is only 2200 m³, just one fourth of the world's average, ranking the 121st. According to UN's evaluation index system for water resources, China is one of the water-deficient nations.

More over, the spatial distribution of the country's water resources is quite uneven, with the south much richer than the north. The area of the Yangtze basin plus that south to the basin makes up 36.5% of the country's total area territory, but holds 80.9% of the country's total water resources. The northern and northwestern region takes up 63.5% of the total territory, but holds only 19.1% of the country's total water resources. The north China region is drought and short of water for a long time, especially the Yellow, Huai and Hai river basins, where the amount of per capita water resources is only 22% of the nation's average. Since the 1990s, water shortage problems in north China, along with the nation's economic development, has become unprecedented grievous. Water shortage problem has become an important restraint factor hindering the country, the north China region in particular in its national and social development.

Because of deficient water resources, the Yellow, Huai and Hai river basins could not sufficiently support the economic and social development, even considering all other possible measures such as water saving, pollution treatment and exploring potential water resources. Located mainly in south China, the Yangtze River is the largest river in China with rich water resources. To divert water from south to north can not only alleviate water shortage problems in north China, but also cause no impact on the economic and social development in Yangtze River basin. Therefore, SNWDP becomes an important strategic measure for

optimizing the country's water resources allocation and solving the severe water shortage problems in north China.

1.2 A brief introduction to SNWDP

After 50 years verification, three routes, including the east route, middle route and west route, have been planned for the SNWDP to divert water, respectively, from the lower reach, middle reach and upper reach of the Yangtze River to the North China and West China areas. When SNWDP is completed in the end, it will link China's four major rivers, i.e., the Yangtze, Huai, Yellow and Hai Rivers, and the general layout the country's water resources will be formed of “four transverse (rivers) and three longitudinal (water diversion routes) water ways, allocation of water from south to north, and mutual aid in water resources between east and west”. The principal function of the project is to satisfy municipal water use with consideration of agricultural and ecological water uses. Because SNWDP will have both public welfare and business benefits, its investment sources will be raised through multi-channel sources. Investment for the project's principal part will mainly come from allocation of central government budget and special SNWD fund as well as bank loans. It will be constructed and operated according to the mechanism of "government's macro-regulation, quasi-market's operation, modern enterprise's management and water user's participation".

According to the General Plan of SNWDP approved by the State Council, and based on the principle of “water saving prior to water diversion, water pollution control prior to water transfer and environmental protection prior to water use” and “relatively strict control of water consumption”, the ultimate amount of diverted water will reach 44.8 billion m³. The construction period is 40~50 years, and the total investment will reach several hundreds billion RMB. The mean annual volume of diverted water will be 14.8, 13.0 and 17.0 billion m³ respectively for the East Route, Middle Route and Western Route.

The East Route Project (ERP) diverts water from the downstream of Yangtze River near Yangzhou in Jiangsu Province. The water will be pumped from Yangtze River near Yangzhou on the lower reach of the Yangtze River, and then diverted northward in steps by pump stations through the existing Beijing-Hangzhou Grand Canal and the parallel rivers. The canal will connect four lakes (i.e., Hongze Lake, Loma Lake, Nansi Lake and Dongping Lake), which will be used as regulation reservoirs. After Dongping Lake, the canal will be branched into two sub-canals. One branch will continue northward and cross the Yellow River near the Weishan Mt. The water will be diverted into Nanyunhe Canal through the enlarged rivers and then flow by gravity toward Tianjing City. The total distance of this route will be 1156Km. The other branch will go eastward in the eastern Shangdong province and end at Yantai city and Weihai City via Jinan City. The total distance of this route will be 701km.

The Middle Route Project (MRP) takes water from the expanded (by dam heightening) Danjankou reservoir on Han River, a tributary of the Yangtze River. It will cross four basins including the Huai River basin, Yellow River basin and Hai River basin. The diverted water will flow by gravity to Beijing and Tianjin with a total distance of 1267km.

The West Route Project (WRP) starts by building reservoirs on Tontianhe River on the upper reach of the Yangtze River, and Yalongjiang River and Daduhe River—the tributaries of the Yangtze River, and goes by tunnel through the Bayankela Mt—the divide between the Yellow and Yangtze River and finally empties into the upper reach of the Yellow River. The major objective of the project is to solve the water shortage problems in the upper reach area of the Yellow river, including Qinghai, Gansu, Ningxia, Inner Mongolia, Shan'anxi and Shangxi provinces, and the Guanzhong Plain of Weihe River.

Due to its super scale, the three routes have to be constructed in phases. Based on the existing water shortage situations, the depth of pre-construction works as well as the country's financial capability, the first phase projects of the East Route and Middle Route have been chosen to put into construction first. It is planned for the east route project to supply water to Shangdong Province in 2007 and the middle route project to supply water to Beijing, Tianjing and Hebei areas in 2010.

The first phase projects of the east and middle route were put into construction in 2002.

2 The general construction management system and project management model for the SNWDP

The SNWDP is a project with both public welfare and business characters. The public welfare property is manifested in its function of water supply for ecologic use through trans-basin water transfer, which needs the government's guidance, macro-control, administrative supervision and unified coordination. The business property is shown in its water supply for municipal and domestic use, which means that the cost of water supply project should be demonstrated in water price, therefore the project should be managed according to modern enterprise system and operated in accordance of market mechanism. Neither can the practice be followed that a project is constructed solely by the government and water users consume water for free as did under the past planning economic system, nor can the water be allocated completely according to market principles. A quasi market allocation mechanism and managerial system for water should be actively explored and established gradually, and the separation should be eventually realized between government functions and enterprise operations, between government and capital management, and between government and non-governmental organization.

Based on above said characteristics and construction background, and on the traditional construction management system and project management model for water resources project, a new construction management system and model that conforms to the requirement of socialist market economy and the characteristics of SNWDP has been explored and set up for SNWDP according to the principle of "government's macro-regulation, quasi-market's operation, modern enterprise's management and water user's participation".

2.1 General framework of construction management system

The general framework of the construction management for the SNWDP can be divided into three layers, i.e., government administrative supervision, project construction management and decision-making consulting.

2.1.1 Government administrative supervision

The State Council set up a construction commission for the SNWDP, with the Premier as its director, two vice premiers as its deputy director, and relevant state department heads and provincial (or municipal directly under the central government) governors as its members. The committee is established as a high level decision-making organ for project construction, and is responsible for determining major guidelines, polices, measures and other key issues for construction of SNWDP. Under the construction commission, the SNWDP office, namely, the State Council SNWDP Office, is set up as a special executive institution, whose function is to propose relevant policies and management methods for SNWDP construction, draft out relevant codes, coordinate relevant State Council departments for water saving, pollution control and ecologic environmental protection, and assume the responsibility for the government administrative management of the SNWDP construction.

A leading group for construction of SNWDP has been set up in the respective provinces and municipalities directly under the central government along the project route. Under the leading group, an executive organ is set up for implementing the laws, codes, policies, measures and decisions related to construction of SNWDP; assuming the responsibility for organizing and coordinating the land acquisition and resettlement; participating in coordinating relevant provincial departments for water saving, pollution control and ecologic environment protections, and examining and supervising construction of water pollution control projects; taking the responsibility of government administrative management of part of SNWDP consigned by the State Council SNWDP Office, organizing and coordinating construction of local supporting projects, formulating management methods for construction of local supporting projects.

2.1.2 Project construction management

Construction of the SNWDP is commenced under the condition of socialist market economy, which means that the laws of socialist market economy should be followed, and the managerial system and mechanism of construction should be formulated according to market economic principles. The SNWDP is a project with both public welfare and business characters. The public welfare property is manifested in its function of water supply for ecologic use through trans-basin water transfer, which needs the government's guidance, macro-control, administrative supervision and unified coordination. The business property is shown in its water supply for municipal and domestic use, which means that the cost of water supply project should be demonstrated in water price, therefore the project should be managed according to modern enterprise system and operated in accordance of market mechanism. Neither can the practice be followed that a project is constructed solely by the government and water users consume water for free as did under the past planning economic system, nor can the water be allocated completely according to market principles. A quasi market allocation mechanism and managerial system for water should be actively explored and established gradually, and the separation should be eventually realized between government and enterprises, between government and capital management, and between government and agent companies.

Based on above said characteristics and construction background, a new construction management system and model that conforms to the requirement of socialist market economy and the characteristics of SNWDP has been explored and set up for SNWDP according to the principle of "government's macro-regulation, quasi-market's operation, modern enterprise's management and water user's participation".

2.1.3 Decision making consulting

An expert committee is set up for consulting on key technical, economical, managerial and quality issues of SNWDP, inspecting and assessing the quality of the project construction, ecologic environmental protection and resettlement, making investigation and study on the related key issues.

2.2 Establishing a new construction model of combination of direct management, consigned management and agent construction with the project corporation as a core

Under the macro control of government, the construction management of SNWDP is carried out on the basis of project corporation liability, open bidding, construction supervision and contract management. A new construction management model has been set up of combination of direct management, consigned management and agent construction with the project corporation as a core.

The provinces and municipalities directly under central government along the project routes are both water users and principal investors. The joint stock –an effective capital form is used for separation of ownership and operational rights through enterprise management, in order to improve the efficiency of project construction and operation management, raise the operational efficiency of capitals, so as to protect the rights and benefits of each investors as far as possible, which reflects the directions and requirement of the institutional reform of investment in China.

Considering the history and present situation of the SNWDP and the needs of project construction, four project corporations, including the Middle Route Construction Management Bureau of SNWDP, the Middle Route Water Sources Company of SNWDP, the East Route Shandong Company of SNWDP, The East Route Jiangsu Water Sources Company , have been established for construction and management of the first phase project of the East Route and Middle Route Project.

Three models are introduced for project management of SNWDP, i.e., direct management by project corporations, agent construction and consigned management.

2.2.1 Direct management

In order to reduce the intermediate links of construction management and take a control of the construction of key projects, the project corporations assume the responsibility of direct management of those large key river-crossing and road-crossing buildings which need high technology and have a tight construction schedule, and those that are located in the boundary area between provinces.

2.2.2 Agent construction mechanism

In order to give full play to the role of public management resources in project constructions, specialized and experienced construction management companies or operation management companies will be selected through market for project construction and operation management.

2.2.3 Consignment mechanism

In order to bring the initiative of the provinces (municipalities directly under the Central Government) along the route into play, consignment mechanism will be used for some projects, that is, the project corporation consigns some projects through contract to the provincial (municipal) construction management institutions where the project belongs to for project construction.

Under the leadership of project corporations, construction of SNWDP will be carried out in a new construction management model that combines direct management and consigned management and vigorously promotes commissioned (agent) construction, which is the real need of the construction management of SNWDP, and is favorable to give full play to the initiative of both central and local governments, raise the efficiency and lower the cost of project construction management, and consequently improve the management levels.

2.3 Implementing of the managerial system of land acquisition and resettlement that under the leadership of the Construction Committee, the provincial governments assume the responsibility of the work with counties as their work basis and participation of project corporations

The SNWDP covers several provinces (municipalities directly under the Central Government) of east, central and west part of China, involving a large area and large number of residents with varied conditions. According to relevant design documents, the first phase project of the East Route involves more than 100 counties of 7 provinces (municipalities directly under the Central Government), covers a land area of over one million Mu and needs to relocate over 400 thousand residents. In order to assure the smooth construction of the project, a new managerial system is adopted for SNWDP land acquisition and resettlement that under the leadership of State Council SNWDP construction committee, the provincial governments assumes responsibility of the work with counties as their work basis and participation of project corporations.

“Under the leadership of the Construction Committee” refers to that the Construction Committee formulates key guidelines and unified policies and regulations on SNWDP land acquisition and resettlement, and thrashes out key issues. The relevant State Council departments are responsible for their respective works related to land acquisition and resettlement.

“The provincial governments assume the responsibility of the work with counties as their basis means that the provincial governments may formulate detailed implementation rules within their own provinces according to the unified policies formulated by the Construction Committee, and make some small adjustments for solving their local individual issues.

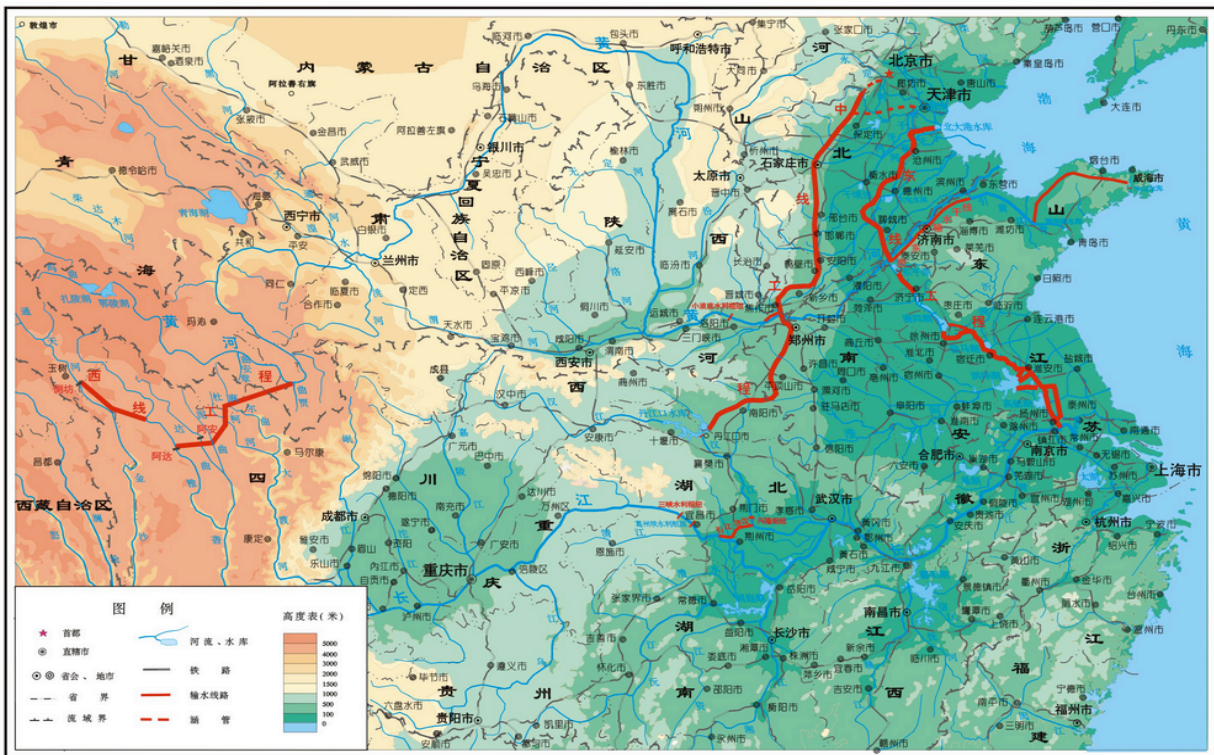
Investment for SNWDP is characterized by multi-channel sources and quasi-market allocations and quite different from pure public welfare water resources projects that exclusively depend on government investment. Investment for land acquisition and resettlement is one part of the project’s total investment, which means that the project corporations need to carry out their obligations on behalf of investors, in addition to land acquisition and resettlement organized by all-level governments. Participation of project corporations means

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that the project corporations are in charge of raising and arranging fund for land acquisition and resettlement and participate in management of the fund, which reflects the rights and obligations of investors and is beneficial to distinction of responsibilities between investors and executors, and to protection of the rights of the relocatees.

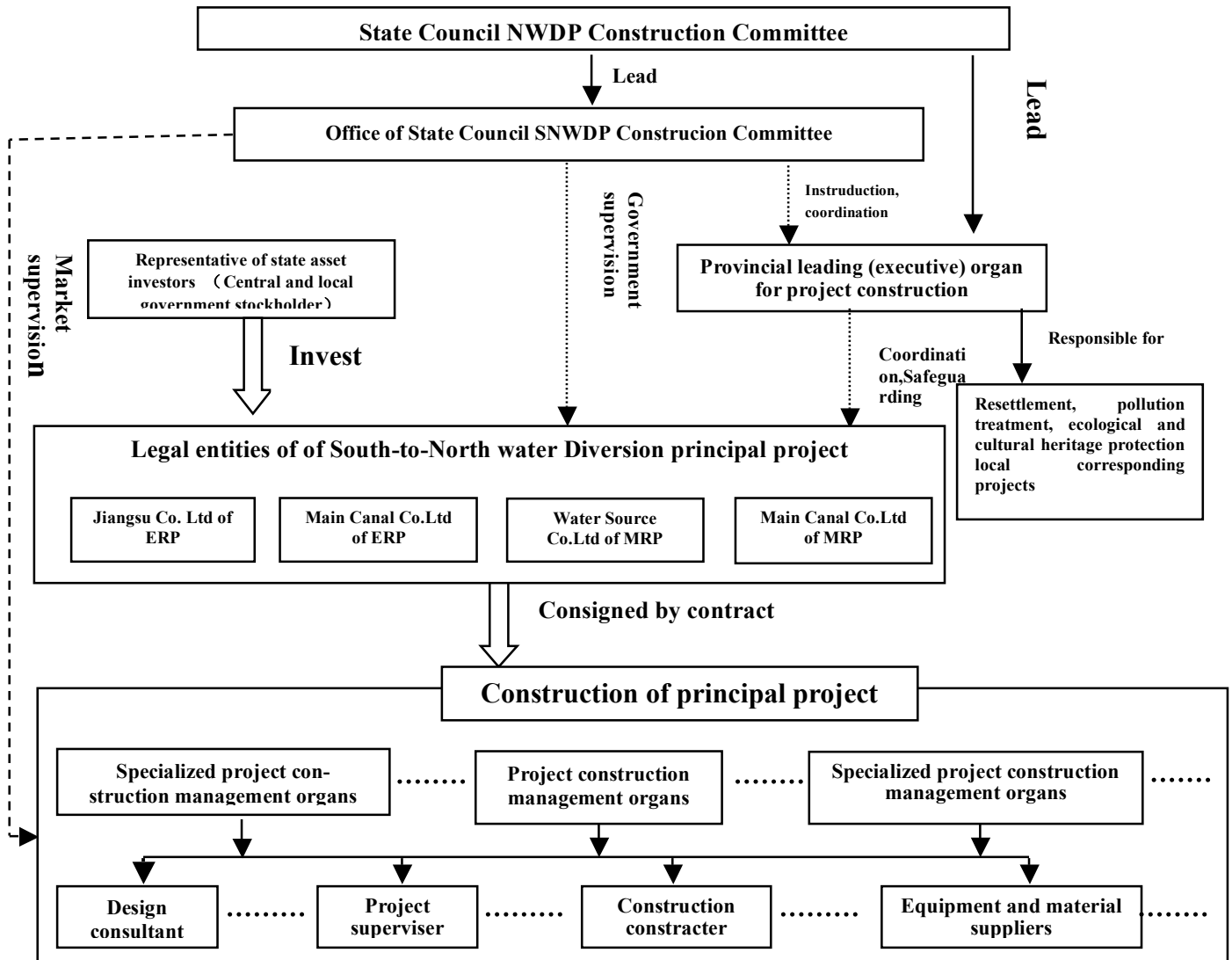
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General Layout of South-to-North Water Diversion Project

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A general framework map of management system for the construction of SNWDP