Good Water Governance for the Sustainable Development of the Arid and Semi-arid Areas of Northwest China

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Abstract. Water resources are of great importance for the sustainable development of the Arid and Semi-arid Areas of Northwest China. The theory of good water governance could provide inspirations for properly dealing with the water challenges of these areas. The integrated water resources management, the environmental water flow protection and the public participation are three major requirements of the good water governance. There are three major challenges for promoting the good water governance. The first is related to the clarification of the responsibilities of the water governance. The second is about balancing the diversified water needs. The third is about the optimal approach for improving the public participation. Three policy choices are proposed for promoting the good water governance. The integration of the water governance system, which emphasizes the four principles and the role of the basin management, could be a significant way of clarifying the responsibilities. Improving the water use efficiency could help the water supply for the ecological environment. The capacity building should be enhanced for facilitating the public participation.

1. Introduction

Water resources are the basis of promoting the sustainable development. In China, water has long been a topic of the policy making because of its extreme importance to the economy, environment and society. In the context of deepening the opening up and promoting the development of the western region, the importance of the Northwest China has been significantly increased. Consequently, the issue of good water governance has been proposed for ensuring the water security and sustainable development of this place. Many parts of the Northwest China are located in Arid and Semi-arid Areas, where the water problems are serious. The Arid and Semi-arid Areas of Northwest China refer to a portion of China's Xinjiang, Qinghai, Gansu, and Inner Mongolia, which totally covers 2.53 million km^2. Compared with the land resources, the water resources in these areas are very limited. The sustainable utilization of water in these areas has already become an urgent work [1]. The development rate of water resources in these areas is high. The average water resources development rate has reached more than 50%; in the urban and population-concentrated areas, the figure could be even greater than 100% [2]. Second, the efficiency of water utilization is low. Taking the inland river basins in Gansu Province as an example, we could find that the water use per capita and per 10,000 RMB Gross Domestic Product (GDP) are both more than three times those of the national average level (see Table 1).

Unreasonable water utilization and development has caused many negative impacts on the local environment and society. Although the Chinese government has announced the implementation of the

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most strict water resources management system, the water situation in these areas is still serious. One of the most important reasons is that the traditional government-centred water management mode cannot effectively solve the challenges for achieving the goals of sustainable development. The traditional mode emphasizes the leading role of the government in the process of the water management, which may encounter the problems of fragmented policies, uncoordinated actions, lack of public participation, etc. To improve the water governance of these areas, drawing inspirations from the theory of good water governance is essential. This article firstly introduces the theory of good water governance, and then reveals the challenges for promoting the good water governance. Lastly, some policy choices are proposed for promoting the good water governance.

Table 1. The main water use indices of different basins in Gansu Province in 2016[a].

Basin	Water Use per Capita (m^3)	Water Use per 10 Thousand RMB GDP (m^3)	Irrigation Water Use per Acre (m^3)
Inland River	1581	433	536
Yellow River	220	81	403
Yangtze River	80	63	308
Gansu Province	453	165	487
China	438	81	380

[a] The data are collected from the *2016 Gansu Water Resources Bulletin* published by the Department of Water Resources of Gansu Province, and from the *2016 China Water Resources Bulletin* published by the Ministry of Water Resources of China.

2. Good Water Governance

The water crisis is often the crisis of governance [3]. Seeking good water governance is urgent as the economy and society are entering into a new normal in the Arid and Semi-arid Areas of Northwest China. Water governance is "the range of political, social, economic and administrative systems that are in place to develop and manage water resource, and the delivery of water services, at different levels of society."[4] Jacobson, et al. pointed out that water governance has four dimensions: a) equity in water resources and services among different stakeholders; b) efficiency in water allocation and use; c) equal opportunities and rights for water stakeholders in decision-making process; and d) sustainable use of water and related ecosystem services [5]. The good water governance is particularly related to the integrated water resources management (IWRM), the environmental water flow protection, and the public participation.

2.1. Integrated Water Resources Management

According to the definition of the Global Water Partnership, the IWRM is "a process that promotes the coordinated development and management of water, land and related resource to maximize economic and social welfare in an equitable manner without compromising the sustainability of vital ecosystems."[6] The water resources governance may involve many government departments; therefore, the integration is necessary. However, the integration does not mean that all the water issues must be managed by a single department. The core meaning of the integration is coordination of different functions, actions, interests, etc. The departments tend to pay more attention to the issues that just occur in their own jurisdiction. Many connections of cross-administrative jurisdiction are usually ignored, which may cause the problems of policy conflicts, low decision-making efficiency, ecological environment destruction, etc. Water is one of the most important ecological environment elements, which cannot be regulated in an oversimplified way. For promoting the integration, some mechanisms that fully consider the specific situation of different places should be established. Meanwhile, reforming the administrative system and optimizing the configuration of organizations (including public and private sectors) are also important.

2.2. Environmental Water Flow Protection

The environmental water flow is defined as the quantity, timing, and quality of water flow, which is indispensable for sustaining the freshwater and estuarine ecosystems [7]. The sufficient water flow with appropriate quality is critical to maintain the ecosystem's functions and services (e.g., the waste decomposition, nutrient dispersal, natural purification, and ecological cycling). The protection of the water flow should be emphasized for seeking the good water governance. Water is interdependent with other ecological elements; therefore, adequate water flow could be recognized as the key of keeping the ecosystem stable and balance. From the perspective of environmental rights, the water flow is related to the supply of many environmental primary goods, which are the basis of human beings to live in dignity. For a just society, government has the responsibility of providing these primary goods. In many areas especially the environment sensitive areas, lack of enough water flow has resulted in many serious disasters, such as the blanking of rivers, the shrinking of lakes and wetlands, the declination of groundwater levels, and the desertification of land. In order to protect the water flow, the competition and conflict in water resources utilization and development should be concerned. When people compete for limited water resources, the water needs of the ecological environment could hardly be taken into account sometimes. The water flow has the attribute of public goods; if it is not properly satisfied, there would be a risk of the tragedy of the commons [8]. Building some mechanisms that focus on alleviating the tensions between different water needs is essential.

2.3. Public Participation

The public participation is advocated by many organizations and countries in dealing with their public affairs. The public participation refers to the rights of the public to participate in the decision-making process of related public affairs, to obtain necessary information about the public affairs, and to get relief through legal procedures. The public participation can coordinate many different values and goals, reduce the costs of conflict, and improve the efficiency of resources use [9]. Good water governance refers to the political and social process that governments, the private sector, and the society make decisions about optimal water resource development and utilization [10]. In the process of the good water governance, public participation can generate trust among stakeholders, and create respect and support for water decision-making. Public participation could provide channels for different stakeholders to express their views and concerns, which could create a good circumstance for water governance. The water governance involves the actors at all levels, such as the water users, policy-makers, and other stakeholders; thus, providing a participatory approach aimed at integrating and coordinating different interests is imperative [11]. Meanwhile, public participation could improve the rationality of decision-making by providing knowledge and intelligence [12].

3. Challenges

The traditional top-down water management mode has already exposed its shortcomings on addressing the water problems in the Arid and Semi-arid Areas of Northwest China. The following challenges centered on three critical issues for promoting the good water governance should be examined.

3.1. Who should be Responsible for the water governance?

According to the *2010 Water Law*, the water issues in China are regulated by a dual system, which consists of the basin and region management. However, this system has many major problems. Who should be responsible for the water governance? Both the basin and region authorities have been given certain powers to regulate the water affairs. However, in practice, the relationship between these powers is not clear. Examining the laws, we could find that in many scenarios the basin authorities should be the leading regulator of many water issues. In fact, the regional authorities are the dominating regulator. Sometimes the basin organizations are regarded as the branches of the regional authorities, and their decisions and actions are usually affected by the local governments [13].

The logic of the basin and region management is different. The basin management focuses on the water issues that could affect the interests of the whole river basin. However, the region management

mainly serves the development of specific administrative area; the related river basin or water is not the primary objective of consideration. Although they have many common positions, the differences are noticeable. The competition for power is the most serious problem. The functions of the basin management are clearly defined by the laws and policies, while the realization of them faces many obstacles. It could be easily found that the basin authorities do have some administrative powers, but they are very limited. In short, to achieve water good governance, the basin management should be highlighted. In addition, the relationship between the basin and region management must be clarified.

3.2. How to Balance Different Water Needs?

The mechanism aimed to ensure the supply of water flow has not yet been established in many places due to the complexity of water resources distribution. The Article 21 of the *2010 Water Law* provides that "the development and utilization of water resources shall first satisfy the needs of the urban and rural inhabitants in their domestic use of water, and give overall consideration to the agricultural, industrial and ecological need for water as well as to the needs of navigation. In the Arid and Semi-arid Areas, the development and utilization of water resources shall take into full consideration the ecological environment's need for water." Although the water flow in the Arid and Semi-arid Areas has been given the priority, it cannot be easily realized under the complex situations of local water utilization. Taking the Shiyang River Basin (an important inland river basin in Gansu Province) as an example, the industrial and agricultural water demand is prior to general ecological water according to the *River Basin Management Plan*. The Wuwei City located in the Shiyang River Basin just allocated 6% of water for ecological needs. The water allocated to the ecology in the basin's main cities or counties is less compared with the water for agriculture, industry, and domestic use (see Figure 1). Even in 2014, three years after the introduction of the most stringent water resource management system, the water distribution in the Shiyang River Basin has not changed substantially [14].

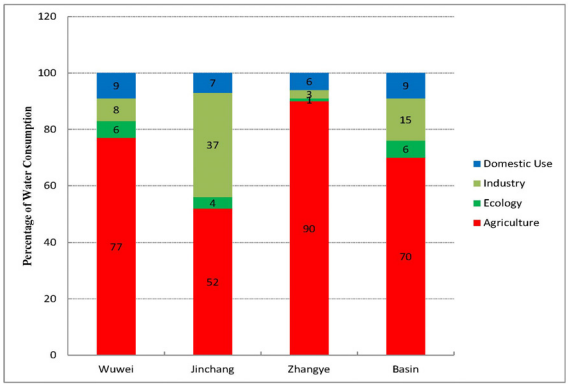

Figure 1. Water Allocation Plan in the Shiyang River Basin (The data are collected from *the Key Management Plan of Shiyang River Basin* published by the Department of Water Resources of Gansu Province and the Gansu Provincial Development and Reform Commission in 2007).

In addition, the water needs of the enterprises, which may have important impacts on the local economy, have also been given the priority. For example, according to *the 2007 Key Management Plan of Shiyang River Basin*, the water use of the key industrial enterprises should be satisfied. The Jinchuan Company is a key enterprise of Gansu Province; thus, the 88 million cubic meters of water use proposed by the company are approved. In short, although a healthy ecological environment is critical for the sustainable development of the arid areas, the water for ecological use has not been taken seriously when the economic interests are seen as the primary goal.

3.3. What is the Optimal Approach for Promoting the Public Participation?

Examining the political practice of many countries, we could find that the governments' attitude to the public participation is subtle and cautious. On the one hand, participatory democracy is critical for governments to enhance their legality and authority. On the other hand, the public participation may bring some negative impacts that could affect their work [15]. This contradictory attitude directly and indirectly contributed to the decorative formalism in the public participation, that is, what really matters is the form (e.g., the opinion polls, seminars, and hearings), not the rights and their implementation. This phenomenon is also noticeable in China's water resources governance; lack of effective public participation has caused many problems [16]. What is the optimal approach for public participation? Although there have been some practices, the answer still needs further exploration.

There is an important mechanism of public participation in China's water governance, namely, the Water User Association (WUA). The WUA represents the benefits of all the water users. But due to the following reasons, it cannot fully perform its functions [17]. First, the WUA is not an independent organization. Most of its staffs come from the village committee; thus, the decision of the WUA could be more or less affected by the committee. Second, lack of financial and technical support seriously affects its ability to the participation. Third, the members of the WUA lack the enthusiasm of participation. Although the water users submitted the application document for the membership, most of them know little about the role and significance of the WUA.

4. Policy Choices

4.1. Integrating the System of Water Governance

The water governance is related not only to the development of one or more specific administrative jurisdictions, but also to the ecological security of river basins. The basin management and the region management in essence represent two different stances and approaches of dealing with the water resources problems. It is necessary to clarify the relationships of the two modes, and redefine their status, functions, duties, and authority for realizing the good water governance. During this process, a series of principles should be followed. First, the water resources must be regulated under a unified policy and legal framework. One of the fundamental reasons of the conflicts between the two modes is the inconsistency of policies and laws. Strengthening the coordination of policy making and legislation could significantly improve the harmony of the water governance. Second, the diversified values of the water resources should be recognized and utilized. The traditional two approaches both have a problem of just emphasizing a single value of the water resources, which blocked the endeavours of seeking cooperation. Third, the river basin should be treated as an integrated ecosystem. Fourth, building some mechanisms and platforms for communication and negotiation is essential. The two authorities should conduct regular consultations for improving the water governance.

The role of the basin management should be highlighted for integrating the system of water governance. First, the administrative region management has many limitations. Serving the development of a particular administrative jurisdiction is one of its biggest constraints. Second, the basin management has been granted many priorities on the water issues by the policies and laws. The consensus that the river basin should be regulated as an indivisible ecological area has been reached in China. The basin management is proposed and designed for solving the major problems in China's water governance, such as the fragmentation of policies, the coordination difficulties of actions, and the ambiguity of responsibilities. In order to improve the basin management, much work still needs to be done. The functions and powers of the basin management should be further clarified and optimized, and its relationship with the region management also should be adjusted. The region management should reform its systems and try to cooperate with the basin management.

4.2. Ensuring Adequate Water Supply for the Ecological Environment

The development situations of the areas should be fully considered for balancing the different water needs. Although the decision makers are facing the pressure of satisfying all the water needs, the

priority of the distribution is clear. In order to support the sustainable development of the areas, the water for the ecological environment should be emphasized. A good environment is the basis of the development of other things. More importantly, ensuring adequate water supply for the ecological environment could be seen as providing the public goods, which are important to safeguard the basic human rights.

The ecosystem to maintain its basic functions needs the support of the minimum quantity and appropriate quality of water; this water could be easily sacrificed if the strict protection mechanisms are missing. In order to ensure this water supply, the following facts should be highly concerned. First, the water consumption efficiency of many sectors should be improved. The water for agriculture accounts for a large proportion of the total water consumption. Actually, many of them could be saved through appropriate measures, e.g., cultivating low water consumption crops. Second, the oases should be particularly protected. The oases are most sensitive parts of the dry areas. More than 90% of the population and more than 95% of the social wealth are concentrated in the oases in the arid areas [18]. The maintenance and evolution of the oases' ecology is directly affected by the availability of water. In order to ensure the water supply for the oases, on the one hand, relevant water utilization should be strictly regulated; on the other hand, a series of plans and policies aimed at preventing possible risks should be formulated and implemented.

4.3. Enhancing the Capacity Building of Public Participation

The capacity building could provide inspirations for promoting the public participation. First, the transparency of water decision making should be improved. The government departments have the responsibilities to disclose the information that could affect the interests and the participation of the public. The disclosure should be conducted in a manner that could be convenient and accessible to the public. Second, the path and mechanism for participation should be established. The coordination mechanism aimed at increasing the communication of different parties could improve the efficiency and effectiveness of participation. The consultation mechanism could solve the problem of the information asymmetry, reducing the costs of the participation. Third, the self-governance mechanism (e.g., the Non-Governmental Organizations, NGOs) should be cultivated. The participant should promote the ability of self-governance, which calls for the policy support from the government.

The following two things should be highlighted with regard to the WUA to fully play its role in the good water governance. First, the independence of the WUA should be strengthened. The WUA is not the branch of the regional water authority or the village committee; the main members of the WUA should be elected by the water stakeholders, rather than designated by the government [19]. It is important to clarify the relationship between the official organizations and the WUA, which could help the WUA achieve its goals and enhance the legitimacy of the decisions of the official departments. Second, the capability building of the WUA should be enhanced. The WUA could play a vital role in the following issues: a) constructing and operating the water infrastructure; b) improving the water use efficiency; c) providing the irrigation and drainage services; and d) preventing the water pollution. Therefore, the WUA should have the necessary knowledge and skills for facilitating these works. The training of the main members of the WUA is a crucial. The government can provide some financial and policy support for the training, such as the subsidies and tax deduction. Finally, the government should publish some guidelines and technical documents for regulating the capability building of the WUA.

5. Conclusions

This study focuses on the issue of good water governance in the Arid and Semi-arid Areas of Northwest China; the main challenges and some policy choices are explored. The good water governance has three core categories, namely, the integrated water resources management (IWRM), the environmental water flow protection, and the public participation. There are three major challenges in promoting the good water governance. The first is who should be responsible for the water governance. The second is how to balance different water needs. The third is the optimal approach for

promoting the public participation. Three policy choices are proposed for promoting the good water governance. First, it is important to integrate the system of water governance. Four principles should be upheld; meanwhile, the role of the river basin management should be highlighted. Second, the water supply for the ecological environment must be secured. On the one hand, the efficiency of the water use of many other sectors (e.g., the agriculture) should be improved; on the other hand, the water for the oases should be particularly protected. Third, the capacity building for promoting the public participation should be enhanced. There are three approaches, namely, a) improving the transparency of water decisions; b) establishing the path and mechanism for participation; and c) cultivating the self-governance mechanism. For the WUA, it is important to strengthen its independence of decision making.

Acknowledgments
The authors are most grateful to the institutions, experts and scholars who provided inspirations to this research. The research was funded by the project of "Promoting the Construction of the Silk Road Economic Belt" (14JZD022).

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