

Chapter 2

Developing Sustainable Water Legal Framework in China: Prepare for Adaptation

It is acknowledged that water management is notoriously compartmentalized into specialties of different aspects.¹ This fragmentation has frequently and urgently appealed a much more integrated approach to coordinate water-related interests in tandem, of which integrated water resources management regime proposed by the international water community is regarded as a great achievement. While the integration of various water management aspects is still making its progress through breaking down vested interests, the advent of climate change complicates this process from a much broader and deeper scale. Water management regime, now and in the future, not only needs to deal with water conflicts in an integrated model, but is expected to go beyond conventional water management scope to absorb and accommodate climate change effects. Putting the difficulties of identifying direct, cumulative and spillover climate change effects on water use aside, the capacity of extant water management regime in resolving internal water crisis no doubt will affects its role and ability in responding to external climatic challenges. The extent to which it could pass the test of climate change generally defines the adaptive capacity of a set water management regime.

‘Adaptive capacity’, according to the IPCC, is ‘the ability or potential of a system to respond successfully to climate variability and change, and includes adjustments in both behavior and in resources and technologies.’² Effective and sustainable water management delivered by a set regime more or less adds up to a higher adaptive capacity which enables the society (including both public and private sectors) to prepare for, respond to, and recover from, climate change impacts quickly.³ Unsustainable ways of water use, on the other hand, not only enlarge the deficit of adaptation owed by lack of development, legal or financial support, but create more difficulties for adaptation by making aquatic system more vulnerable. This leads to a serious review and assessment of China’s water management regime which is framed by structured legal and institutional system, to see how it could deliver sustainable water outcomes.

¹Burton and May (2004, 31, 36).

²IPCC (2007, 727).

³Klein and Smith (2003, 317, 320).

2.1 A Theoretical Introduction of the Integrated Water Resources Management (IWRM)

Modern water industry has realized that the development of a more integrated water management regime should be promoted with all due speed and support. Yet, it was not born in one minute and paid with no price.

Under the backdrop of immense pressure to alleviate poverty and develop its economy in the first 20 years of the Reform and Opening up Policy, China had undergone through an intensive water resources exploration without giving adequate consideration of the water use efficiency and aquatic environment. For instance, the ‘treatment after pollution’ pattern had dominated the China’s overall water management paradigm for decades.⁴ This paradigm has been criticized widely due to its negative effects on water utilization and protection. Having been aware of the importance of managing water resources in a holistic, integrated and preventative way, the Chinese government commenced water reform in the late 1990s by establishing a comprehensive legal framework, reforming institutional arrangements and implementing the IWRM regime.⁵ Before analyzing China’s legal framework on the IWRM, this part will first analyze IWRM to clarify its conception, principles, features and criticisms.

The Evolution of the IWRM

The concept of IWRM was initiated in Mar del Plata, Argentina, at the UN Conference for Water in 1977. The 1990s strengthened the development of IWRM, thanks, in part, to the efforts of several conferences and international organizations, for example the International Conference on Water and Environment, at which the well-known Dublin Principles were formulated.⁶ The Dublin Principles were later consolidated into Chap. 18 of Agenda 21 in Rio de Janeiro in 1992. In the same year, IWRM was formally put forward as a part of the portfolio of measures designed to achieve sustainable development by the Rio United Nations Conference on Environment and Development (UNCED).⁷ It was not until 2002 at the World Summit on Sustainable Development in Johannesburg, South Africa, that IWRM was recognized as one of the key components to achieve sustainable development. Now it is being implemented in many countries, expecting to achieve the best balance among social equity, economic development and environmental sustainability.⁸

⁴Varis and Vakkilainen (2001, 93–104).

⁵Jiang (2009, 3185–3196).

⁶Rahaman and Varis (2005).

⁷Ibid.

⁸Lenton and Muller (2009, 3).

According to Radif, 'IWRM is based on the perception that water is an integral part of the ecosystem, a natural resource and a social and economic good, whose quantity and quality determine the nature of its utilization.'⁹ This integrated approach requires developing water policy options that recognize and incorporate these elements in ways that could promote the sustainable, efficient and equal use of water resources. Among the various understandings and explanations of IWRM, a popular definition is given by the Global Water Partnership (GWP).¹⁰ It describes the IWRM regime as

a process that enables the co-ordinated management of water, land and related resources within the limits of a basin so as to optimize and equitably share the resulting socio-economic well-being in an equitable manner without compromising the long-term health of vital ecosystems.¹¹

Although there are other definitions given, by various organizations and, at conferences, most of them are actually based on the Dublin Principles: (1) water has an economic value and should be recognized as an economic good; (2) water is an integral part of the ecosystem and is a finite resource; (3) human activities affect the productivity of water resources greatly; water management requires a coordination of planning and policy-making at all levels; (4) water management needs the integration of land, water other related resources, which demands the cooperation among different institutions; (5) water has to be managed at a basin, watershed, lake or aquifer level through active participation of the stakeholders at all levels in a decentralized approach; (6) as a participatory approach, water management should involve water users and stakeholders; women should play a central part in the water provision, management and safeguarding.¹² The Dublin Principles have, to a large extent, extended our understanding of water resources and water management. IWRM represents a fundamental transformation of the decision-making process towards a more integrated, cooperative and participatory approach of water management. Mitchell encapsulated IWRM into three key elements: coordination, stakeholder participation and the existence of a different level of decision-making at which integrated resource management can be pursued.¹³ His understanding has more procedural and institutional applications, which distinguish IWRM from traditional fragmented, hierarchical and sectoral water management approaches. Nonetheless, it is worthwhile to point out that IWRM is not a simple amalgamation of the existing management of water, land and other related resources, or the assembly of multiple water development concerns. On the contrary, it reflects a paradigm shift in water management, both from a substantive perspective and a procedural perspective.

⁹Radif (1999).

¹⁰For more information about the GWP, please visit <<http://www.gwp.org/en/About-GWP/>>.

¹¹Global Water Partnership and International Network of Basin Organizations (2009, 18).

¹²Pangare et al (2006, 79).

¹³Mitchell (1990, 1–21).

Some key principles of the IWRM regime, such as basin-level management, public participation, good governance and information sharing, have been widely recognized and implemented by both developed and developing countries. In order to implement IWRM, most water management strategies and practices should be guided and developed based on these principles. Nonetheless, this does not mean that IWRM is a panacea for water management in every country or every basin. In fact, each country has its priorities, governance approaches and political realities, which must be taken into account to respond to specific condition and needs of that country. For instance, the scale of IWRM is defined differently according to various specific contexts. Canadian IWRM involves four interlocking scales: watershed, sub-watershed, tributary and site, while IWRM in the EU under the WFD (Water Framework Directive) occurs within a network of river basin districts.¹⁴ Even within one country, various levels of government (national, regional and local) apply IWRM within their own social, economic, cultural and political context. By implementing these principles, IWRM is expected to provide pragmatic, incremental, promising approaches and more practical frameworks for various countries and river basins to address water problems within their own context.¹⁵

Not surprisingly, the IWRM concept and implementation also encounters some skepticism. There are some concerns that IWRM is an unrealistic and impractical approach, difficult to be put into practice and lacking in operational definition and measurable criteria.¹⁶ One recurrent criticism is the multiple, undefined interpretation of the word ‘integrated’. In one of his articles criticizing IWRM, Biswas listed more than 30 sets of issues that should be integrated, such as the integration of social welfare, economic development and environmental protection, the integration of surface water and groundwater, the integration of water, land and other resources, the integration of water quantity and quality and the integration of industrial, domestic and agricultural water use.¹⁷ It is true that there has never been a clear definition of ‘integration’ due to the complicated crosscutting nature of water resources.

Nonetheless, this book argues that it is not necessary and possible to give a unified definition that could apply in different countries and river basins. Some basins may need to focus on the integrated management of surface water and groundwater while other basins may need to manage water quality and quantity in an integrated way. Integration has to be defined according to water management practices, problems and future needs in a specific context. What really matters is the integrated paradigm and approach of managing water resources. Furthermore, IWRM should be deemed as ‘an empirical concept which is built up from the on-the-ground experience of practitioners, and a flexible approach to water

¹⁴Gain et al. (2013, 14).

¹⁵Lenton and Muller (2009, 3).

¹⁶Biswas (2004).

¹⁷Ibid., 251–2.

management that can adapt to diverse national and local contexts.’¹⁸ It is not a theory that needs to be proved by scholars, but instead, ‘it is a set of common-sense suggestions as to what makes up important management aspects.’¹⁹

Three Pillars of the IWRM

Theoretically, for IWRM per se, first, it should not be seen as a single approach but as a wide range of approaches involving institutional, legal, economic and environmental measures to manage water and related resources.²⁰ Second, it is better to be regarded as a holistic and systemic process—it entails changes or transformations in policies, laws, institutional structures rather than a once-for-all project or investment, which focuses more on the ultimate outcome or impact.²¹ Third, it is a dynamic and iterative process, both temporally and spatially. Plans and strategies of IWRM need to take into account future scenarios and they are subject to changes along with the changing situation.²² The process perspective of IWRM implies that it should be developed as a circular rather than a linear course. In a cyclic process, the previous step is able to shape the next one. Regarding IWRM as a process also enables it to respond to new challenges and opportunities rather than seeking an ending point.²³ In addition to the diverse understanding of the term ‘integrated’, the practices of IWRM in different jurisdictions, likewise, are varied because of the particular contextual realities of water resource endowments, development priorities and social-economic challenges. Although it is hard to find out a panacea for a successful IWRM, some crucial features of better water management practices are available as suggested below:²⁴

- (1) sound investment in infrastructure—to store, abstract, convey, control, conserve and protect surface and ground water;
- (2) a strong enabling environment—the enabling environment includes all of the social structures that make IWRM function, such as proper goals set for water use, protection and conservation; enforceable legislative framework and policies; financial and incentive structures;
- (3) clear, robust and comprehensive institutional framework—laying out institutional forms and functions, building institutional capacity, developing human resources, establishing transparent processes for decision-making and stakeholder participation;
- (4) effective use of available management and technical instruments—for such purposes as water resources assessment, water resources management

¹⁸Danka J. Thalmeinerov, *Introduction to IWRM* Global Water Partnership <www.gwpforum.org>.

¹⁹Hassing et al. (2009, 4).

²⁰Lenton (2011).

²¹Lenton and Muller (2009, 12).

²²Pangare et al. (2006, 48).

²³Lenton and Muller (2009, 208).

²⁴Ibid., 8–9.

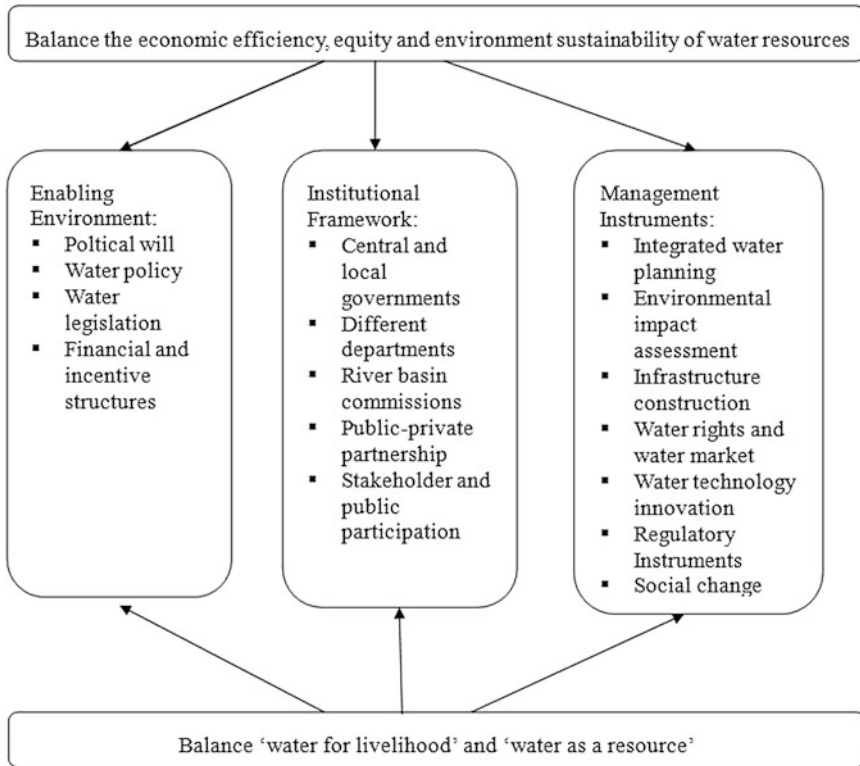


Fig. 2.1 The three pillars of the IWRM—enabling environment, institutional framework and management instruments. *Source* Hassing et al. (2009)

planning, demand management and social change, conflict resolution, allocation and water use limits, using value and prices for efficiency and equity, information management and exchange.

In some of the literature where infrastructure construction is regarded as a water management approach, (2)–(4) are widely referred to as the three pillars of IWRM, attempting to balance 'water for livelihood' and 'water as a resource' (Fig. 2.1).²⁵ These three pillars provide a relatively comprehensive vision of effective IWRM—from the existence of well-functioning institutions to an enabling policy and legal environment; from the recognition of water as economic good to its environmental value and; from infrastructure investment and good water governance to feasible management mechanisms. Based on the research scope of this book, only the policy and legislative framework of the first pillar, institutional arrangements of the second

²⁵Hassing et al. (2009, 4).

pillar and management instruments of the third pillar will be discussed in detail in this book.

Unfortunately, in practice, these different aspects and approaches have been treated differently and, in some cases, inappropriately. For example, among various management instruments employed by water managers, too much emphasis has been placed on water market, partly due to the recognition of water as an economic good under the Dublin Principles and the economic description in the Washington Consensus.²⁶ ‘Far more attention has gone into increasing the efficiency of water use through transfers into higher value-added areas or through new technologies than to equity and social justice central to human development’.²⁷ In China, the priority of water reforms is focusing on ‘efficiency’ without considering human rights with respect to water.²⁸ Water is an economic good, but at the same time, it is also a social good.²⁹ In 2002, the UN Committee on Economic, Social and Cultural Rights declared water as not only a limited natural resource and public good, but also a human right.³⁰ Economic instruments such as water pricing and water trade need to be used very carefully to protect people’s basic need for water and not to overlook the need of the poor and disadvantaged.³¹ Water development initiative could only be sustainable and successful when it is based on the equitable and efficient management.³²

Besides, due to the prevalence of a technology mentality, IWRM in China has been given more technical than legal and institutional application. However, based on a theoretical analysis of the three IWRM pillars, what the Chinese water managers need to focus on are as follows:

- (1) legislation should be designed properly to allocate and manage water use in a way reflecting its social, economic and environmental values;
- (2) institutions should be arranged effectively to facilitate the coordination among central, local governments and basin level organizations, and among different related authorities;
- (3) mechanisms should be devised wisely to enable the participation of stakeholders in the decision-making process.³³

²⁶Lenton and Muller (2009, 213).

²⁷Mukhtarov (2007).

²⁸Cullet (2012, 72–73).

²⁹Ibid., 72.

³⁰UN Committee on Economic, Social and Cultural Rights (2003).

³¹Pangare et al. (2006, 79).

³²Rahaman and Varis (2005).

³³Lenton and Muller (2009, 214).

2.2 China's Legal Framework on the IWRM

As one of the pillars underpinning the IWRM, a well-designed legal framework should clearly define water rights, establish proper instruments to implement these water rights and set up decision-making rules or procedures for water managers. To what extent existing water legislation is well stipulated largely determines the ability of water managers in implementing IWRM and further in addressing emerging climate change challenges. This part will focus on investigating the adequacy and effectiveness of water laws in supporting and implementing IWRM. This task is approached by analyzing related regulations at the national and basin level respectively. Along with this analysis, the capacity of water laws in facilitating sustainable water management will be assessed.

2.2.1 Water Laws at the National Level

The Chinese government realizes that the country has reached a tipping point and that further water exploitation and development without considering the environment will come at the expense of greater aquatic environment degradation and social disturbance. Given that, the government has enacted and implemented a set of laws and regulations on water resource management through a complicated and hierarchical legislative system.³⁴

With a centralized and unified administrative and political system, the Chinese government has developed an approach of having policies and laws set centrally but implemented locally.³⁵ Meanwhile, local legislative departments and administrative authorities conserve certain powers in formulating regulations on local issues. For major river basins, river basin commissions (RBCs) are also entrusted with limited power in formulating regulations on specific issues within a basin area. Under such legislative structures, China has built up a comprehensive legal framework on water resources at the national and local level, which covers majority aspects of water resources, including but not limited to water resources development, utilization and protection, water and soil conservation, flood and drought prevention and control, as well as hydraulic project design and management.

In accordance with to current legal systems in China, water laws and regulations are generally classified into the four categories: (1) laws enacted by the National People's Congress (*jiben fa*) and its Standing Committee (*falv*); (2) State Council decrees (*xingzheng fagui*); (3) ministerial regulations of the water-related ministries (*xingzheng guizhang*); (4) local regulations formulated by the local legislative departments and implemented by local governments (*difang fagui he guizhang*). There is a hierarchical order among those laws and regulations in which the

³⁴Lee (2006, 4).

³⁵Cosier and Shen (2010).

higher-level ones supersede those of lower level. Category (1) is the highest in terms of its legal validity and applicable around the nation, while category (4) is the lowest and only applied within local jurisdictions. Lower level regulations are usually based on, and developed from, national laws, either at the ministerial level or at the local level. With regard to the content, national and local laws are more general while decrees and ministerial regulations tend to be more specific and technical.³⁶

Assessing Water Legal Framework in General

Until now, there has been no legislation addressing water utilization, water pollution control, water disaster prevention and control, and ecological conservation in an integrated way. At the national level, four laws—‘*Environmental Protection Law*’ (EPL), ‘*Water Law*’, ‘*Water and Soil Conservation Law*’ and ‘*Water Pollution Prevention and Control Law*’ are regarded as four basic laws regulating national water resources management. Although engaged with very different concerns, these laws share the same mission in delivering better water governance in the context of China’s rapid economic growth. In addition to national laws, more than 25 State Council decrees, 100 ministerial regulations and 800 local laws and regulations have been in place to provide a legal framework for water management activities.

Compared to past water management practices from 1949 to 1978, especially during the Great Leap Forward and Cultural Revolution periods, which were characterized by government dominance and negligence of natural power, China’s current water legal system represents a welcome historical development by its acknowledgement of restraining government power and regulating human behavior. A more sustainable, comprehensive and scientific overview has been embedded in most of the water laws. They have paid more attention to sustainable water resources development and focused more on water quality, wetlands protection, flood management, water allocation, and the impact of water resource projects.

Unfortunately, although China’s water legislation is quite impressive due to its broad scopes, it also receives many criticisms of its fragmented legislative mentality, ambiguous legal provisions and weak enforcement capacity. With the aim to resolve water problems, these water laws are, in turn, becoming barriers to good water governance, exacerbating existing water crisis. Furthermore, even though some amendments were subsequently made to reflect the new perceptions of water resources,³⁷ they do not change the ideology, mentality and regime of understanding and managing water resources. Set mainly in the 1980s, these water laws clearly reflect some inherent characteristics of the first generation environmental laws: segmented management of water as natural resource and environmental elements, utilitarianism and anthropocentrism, dominant command-and-control

³⁶Zhang et al. (2012, 12146).

³⁷See e.g. Water Law was passed in 1988 and amended in 2002; Water Prevention and Control Law was passed in 1984 and amended in 1996 and 2008.

approach and end-of-pipe treatment.³⁸ For example, the emphasis of most water laws has been on securing water supply, developing hydropower and maximizing the economic value.³⁹ Another prominent example is the objectives stipulated in these water laws. Economic growth has been the overriding objective of water resources management both at the national and local level. This is often manipulated by economy-oriented government officials at the local level, which results in prevailing water crises like water overexploitation and water pollution. Understanding that, this part will examine the 2002 *Water Law* (of People's Republic of China) as an example to investigate to what extent existing water laws is a contributor or barrier to good water governance.

Assessing 2002 Water Law for Good Water Governance

With the purpose of establishing a water-saving society, preventing water pollution and achieving the sustainable use of water resources, the 2002 *Water Law* developed from the 1988 *Water Law* indicates a remarkable progress in China's water management history.⁴⁰ It emphasizes the saving, protection and rational allocation of water resources, attempting to balance water's economic and environmental value as well as contributing to a water-saving society.⁴¹ Furthermore, it encourages the adoption and implementation of the IWRM, of which Integrated River Basin Management (IRBM) in conjunction with jurisdictional management is stipulated as a dominate water management regime on seven major rivers.⁴² According to this law, the RBCs have been established on rivers and lakes that are of national significance to implement IWRM.⁴³ It is the first time that RBCs are given formal legal status. The requirement that national strategic water resources planning and river basin (regional) planning (comprehensive planning and specific planning), and water supply and demand planning should be conducted provides water resources planning with a clear legal position and a good start for IWRM.⁴⁴

This law also set up a water right licensing system along with a compensation system, signifying the transition from exclusively focusing on infrastructure development to paying considerable attention to water resources protection and management.⁴⁵ Attempting to establish a water trading market, this law has promoted the development of water trading practices. For example, a few water transfers have taken place between municipalities,⁴⁶ helping to alleviate pressing water shortages in some cities. Other important mechanisms such as water-function-zone system, total

³⁸Cao (2006, 255, 258).

³⁹Yang and Griffiths (2010).

⁴⁰Water Law of People's Republic of China (2002, art 1).

⁴¹Water Law of People's Republic of China (2002, art 2, 8).

⁴²Water Law of People's Republic of China (2002, art 12).

⁴³Water Law of People's Republic of China (2002, art 12).

⁴⁴Water Law of People's Republic of China (2002, art 14, 15).

⁴⁵Zhou (2008, 31–35).

⁴⁶Moore (2013).

pollutant discharge and combined total-quantity control and quota-based control were also established to promote water quality and sustainable water use. After fifteen years' application, mechanisms like water planning, water rights licensing, total water volume control and water-function-zone have been generally established in China.

Nonetheless, the 2002 *Water Law* is criticized for its low capacity in alleviating water shortage, deteriorating water pollution and delivering good water governance. One of the root causes is the dual management paradigm of water utilization and water pollution control, while both of them should be regarded as an integral part of IWRM. Isolated management between water quantity and water quality, between water protection and water utilization gives rise to endless legal conflicts and institutional confusion. This insufficient consistency and coordination is manifested quite evidently between '*Water Law*' and '*Water Pollution Prevention and Control Law*' in terms of formulating water plans, water quality monitoring and information distribution, drinking water protection, and quantity control of pollution discharge.⁴⁷ This situation is further complicated by China's outdated legislative philosophy and technique—it only provides general principles and framework for water management, lacking clear definitions, mechanisms and procedures for implementation. Amphibolous language frequently employed in this law has led to various conflicted explanations and difficulties in implementation. For instance, there has been a failure to define 'water right'. Some interpret it as the right to own and use water while some refer it to the legal acquisition of the right to use or benefit from surface and ground water.⁴⁸ The flawed demarcation of the responsibilities among various levels of government, water administrative authorities and RBCs have also created a number of vacuums and overlaps.⁴⁹

In addition, numerous regulations and rules formulated under the old 1988 *Water Law* have not been updated or amended accordingly, resulting in vacuums and conflicts.⁵⁰ In practice, with a responsive mentality, certain incidents (especially water pollution incidents) could speed up the legislative process of certain chronic water problems. For example, the enforcement of 'Temporary Regulation on Public Participation in Environmental Impact Assessment' was largely due to the Songhuajiang Pollution Incident and Nuijiang Dam Construction Dispute,⁵¹ while Wuxi Water Incident catalyzed the formulation of '*The Tai Lake Basin Management Regulation*'. This sometimes inevitably results in inconsistency with other laws.⁵²

Comparing the progress with its deficiencies, it is obvious that the 2002 *Water Law* is the combination of a traditional fragmented management regime and

⁴⁷Wang (2012).

⁴⁸Zhou et al. (2008).

⁴⁹Wouters et al. (2004, 277).

⁵⁰Ibid., 301.

⁵¹China Water Net (2005).

⁵²Yang and Griffiths (2010).

advanced IWRM. Although there have been quite a lot breakthroughs in water management ideology and mechanism, this new law shows a clear sign of compromise with formed ideas, interests and institutions. This is partly because China's water resource management is in its transitional stage, which will be analyzed later. While a transitional period is very common for many developed countries in water management history, China complicates this process by its weak legal traditions and powerful administrative system. It is worth noting that the transition will not be accomplished in a short period, indicating that the old and new regime, their conflicts will coexist for the time being. What water legislation can contribute towards good water governance is to be IWRM-oriented and to be updated continuously with new perceptions on water resources.

2.2.2 Specific Regulations on River Basin Management

Due to the significance of certain major river basins in China, some administrative regulations and ministerial regulations have been issued specifically. The '*Yangtze River Channel Sand-mining Regulation*' issued by the State Council is one of such examples.⁵³ Apart from these, there are also some specific enforcement regulations, rules, methods or standards issued by the river basin commissions (RBCs). Most of these normative documents are on specific issues such as the choice and management of sewage outlet in the Yangtze mouth area, soil and land conservation in specific areas and various water resources investigation or valuation. National laws and regulations have to rely on local governments and organizations to implement. Enforcement regulation is one of the most popular approaches to link national legislation with local realities. For instance, the MWR issued '*The Supervision and Management Methods on Drainage Outlets to Rivers*' (Methods) in 2004. In 2011, the Changjiang Water Resources Commission (CWRC) promulgated its enforcement regulation on 'Methods' to supervise and manage related activities in the Yangtze River Basin (YRB).⁵⁴ 'Rules tend to be more administrative and methods more technical, while standards provide numerical bases for compliance.'⁵⁵ For the RBCs, which are only entrusted with very limited legislative power on certain issues, rules, methods and standards are common tools for them to manage water resources.

Legislative Progress at the Basin Level

Compared to the development of laws and regulations at the national and local level, legislative progress at the basin level has been far behind. For the seven major river basins in China, only the '*Tarim Basin Water Resources Management*

⁵³China's River Channel Sand-mining Regulation (2001).

⁵⁴The CWRC (2011).

⁵⁵Zhou et al. (2012, 12146).

Regulation’ could be regarded as a comprehensive legislation on water resources. The absence of comprehensive basin level legislation for most of other river basins has been a barrier for IWRM implementation and for the RBCs to play its role.⁵⁶ There has been a strong appeal for a ‘river basin law’ on Yellow and Yangtze River Basin to improve water-related technical cooperation and bureaucratic efficiency.⁵⁷ This idea has been widely advocated by legal scholars and water managers due to its advantage in facilitating basin-wide water management and prevent ‘public tragedy’. The CWRC, for example, proposed to establish a macro legal system for the YRB, which was centered with ‘Yangtze River Basin Law’.⁵⁸ However, also due to the broad and complicated nature of enacting a comprehensive river basin law, after several years of research, formal legislative progress still has not been high on the political agenda. While there is still considerable uncertainty for the destiny of the ‘Yangtze River Basin Law’, some laws or regulations on a sub-basin level have made substantive progress, such as the Tai Lake Basin (TB).

Legislative Progress at the Sub-basin Level

As a sub-basin of the YRB, TB mainly covers Jiangsu, Zhejiang Province and Shanghai Municipality. Although geographically it is regarded as one of the tributaries of the Yangtze River, its significant physical and economic position has distinguished itself as one of China’s seven major rivers. With its 0.4 % land and 4.3 % population, the TB generated 10.8 % of the GDP in 2010.⁵⁹ Due to the intensive population and rapid economy development, the pressures of severe water pollution, water scarcity and floods have long overwhelmed.⁶⁰ The Wuxi Water Incident in 2007 shocked both the central and local governments, which, as a result, catalyzed the enactment of the first comprehensive administrative regulation with respect to a river basin—the ‘*Tai Lake Basin Management Regulation*’ (TBMR) in 2011, after ten years of research and negotiation.⁶¹

This regulation marks a significant step that China has made towards IRBM from a legal perspective. Not only because is it the first ‘river basin law’ in China, but, more importantly, it represents an important shift towards IWRM from the existing water management mentality and paradigm. It requires that water resources protection, water pollution prevention, flooding control and aquatic environment security should be integrated in local economic and social development plans.⁶² Compared to the counterpart in the 2002 Water Law, which only requires water

⁵⁶Water Legislation Plan in China’s River Basin (2004).

⁵⁷Boxer (2001, 335–336).

⁵⁸Water Legislation Plan in China’s River Basin (2004).

⁵⁹Tai Lake Basin Bureau, MWR (2011a).

⁶⁰Ibid.

⁶¹China Water Resource Newspaper.

⁶²Tai Lake Basin Management Regulation (2011, art 6).

infrastructure construction to be enhanced by local government above county level and to be integrated in local economic and social development plan,⁶³ this new regulation implies a significant development from fragmented management to integrated management and a shift from an engineering mentality to a resource-oriented mentality.

Furthermore, the understanding of water resources has been improved significantly. By stipulating that ‘the objective of this regulation is to protect water resources, prevent water pollution, guarantee water security for domestic, industrial and ecological use and improve the ecological environment of the TB’, the inherent value of water resources in ecosystem management has been recognized.⁶⁴ This is significantly different from the understanding of water resources in the 2002 *Water Law* which regards water as a tool for facilitating economic development. In the 2002 *Water Law*, water resources are managed to adapt to the requirements of economic and social development,⁶⁵ while in the TBRM, economic structure and industry distribution is required to readjust to adapt to water resources.⁶⁶ This reflects a shift from water-supply management to water-demand management, an essential transformation towards IWRM. Although this new regulation retains the much criticized IRBM and administrative combination management regime, it clearly recommends building a more collaborative mechanism.⁶⁷ For instance, it requires that the plans made by local water authority and those of environmental authority must be the subject of collaboration and consistency.⁶⁸ An information sharing mechanism among the Tai Lake Basin Bureau, water authorities, environmental authorities and meteorological authorities has been proposed to establish a basin level monitoring and information exchange system.⁶⁹

In a nutshell, as the first comprehensive ‘river basin law’, the TBMR has shed light on the implementation of the IWRM. It is able to provide valuable experiences for integrated management of water resources in other basins. While the formulation process of this regulation demonstrates the Chinese government’s political will in resolving water crises through law, it also reveals the complicated competing interests among different authorities. If this pilot regulation could be implemented effectively in practice, it could encourage and facilitate the legislative process of the river basin laws in China largely.

⁶³Water Law of People’s Republic of China (2002, art 5).

⁶⁴Tai Lake Basin Management Regulation (2011, art 1).

⁶⁵Water Law of People’s Republic of China (2002, art 1).

⁶⁶Tai Lake Basin Management Regulation (2011, art 6).

⁶⁷Tai Lake Basin Management Regulation (2011, art 4).

⁶⁸Tai Lake Basin Bureau, MWR (2011b).

⁶⁹Tai Lake Basin Management Regulation (2011, art 54).

2.3 Institutional Settings of the IWRM

As the second pillar of the IWRM regime, a well-arranged institutional framework could largely assist with the implementation of IWRM in the context of complicated laws and regulations. More importantly, a resilient institutional structure also enables a quick and effective response to emerging information or unexpected events and surprises.

The 2002 Water Law states that water resources in China are public goods and state-owned. The MWR is the department responsible for water resources management and supervision at the national level. RBCs are dispatched institutions of the MWR to undertake corresponding responsibilities and powers authorized by laws, regulations and the MWR.⁷⁰ Combined with various levels of local government and water authorities (provincial, prefecture and county), a complicated multi-level administrative system with a river basin-based approach has been formed in China.⁷¹ From a horizontal perspective, other authorities, such as the MEP and the Ministry of Agriculture (MOA) take their own responsibilities from their sectoral interests. As a result, current institutional settings on water management are characterized by being ‘vertically fragmented and subject to primarily sectoral management’.

2.3.1 Vertical Institutional Settings

Vertical institutional settings deal with the responsibility distribution among different levels of government and water authorities, from central to regional (basin) and to local level. China has developed a powerful centralized administrative system, where the central government plays a dominate role in managing water resources, especially on river basins and lakes of national significance. At the national level, the MWR reserves the ultimate responsibility of water plan preparation and withdrawal permit to balance water demand and supply. The RBCs are responsible for implementing water plans and laws, and coordinating conflicts at the basin level. They are also empowered with certain power of organizing the planning process and determining key plan elements for trans-provinces tributaries or sub-basins, together with provincial water authorities.⁷² Various levels of local water authorities are accountable for water management within their own administrative jurisdictions.

Practices show that the relationship among various levels of government has not been coordinated well to convey sustainable water use. Policies, plans and laws made by the powerful central government are often encountered with resistance or

⁷⁰Water Law of People’s Republic of China (2002, art 12).

⁷¹Shen and Liu (2008).

⁷²Water Law of People’s Republic of China (2002, art 17).

ignorance of local governments that are responsible for their implementation. Inter-governmental rivalries, corruption and incentives favoring economic development than sustainable resources use have largely undermine China's effort to implement ambitious water management strategies.⁷³ Additionally, within China's hierarchical administrative structure, most water-related authorities are only responsible for making and implementing water decisions within their own jurisdictions, based on their own interests and priorities rather than considering the interests of the whole basin.⁷⁴ RBCs complicate this administrative structure due to their ambiguous legal status. Based on the regime of IRBM in conjunction with jurisdictional management, RBCs and local government play key roles in water management of the basin level.

The Role of the RBC in China's Water Resources Management

A credible river basin commission should have at least three characteristics, namely comprehensive administrative authority related to the economic and social development within the river basin, substantial independence in both river basin management and administrative expenditures, and strong coordinating functions.⁷⁵ Using these three lenses to measure the powers and responsibilities entrusted to the RBCs of China, it is evident that they have not yet developed into a mature and credible river basin commission.⁷⁶

According to Article 12 of the 2002 *Water Law*, the RBCs are directed by the MWR to undertake administrative water management responsibility for designated river basins. However, due to the ambiguous language in the *Water Law*, there are no clear stipulations with respect to the powers and responsibilities given to them.⁷⁷ In practice, they have proceeded in accordance with the following missions:⁷⁸

- (1) To implement and supervise the enforcement of *Water Law* and other relevant laws; to exercise the water administrative functions as enacted in the *Water Law* and authorized by the MWR
- (2) To organize the preparation of basin master plan and specialty plans, and oversee their implementation
- (3) To deploy preparatory work and technical review for the planned projects
- (4) To implement the IWRM in the basin
- (5) To provide guidance, coordination and supervision on flood control and drought relief activities in the basin
- (6) Water resources protection in the basin

⁷³Moore (2013).

⁷⁴Xie (2009, 47).

⁷⁵He and Chen (2001).

⁷⁶Yang and Muller (2009, 148).

⁷⁷Zheng (2005).

⁷⁸Changjiang Water Resources Commission, *The Introduction of CWRC* <<http://eng.cjw.gov.cn/eng-introduction-mission.asp>>.

- (7) The construction and management of central government funded water projects; guidance and supervision for river development projects
- (8) Unified management of river sand extraction, including supervision, coordination and guidance
- (9) To organize the implementation of soil conservation in priority areas, including soil loss control, dynamic monitoring, supervision and guidance

When observing these missions and responsibilities, verbs like ‘organize’, ‘prepare’, ‘coordinate’ ‘supervise’ and ‘guide’ etc. are employed very frequently. It indicates that RBCs have been entrusted with more procedural rather than substantive powers. From a substantive perspective, although they have certain powers such as distributing water among provinces, formulating certain regulations and operating water projects, they only have very limited power in allocating water resources, managing water resources exploration and conservation and making water resource planning at the basin level.⁷⁹ Even the duty of water pollution prevention and control, an indispensable part of IWRM, has been assigned to the basin’s water resources protection bureaus affiliated to the MWR and the MEP. From a procedural perspective, supervising the implementation of laws and plans, coordinating conflicting interests and providing scientific guidance have been the main responsibilities of RBCs. For example, in the ‘Water Pollution Prevention and Control Law’, responsibilities of RBCs are limited to monitoring water pollution and reporting the monitoring results to the MWR and MEP. It does not have the authority over pollution control at the source. Being entrusted with procedural power is essential and crucial for RBCs to mediate conflicting interests, but without appropriate substantive power, it is not able to function as a real river basin commission for the interests of the whole basin.

Besides that, the affiliated position to the MWR also restrains RBCs from being effective river basin commissions. As an extension of the MWR, RBCs can only undertake actions within the responsibility scope of the MWR in a very narrow way.⁸⁰ For example, they have authority on related water quantity issues, but does not have the same authority for water quality. In addition, being confined by the responsibility scope of the MWR, RBCs have a single focus on water resources, without giving enough consideration to other sectors such as land and forest. Their affiliated status also determines that they will follow the approaches of the MWR in managing water resources. As a result, RBCs are intended to provide technical support, preferring a technology and engineer-oriented approach rather than an integrated technical, economic and legal approach. They are very weak in enforcing laws in terms of investigating and punishing those illegal water activities. In general, RBCs have been mainly functioned as the principal scientifically administrative, advisory and consulting agency within river basins.⁸¹

⁷⁹Jiang (2009).

⁸⁰Turner (2004).

⁸¹He and Chen (2001).

Furthermore, although using the term ‘commission’, the RBCs do not work like those in the U.S., Europe, Australia or Japan, which have wide representatives from various levels of governments, water users and interested public. There is no institutionalized procedure or platform for other related departments (e.g. the MEP) and local governments to participate, which inevitably impairs their ability in managing water resources comprehensively.⁸² As a crucial part of a real river basin commission, stakeholder and public participation has also not been in place. No proper mechanism has been designed to bring the voice of related stakeholders, communities and NGOs. Consequently, most of the decision-making on China’s water management are administration-driven rather than stakeholder-driven.⁸³

Being aware of the problems, some RBCs such as the CWRC are undergoing a systematic reform of their management system to develop themselves to be proper basin commissions.⁸⁴ For instance, there has been an increasing role of the CWRC in strategic planning of those significant provincial watersheds or lakes that are used to being predominated by provincial water departments.⁸⁵ Nonetheless, its fully-fledged status cannot be established just through RBCs’ self-reform. In the above case, the CWRC still lacks power over plan enforcement, which too often leads to incompatibilities between a plan on paper and in practice. To be real RBCs, they need the empowerment from relevant laws to stipulate clearly their substantive responsibilities. More importantly, they require a paradigm shift to include the public participation as an integral part of the RBCs and the decision-making process.

Local Government and Water Authorities

In the 2002 *Water Law*, the RBCs are required to collaborate with local government to implement the IRBM in conjunction with jurisdictional management regime. Local government is required to be responsible for water resource development at local level through its water authority.⁸⁶ As part of provincial government, provincial water authority is under the technical and professional guidance of the MWR. There is no administrative and professional hierarchy between the RBCs with provincial water authorities, which is hard for the RBCs to get involved in local water affairs. In that case, the function of the IRBM in conjunction with jurisdictional management regime, largely, depends on the collaborative mechanism among them. While local government prefers to manage water resources from its own local interests,⁸⁷ managing water resources on behalf of the whole basin will prove to be very difficult due to the delineation of duties and responsibilities between the RBCs and local (especially provincial) water authorities.

⁸²Li and Zhao (2012).

⁸³Song et al. (2010, 503).

⁸⁴Cai Q (2005).

⁸⁵Xia and Pahl-Wostl (2012, 71).

⁸⁶Water Law of People’s Republic of China (2002, art 23).

⁸⁷He and Chen (2001).

Under China's administrative structure, all ministerial departments at the central level such as the MWR and MEP can find their subordinate agencies at various local levels (province, prefecture, county). These lower level water authorities conduct their duties and responsibilities within their respective jurisdictions. They have technical skills, but their internal incentives are not well matched with current institutional missions.⁸⁸ Although they receive technical and professional guidance from upper-level counterparts, upper-level authorities do not have much leverage in ensuring that national regulations and standards are strictly enforced at the local level.⁸⁹ Since water authorities are part of the corresponding local governments, they are influenced by government decisions and are required to report to them administratively. In addition, obtaining their financial and personnel resources from local governments, water authorities face significant financial constraints and are frequently undermined by economic pressure while enforcing their policies. On the other hand, local governments are very often sponsors or stakeholders of polluting enterprises, considering environmental regulations incompatible with economic growth.⁹⁰ Based on local protectionism, they are very likely to ignore or minimize the pollution problems produced by industrial enterprises. This relationship with local governments makes it difficult for water authorities to enforce their policies and play their role in managing water resources comprehensively and sustainably. In reality, it too often leads to a situation that water resources are managed in ways maximizing local but ignoring basin-level interests.⁹¹

The Stakeholders and Public Participation in the RBCs

Civil society involvement or more specifically public participation is the third pillar of the IWRM. As Xie argues, 'public participation is helpful to tailor policy to local situations, to maximize the social welfare and utility of resources use, and to protect vulnerable groups.'⁹² Whether stakeholders and the public are engaged in the decision-making process is one of the criteria of good water governance. At least two approaches can be employed to facilitate public participation: an institutional setting to include representatives of the stakeholders and the public and; a procedure or mechanism stipulated in legislation to engage the stakeholders and public in the decision-making process. From an institutional perspective, as previously analyzed, most RBCs are not yet developed into fully-fledged river basin commissions where stakeholders and the public are an inherent and integral part of the RBCs. From a legal perspective, current regulations are not effective in enabling them to participate in the water planning and decision-making process.

⁸⁸Varley (2005).

⁸⁹Beyer (2006, 210).

⁹⁰Ibid., 207.

⁹¹Johnson (1997).

⁹²Xie (2009, 55).

Despite the fact that water laws in China have provided a simplified system for public participation,⁹³ most of these provisions exist only in principle and are very weak in practice.⁹⁴ The insufficiency of stakeholder and public participation has resulted from a couple of factors. First, China has a long history of centralized government, making decisions on water resources from the top-down without the involvement of the public. While there has been some development in incorporating public participation in laws and regulations in the past decades (e.g. Regulation on Public Hearings for Administrative Permits in Water Sector),⁹⁵ its application in practice is often manipulated by governments. Second, although there are guidelines and principles of public participation in the legal framework, there is no clear procedural regulation for institutionalized participation.⁹⁶ This too often leads to distorted implementation. Third, as a crucial precondition of public participation, information disclosure system has not been in place to ensure stakeholders' right to know. Fourth, as planning for water resource management has often been approached from an engineering perspective,⁹⁷ public participation in decision-making process is normally replaced by expert consultation, which provide a 'sound' excuse to exclude stakeholders and the public from involvement. The public are tended to be regarded as having a lack of interest and professional knowledge of water resources management, therefore a lack of participation ability. In some cases, independent experts and potential objectors from the public are prevented from joining the planning process because local governments are concerned they may have different views and consequently regard them as 'trouble-makers'.⁹⁸

The absence of public representatives in the RBCs and related decision-making processes not only undermines the legitimacy of water policies and planning due to lack of affected stakeholders, but also generates conflicts and resistance to implementation if the interests of those affected are not considered.

2.3.2 *Horizontal Institutional Settings*

With regard to institutional settings on a horizontal level, it shows a very complicated intersecting picture, which is dubbed as the 'Nine Dragons Governing the Water'.⁹⁹ These 'nine dragons' (not literally mean nine authorities) from different sectors and with different interests of water resources, as a result, lead to sectoral

⁹³See e.g. Water Pollution Prevention and Control Law of People's Republic of China (2008, art 10).

⁹⁴Wouters et al. (2004, 307).

⁹⁵Regulation on Public Hearings for Administrative Permits in Water Sector (2006).

⁹⁶Geng et al. (2010).

⁹⁷Easter and Dixon (1991).

⁹⁸Geng et al. (2010).

⁹⁹Feng et al. (2006).

and fragmented water management. The original objective of this institutional setting is to improve water management efficiency and effectiveness from different aspects. However, due to unclear responsibility distribution and insufficient coordination mechanisms, this institutional setting has become a barrier for effective water management.

At the central level, several equivalent departments under the State Council share water management responsibility with the MWR from different perspectives. As shown in Fig. 2.2, the main ministries involved in water resources management are the MWR, MEP, MOA, the Ministry of Transportation, the Ministry of Construction, the State Forest Bureau, the State Development and Reform Commission, the Ministry of Health, the State Electric Power Company and the Ministry of Communication. According to sectoral laws and regulations (e.g. 'Water Law', 'Agriculture Law' and 'Environmental Protection Law'), they are entrusted with certain power to engage in water management within their responsibility scopes. For example, the MWR is mainly responsible for surface and ground water management, flood control and water resources planning from the perspective of water quantity; the MEP focuses on formulation and implementation of national water protection plans to prevent and control water pollution; and the MOA has the responsibility to control agricultural non-point source pollution and protect fishery aquatic environment. This institutional division of responsibilities at the central level is roughly reflected in equivalent line agencies at each of the lower levels of governments. Apart from water authorities above county level, which take charge of water management within their jurisdictions, administrative departments of environment protection, land use, agriculture, construction and transportation also conduct their own responsibilities on related water issues.

Given the crosscutting nature of water resources, involving different authorities could provide a balance to different aspects and values of water resources, subjecting to the precondition that their responsibilities must be clearly defined or arranged. As illustrated previously, existing water legislation is developed based on sectors, which too often results in conflicting legal provisions due to the absence of efficient coordination. Furthermore, the lack of clear responsibility allocation in related water laws is likely leading to overlaps and conflicts when undertaking specific water management actions.¹⁰⁰ For example, while the MWR is responsible for monitoring and regulating the water quantity and quality of rivers to examine and improve their capacity in absorbing pollutants, it is also clear that the MEP takes charge of monitoring water quality to prevent water pollution by implementing regulations on water pollution prevention and plans on total pollution discharge control.¹⁰¹ In addition, both of them are involved in designating and

¹⁰⁰Cheng and Hu (2012, 253, 267).

¹⁰¹Feng et al. (2006).

Main water-related departments	Main water management responsibilities
Ministry of Water Resources	Surface and ground water management, river basin management, flood control, water and soil conservation, designation of water function regionalization, national water planning and policy making; supervision lower level implementation
Ministry of Environmental Protection	Aquatic environmental protection, water environmental function regionalization/zoning, establishing national water quality standards and national pollutant discharge standards, water pollution prevention and control, supervision the implementation
Ministry of Agriculture	Non-point source pollution control, protection of fishery water environment and aquatic environmental conservation, irrigation water protection
Ministry of Transportation	Pollution prevention and control of navigation of ships on rivers
Ministry of Construction	Planning, construction and management of water supply projects, drainage and sewage treatment projects, urban and industrial water use and urban water supply and drainage
State Forest Bureau	Forest protection and management for protecting watershed ecology and water resources
State Electric Power Company	Construction and management of large and mid-scale hydropower projects
Ministry of Health	Supervision and management of the drinking water standard

Fig. 2.2 Main water-related departments and their responsibilities on water management

developing water functional zones; both of them are responsible for managing, protecting and developing urban water resources; both of them have the power to coordinate transboundary water pollution disputes. The undefined responsibilities, the lack of effective coordination and cooperative mechanisms not only result in unnecessary duplicate data collection, and controversial plans and actions, but also impede the effective implementation of water-related decisions.

Another example of fragmented institutional settings is that water-related disasters such as floods and droughts are managed differently from other water issues. Not only is flood prevention planning formulated separately from river basin planning,¹⁰² but institutions are also organized differently. The main agencies involving in flood control and drought relief are China Meteorological Administration (CMA), State Flood Control and Drought Relief Headquarters (SFCDRH), National Disaster Reduction Centre of the Ministry of Civil Affairs (NDRC-MCA), MWR, NDRC and the Ministry of Land and Resources (MLR). As an administrative body of the MWR, SFDH is the main agency to make decisions and mobilize resources to engage in disaster mitigation activities. However, how to coordinate among these authorities that hold equivalent powers has not been clearly defined. At the basin level, there is the Flood Control and Drought Relief Headquarter (FCDRH) for each river basin responsible for the flood control and drought resistance. Although lead by the SFCDRH, they are administrative bodies of the RBCs. At the provincial, prefectural and county levels, the Flood Control and Drought Relief Office (FCDRO) under corresponding local water authorities are in charge of local floods and droughts. A complicated nexus exists among the MWR, MCA, SFCDRH, RBCs, FCDRH and local FCDROs, resulting in conflicts when clear responsibility allocation is absent. For example, the SFCDRH, MCA and other relevant government departments have their own schemes for declaring an emergency status, but with completely different criteria.¹⁰³ The inconsistent actions undermine the emergency response and the effectiveness of relief efforts. Therefore, interdepartmental coordination needs to be improved to provide a more consistent response.

From above analysis, it is reasonable to conclude that this institutional structure is controversial at several points and impedes the effective management of China's water resources. They 'are costly due to their complexity, the need for a high level of consistency and the involvement of multiple government agencies, each with their own priorities'.¹⁰⁴ Unless significant progress is made to establish integrated, efficient and effective institutional settings, IWRM could not be implemented in its desirable manner.

¹⁰²Water Law of People's Republic of China (2002, art 17).

¹⁰³Ye (2012, 94).

¹⁰⁴Cosier and Shen (2010).

2.4 Practices of the IWRM in China

The implementation of IWRM is not isolated, but is often influenced by various economic, social and political factors. The political transition from a totalitarian regime to an authoritarian regime, the economic transition from a command and planned economy to a market economy, and the social transition from administrative dominated management approaches to a combination of administrative, legal and market approaches have the great potential to redefine and shape China's approaches to managing water resources.¹⁰⁵ In line with these transitions, water resources management in China is undergoing a transition from engineering-oriented and a supply management water management regime to a resources-oriented and demand management regime. In many cases, however, water management practices in the river basins still exhibit the coexistence of tradition and modern water management regimes.

2.4.1 *The Status of IWRM in China*

Given severe water problems, taking into account the state-of-art water management practices and successful international experiences, IWRM is expected to play an increasing and meaningful role in relieving stringent water crisis. Chief engineer of the MWR, Liu Ning, notes that 'without IWRM, China's total annual water supply will reach 800–900 billion m³ in the next 25 years or hit the limit of the country's total water supply'.¹⁰⁶ Compared to current fragmented, messy and single-objective water management regimes, IWRM is more likely to achieve sustainable water management through its integrated, coherent, collaborative and participatory framework.¹⁰⁷ For instance, while current fragmentation among sectors and jurisdictions has been the main obstacle of achieving sustainable water management, the coordination of cross-sector and cross-jurisdiction in IWRM will greatly facilitate effective and sustainable water management at the basin level.¹⁰⁸ Within the IWRM framework, strategic operational planning and implementation is processed, stakeholder participation is properly integrated, and economic efficiency, social equity and environmental sustainability are fairly balanced.¹⁰⁹ An expert from the GWP commented that:

¹⁰⁵Economy (2010, 237).

¹⁰⁶Liang (2005).

¹⁰⁷Zhang et al. (2010, 123).

¹⁰⁸Ibid., 125.

¹⁰⁹Ibid., 123.

[I]t is a must for China to use IWRM for its future sustainability as it can help all concerned authorities promote the co-ordinated development and management of water, land and related resource.¹¹⁰

Along with the evolution of the concept of sustainable development, which has gradually become a national priority in China, the principles of IWRM are being applied with a view to sustainable water resources management.¹¹¹ The adoption and implementation of IWRM is particularly facilitated by amendments to the *Water Law* in 2002.¹¹² Some important features of IWRM can be demonstrated as follows:

- (1) the Chinese State Council holds the ownership of water resources on behalf of the Central Government;¹¹³
- (2) IRBM and administrative management are combined to manage the river basins;¹¹⁴
- (3) the MWR directs unified water resources management and supervision throughout the country, while local water authorities take their responsibilities within their own corresponding jurisdictions;¹¹⁵
- (4) integrated planning should be undertaken by regarding a river basin as a basic unit of management;¹¹⁶
- (5) national strategic planning, river basin planning, regional planning, and also the mid-and-long term planning should be developed and managed in line with each other with respect to the demand and supply of water;¹¹⁷
- (6) the plan for a region within a river basin should be subordinated to the comprehensive river basin plan etc.¹¹⁸

The above provisions clearly indicate that some key IWRM elements have been written into current water legislation, laying important foundations for integrated water management at the basin level, from water planning, responsibility allocation to implementation and monitoring. These salient features of IWRM in the 2002 Water Law mark historic progress over the previous water management regime in China.

The status of IWRM has been further reinforced in the national Five Year Plan (FYP), which is the most significant blueprint for China's national economic and social development. The 11th Five-Year Plan (The 11th FYP) (2006–2010) set out a number of policies and priorities for water resources management, including:

¹¹⁰Liang (2005).

¹¹¹Chinese Academy of Science (2007).

¹¹²Song et al. (2010, 501).

¹¹³Water Law of People's Republic of China (2002, art 3).

¹¹⁴Water Law of People's Republic of China (2002, art 12).

¹¹⁵Water Law of People's Republic of China (2002, art 12).

¹¹⁶Water Law of People's Republic of China (2002, art 14).

¹¹⁷Water Law of People's Republic of China (2002, art 15).

¹¹⁸Water Law of People's Republic of China (2002, art 15).

(1) adopting a more unified management system; (2) shifting from supply-side to demand-side management; (3) integrating river basin management with regional management; and (4) establishing a preliminary system of water rights trading.¹¹⁹ All of these provisions concerning water resources management at a national level signify a requirement of shift in the water management regime and support the implementation of IWRM in China.¹²⁰

Nonetheless, not all of these initiatives cover all what is necessary to properly develop and implement the IWRM regime.¹²¹ First, while China is moving towards an IWRM regime and taking the entire river basin into account when planning and allocating water resources,¹²² the use of the IWRM regime is presented in the Chinese literature as more developed than it seems to be in reality.¹²³ Although cautious and progressive steps on developing legal framework and institutional arrangements have been taken to keep pace with the requirements of the IWRM regime, the traditional water management regime is still very influential among water communities. The provision that ‘river basins should be managed by RBCs in conjunction with local governments’ and the limited power entrusted to RBCs in the 2002 Water Law is one of the prominent examples to illustrate IWRM’s embarrassing status in China’s water legislation. Furthermore, as previously mentioned, effective IWRM should be underpinned by well-designed legal framework, cooperative institutions, transparent and participatory decision-making processes. All of them are based on advanced legal, economic, political and social governance systems. At present, China is on an economic, political and social transition stage, having very limited ability to embrace an IWRM regime in a complete manner: the laws are poorly developed, institutions are fragmented and stakeholders’ participation is curtailed severely. These impediments are not conducive to widespread and effective implementation of IWRM.

2.4.2 *The Implementation of the IWRM in China*

Implementing the IWRM at the Basin Level

The IRBM is the adoption and implementation of IWRM at a basin level due to the recognition that the river basin is a basic unit suitable for integrated water and land resources management. It shares majority of the common attributes with IWRM, such as the coordination of water, land and biological resources, the integrated management of upper and lower stream, the participatory mechanisms to solve conflicts and compromise among competing water users, and the balance among

¹¹⁹The Eleventh National Economic and Social Development Five-Year Plan (2006, Chap. 25).

¹²⁰Jiao (2010).

¹²¹Zhang et al. (2010, 125–126).

¹²²Water Law of People’s Republic of China (2002, art 14).

¹²³Makkonen (2005).

economic, social and environmental aspirations.¹²⁴ The international community has recognized the status and significance of IRBM in various international documents. For instance, the 1992 Earth Summit declared that ‘integrated water resources management, including the integration of land- and water-related aspects, should be carried out at the level of the catchment basin or sub-basin’;¹²⁵ the 2002 World Summit for Sustainable Development also clarified that ‘the river (or water) basin should be used as the basic unit for integrating management’.¹²⁶

In China, the IRBM has also been provided with legal status in the 2002 *Water Law* through the provisions about river basin planning and river basin management.¹²⁷ It has been recognized by the CCICED (China Council for International Cooperation on Environment and Development, the high-level consultative body providing strategic consultation to the State Council on issues concerning environment and development) as the fundamental platform for pursuing the harmonization between people and nature, urban and rural areas, economic and social development.¹²⁸ Nonetheless, the IRBM is by no means a simple combination of the water resources, land and forest management. Rather, based on the ecological system theory and the extensive participation of stakeholders, it is intended to remove departmental, sectoral and administrative barriers in the management of river basin in order to build a systematic and comprehensive management regime to rejuvenate the river. It also requires a transformation in mentality, legislation, institutional arrangements and management approaches. The full understanding and implementation of IRBM takes some time and requires some significant changes in current social and economic perspectives. On many occasions, the concept of IRBM has been used more or less as a synonym for IWRM in China.¹²⁹

There is a considerable political commitment to implement IRBM at the basin level.¹³⁰ One of the prominent examples is the formulation of more comprehensive plans in the context of the river basins. As of 2013, integrated river basin planning (2012–2030) for seven river basins have been approved by the State Council.¹³¹ These new plans set aquatic ecosystem health as a key target in order to manage the river basins comprehensively and sustainably through river basin planning, integrated management and balancing different interests. They focus on flood and disaster prevention, river basin management approaches, aquatic environment conservation and the improvement of water use efficiency, reflecting the transformation in both water management mentality and approach.

¹²⁴CCICED Taskforce on Integrated River Basin Management (2004).

¹²⁵Agenda 21, Report of the United Nations Conference on Environment and Development (1992).

¹²⁶World Summit on Sustainable Development (2002).

¹²⁷Water Law of People’s Republic of China (2002, art 12, 14).

¹²⁸CCICED Taskforce on Integrated River Basin Management (2004).

¹²⁹Varis (2011).

¹³⁰WWF (2005).

¹³¹The Ministry of Water Resources (2013).

Compared to the progress of IRBM at a basin scale, many practical measures at the tributary or local level have been very innovative. For example, at the tributary level, the CCICED has worked with World Wildlife Fund (WWF) on various Yangtze tributaries to implement the IRBM regime. Case studies conducted by them in the YRB mainly include (1) Xianghexi River Basin; (2) Lake Zhangdu River Basin to examine wetland and river basin management; (3) Lake Poyang where WWF has been working with local stakeholders (government, NGOs, and community groups) to devise an IRBM Action Plan; and (4) Danjiangkou Reservoir (upper Han River).¹³²

The CCICED has also proposed to introduce IRBM governance in the Chishui River and the Tai Lake Basin (TB), which are important tributaries with natural and cultural values.¹³³ Chishui is the last free flowing river of the YRB and is the last refuge for many important fish species while the TB is one of the seven river basins with national significance identified by the MWR. These pilot programs will operate through establishing tributary commissions, undertaking tributary planning and engaging stakeholders to implement IRBM.¹³⁴ Experiences obtained and capacity built in these pilot programs are expected to provide reference for IRBM in other basins.

Implementing the IWRM at the Local Level

At the local level, since only limited legislative power has been given to cities, most of these reforms and initiatives occur from an institutional perspective (either by establishing new institutions or by facilitating institutional cooperation), to improve technical cooperation and bureaucratic efficiency. Two examples will be provided here to illustrate the implementation of the IWRM regime at the local level.

Example 1: Building Collaborative Mechanisms among Local Government and RBCs

Collaboration among RBCs and provinces with various interests is always one of the most challenging tasks for China's water managers. The fragmentation and conflicts among them have created most of the water problems. Current legal and institutional frameworks do not provide a resolution for these conflicts as discussed earlier. In recent years, many innovative measures have been undertaken towards the development of a collaborative mechanism and have acquired some useful experiences. For example, a 'Five plus One' model has been created to protect the water quality in the middle line of the SNWT project.¹³⁵ It is a significant innovation over current 'IRBM in conjunction with the jurisdiction management regime'. In 2009, the Yangtze water protection institution affiliated to CWRC—The Yangtze River Water Resource Protection Bureau (WRPB) organized a conference 'The Joint Meeting on Water Protection and Pollution Prevention in Water Source

¹³²Turner (2004).

¹³³CCICED Taskforce on Integrated River Basin Management (2004).

¹³⁴Ibid.

¹³⁵Changjiang Water Resource Commission (2011).

Areas' with participation from five prefectures: Hanzhong, Ankang and Shangluo of Shaanxi Province, Nanyang of Henan Province and Shiyan of Hubei Province.¹³⁶ The document 'Shangluo Declaration' generated at the meeting proposed to establish a joint meeting system which covers multi-department, multi-level river basin consultation mechanism and an information exchange platform to facilitate trans-jurisdictional and trans-departmental water resources management and conservation.¹³⁷ This 'Five plus One' model, which means five local governments plus the WRPB, could break the fence existing among jurisdictions and sectors, promoting more coordinated and harmonious water usage, protection and development. The administrative body it set has made remarkable progress in developing law enforcement coordination mechanism through promoting teamwork in water quality monitoring, investigating illegal activities and responding to water pollution incidents.¹³⁸

Example 2: Setting up Institutions to Integrate Water Quantity and Quality Management

In practice, several highly industrialized cities (including Shenzhen, Beijing, Shanghai and Taizhou in Jiangsu province) which are confronting with the pressure of water scarcity and water pollution have begun to implement IWRM by setting up overarching water authorities to integrate water quantity and quality management.¹³⁹ The supervisory and planning functions of water conservancy and resource management are integrated into this single institution, which carries the ultimate responsibility for improving information exchange and cooperation and for solving conflicts among various related governmental authorities.¹⁴⁰ Although these water authorities are not recognized strictly as integrated institutions due to their lack of authority over urban water supply and sewage treatment, and water quality control, their experiences provide valuable insights for larger scale IWRM.¹⁴¹

To sum up, Chinese water managers have been aware of the necessity of implementing the IWRM and IRBM. However, given the complicated circumstances of the various river basins, most of which involve several provinces with different levels of development, from the impoverished western area to prosperous east, the variety and escalating gaps among them makes IRBM implementation very challenging.¹⁴² Fortunately, considerable progress has been made at the tributary or local levels on a number of different water management fronts. What various levels of water managers need to realize is that no matter at which level IRBM is implemented, a comprehensive mindset and regime must replace the current fragmented and localized thinking and paradigm.

¹³⁶Changjiang Water (2011).

¹³⁷China's River Water Resources Protection Bureau (2012).

¹³⁸Chen (2014).

¹³⁹Ministry of Water Resources (2003).

¹⁴⁰Lee (2006, 18).

¹⁴¹Ibid.

¹⁴²Varis and Vakkilainen (2001).

2.4.3 *The Transition to a Resource-Oriented Mentality*

Preference to Engineering Water Management

China has a long history of managing water resources through project construction, river diversion and canalization, mainly due to the requirements of agriculture and floods control. Some famous examples are Dujiangyan and Zhengguo Canal of Warring States, and the Grant Canal of Sui Dynasty. In ancient times, controlling water resources by constructing projects was usually connected to the legitimacy of political control as well as social stability. Both the Republic of China (1911–1949) and the People's Republic of China (1949–) have inherited this preference to large-scale infrastructures. Even today, the Chinese government still focuses its efforts and investment in expanding irrigation systems, conducting trans-regional diversions and building different scales of dams.¹⁴³

In addition to the legacy from China's thousands of years of history, China's deep-seated understanding of nature-human relationship also imposes a profound influence on China's approaches to managing water resources. Water management in China has been dominated by an 'engineering' (*gongcheng shuili*) mentality,¹⁴⁴ which focuses on human economic interests and the capacity to transform nature. Furthermore, the identification of water resources management as a technical problem in China contributes to the widespread adoption of engineering construction. This preference is further enhanced by China's predominate water professionals in various levels of water authorities. The economic visibility and certainty of hydraulic projects also contributes to their priority among various approaches. As a result, both central and local water authorities prefer to respond to water problems by investing in massive new hydraulic infrastructures rather than innovative management approaches.¹⁴⁵ Perhaps the most persuasive supply-augmentation example is the ambitious and gigantic SNWT project that contains eastern, central, and western routes. This project is proposed to meet projected water demand growth of the north, especially the Beijing-Tianjin region, thus redressing China's fundamental geographic disparity in water availability, through transferring some 45 billion m³ water per year from central and southwest China.

This entrenched philosophy to control water resources and resolve certain water problems has subjected most China's rivers to intensive fragmented construction of dams, reservoirs and other floods protection infrastructure.¹⁴⁶ On the Yangtze River alone, there are an estimated 50,000 dams, including the largest one in the world—the Three Gorges Dam.¹⁴⁷ Due to the great economic benefits of building dams in

¹⁴³Wouters et al. (2004, 247).

¹⁴⁴Boxer (2001, 335–341).

¹⁴⁵Ibid.

¹⁴⁶Wang et al. (2010).

¹⁴⁷Gleick (2008, 91).

terms of satisfying growing energy needs and rapid economic development, many new dams, especially those small-scale ones, are still under construction, without fully understanding and assessing their environmental and social costs.

In 2001, the former minister of the MWR, Wang Shucheng, proposed that ‘the optimized allocation of water resources must rely on four approaches: the hydraulic, administrative, economic and scientific approaches.’¹⁴⁸ Yet, in practice, the hydraulic approach is still attracting most of the attention from the water management community. The social and legal aspects of water management have generally been ignored. The adoption of these hydraulic construction measures could temporarily resolve some water problems, but at the same time, they have resulted in an inappropriate expensive approach that requires evaluation and public acceptance.¹⁴⁹

In addition, many researchers, both domestic and international, have revealed that the over-reliance on hydraulic projects have caused a number of environmental and ecological problems due to the interruption of water integrity, the alteration of physical habitats and the disruption of longitudinal connections.¹⁵⁰ The deterioration of aquatic ecosystem and land habitat, the loss of biodiversity and the drying up of the river-system are examples of these adverse impacts. Its negative effect has also been confirmed in the recent severe droughts in the YRB—provinces are proud of their abundant water resources and advanced water facilities did not demonstrate their superiority in tackling severe droughts.¹⁵¹ The over-reliance on structural measures also leads to a tendency of overconfidence in predictions on future water status, neglecting the potential change in future hydrologic variability.¹⁵² This may be challenged by climate change impacts that are with high uncertainty and unpredictability.

Transiting to Resources-Oriented Management Mentality

Given the adverse impacts of an engineering mentality in managing water resources, there has been a move to rethink and reevaluate this long-standing water management approach. A debate about the balance between the continuous investment in hydraulic projects and the investment in better water management regime has also been conducted.¹⁵³ This debate argues that: first, the benefits and costs of hydraulic projects must be re-evaluated. Not only should the economic cost of a project be assessed, but also its environmental and social cost recalculated; second, other water management choices such as water efficiency improvement, water rights adjudication and water market development should be given equal consideration. Study conducted at the country level reveals that developed countries

¹⁴⁸Chen and Chen (2005).

¹⁴⁹Wang et al. (2012, 925).

¹⁵⁰Qian et al. (2009).

¹⁵¹China.com (2011).

¹⁵²Cheng et al. (2009).

¹⁵³Brown and Lall (2006, 308).

typically require improving water management regime while those less developed prefer dam and reservoir construction.¹⁵⁴ Nonetheless, it is important for less developed countries to realize that improving water management regime will benefit the nation's water development in the long run. In terms of China, where an engineering mentality has been embedded for a long time, redefining and reinterpreting water resources and the management regime is necessary in order to implement IWRM.

Also, productive collaboration conducted with western countries like 'EU-China River Basin Management Programme' help Chinese water managers to adopt a new 'resource' concept and ideology which 'integrates engineer intervention, economic assumption and management strategies to achieve interrelated water quality, water supply, and water conservation goals'.¹⁵⁵ In 1999, the MWR introduced a distinctive perspective to Chinese water management—'resource-oriented' concept (*ziyuan shuili*). In line with this new understanding, on the one hand, the role of water resources has been expanded from fulfilling human needs to recognizing its inherent natural, ecological and social values. On the other hand, water management is recognized as not only a technical issue managed by top-down command-and-control measures but also a social, economic, legal and institutional issue managed through comprehensive approaches. While an engineering mentality implies reliance on administrative and technical approach to manage water resources, this 'resource' mentality entails system thinking and an integrated paradigm of market-based, administrative, scientific, legal and institutional solutions. Since China is on a transition stage economically, politically, socially and legally, this 'resource' mentality will take some time to be fully implemented in practice. Contradictory messages may still be manifested in China's water management community in a short time.

2.4.4 *The Transition to Water Demand Management*

Population growth, urbanization and economic development are considered as the main driving forces of water crises and the increasing gap between water supply and demand in contemporary China.¹⁵⁶ Besides that, climate change as a fundamental driver of the water cycle not only affects hydrologic processes, but also increases the demands for water supply, which makes water problems in China more complicated than ever before.¹⁵⁷

¹⁵⁴Ibid., 308, 315.

¹⁵⁵Boxer (2001, 335–341).

¹⁵⁶Wang et al. (2012, 924).

¹⁵⁷Wang et al. (2010).

China's Water Supply Management

As a legacy of planned economy and engineering-centered water management, China's water resources management are largely supply-driven. Wherever there is a water shortage issue, water managers would resort to finding water to meet the increasing water demand. Measures like massive investment in water conservancy projects (such as dams and reservoirs) and various water transfer projects are regarded as best ways to secure China's water supply. Water management strategies developed under this supply-driven paradigm inevitably put intensive efforts on accessing new water resources, capturing a greater percentage of available surface or ground water and increasing total water storage via project building.¹⁵⁸

With a very narrow focus on maximizing the quantity of water availability for direct use, this management approach has come at expensive, irreversible and delayed ecological, economic and social costs.¹⁵⁹ Extensive water use without considering water utilization efficiency has contributed to water overdraft, increasing water pollution and more intensified contradiction between supply and demand. The unrestraint water resources exploitation and ignorance of water carrying capacity, too often, lead to the deterioration of aquatic environment and vulnerability to emerging pressures. Freshwater resources are finite and cannot be explored endlessly to fulfill the infinite human desire for water. It should be recognized that water transfer through the gigantic SNWT project may alleviate Northern China's thirst for water in a short time, but it will not be able to resolve chronic water shortfall in a sustainable way. Grim water crisis has pushed Chinese water managers to a turning point where water management paradigm should be reflected and transformed.

Transiting to Water Demand Management

Water demand management was born when water scarcity, water pollution and increasing water supply cost was perplexing western countries. As an integral part of the IWRM regime, it is usually approached through implementing a wide range of technical, planning, economic, legal and participatory instruments.¹⁶⁰ Its strong preference to non-structural approaches is also in line with the transition to a resources-oriented mentality discussed previously. Different from supply management, which focuses on finding new water resources, water demand management commits itself to regulating water demand, optimizing water resources allocation and improving water-use efficiency. The regeneration capacity and carrying capacity of water resources is taken as the threshold when balancing the increasing need for water and limited water supplying capacity. More importantly, the turn to water demand management implies a transformation of legal methods in managing water resources. Regulations on water-drawing permit is the center to implement total volume control, the practical way to allocate water resources and the

¹⁵⁸Cheng et al. (2009).

¹⁵⁹Wang et al. (2011).

¹⁶⁰Gumbo et al. (2005).

prerequisite to perform water right trade. Water authorities who grant initial license are required to consider water supply capacity and balance various water use application. Water rights holders are then encouraged to trade in water market based on different water use efficiency. Both administrative powers and market mechanisms are expected to transfer water to sectors with higher value or more productivity. The great advantage of water-demand management paradigm in water conservation, water pollution control and water utilization has made it advocated by countries with very diverse water endowment. Not only water-strapped countries like Israel and Singapore, but also those with abundant water like America and Canada, advance water demand management positively.¹⁶¹

China starts to carry out water demand management after 2000 with the advocacy of the MWR. Yet, in practice, both water plan and water management strategies are still lingering on traditional water supply management. This may result from misunderstandings of water managers and researchers on water demand management:

- (1) water demand will certainly continue to increase along with economic development, industrialization and urbanization;
- (2) water conservation is not related to water pollution prevention;
- (3) water distribution should be in line with local economic development plans;
- (4) water savings in agriculture only means saving irrigation water.¹⁶²

With regard to the first misunderstanding, Wang et al. illustrated the relationship between socio-economic development, the state of water resources and water management strategies (Fig. 2.3).¹⁶³ From this figure, it is clear that, in the short term, water demand will increase with social and economic development, but will decrease after reaching tipping point C. China is presently at the B → C stage where water demand has exceeded water resources and availability but water is still managed by supply-driven approaches. Wang's paper revealed that the transformation from water supply management to water demand management could serve as a turning point for the change in water quantity demand. The gap between declining water demand and comparatively stable water resources (C → D) could only be bridged through this shift.

Water demand management approaches such as water saving technology, water price setting and water rights allocation, if adopted, will benefit our society in the end: the total water demand could even decrease, the harmony between ecology and human activity could attain and the water quality could be improved. More importantly, these water demand management approaches could stabilize total water demand by changing water demand structures and increasing water use

¹⁶¹Wang and Wang (2009).

¹⁶²Qian et al. (2009).

¹⁶³Wang et al. (2012, 931).

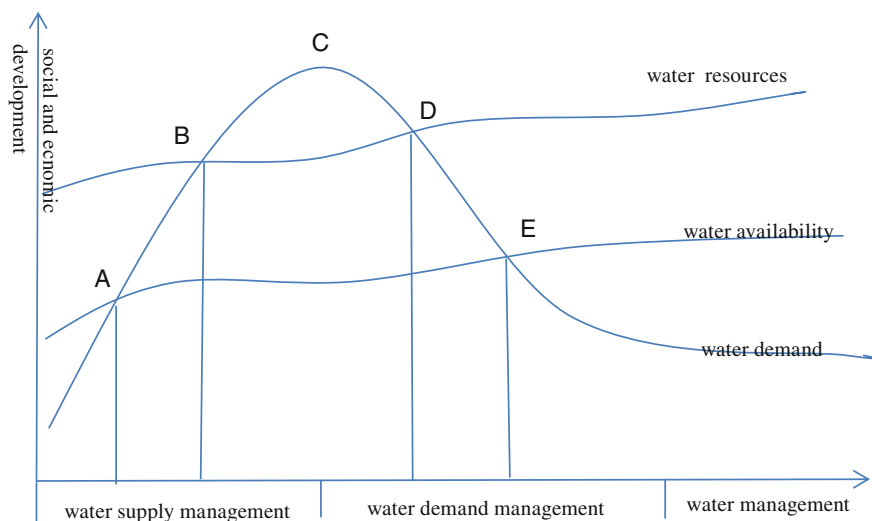


Fig. 2.3 Relationship between social-economic development, water demand and water resource management. *Source* Modified from Wang et al. (2012)

efficiency.¹⁶⁴ The stabilization of water demand on the other hand will also benefit water planning by reducing the difficulty in water utilization forecast in the future.

Along with the new understanding of water resources and water management rules, prevalent misconceptions could be rectified:

- (1) the economic development path and model must be adjusted to adapt to the natural availability and variability of water resources rather than the opposite;
- (2) water recycling and water pollution prevention is an important way to meet water demand; and
- (3) water quality and water quantity should be managed in an integrated way.

As water demand management is a relatively new approach for water managers, how to implement it will remain a very challenging task. Nonetheless, three legal methods could be proposed to control total water demand and improve water efficiency:

- (1) setting clear rights to own and use water in order to reduce water conflicts and rivalries;
- (2) formulating effective water trade market and rules on the basis of water conservation to improve water use efficiency;
- (3) establishing dispute settlement mechanism and promoting regulation enforcement to ensure the commitment to water rights holders.

¹⁶⁴Qian et al. (2009).

In another research article, Wang et al. presented a framework for implementing water demand management in the middle reaches of the Yellow River. In this framework, tools and techniques to promote water demand management include (1) institutions and laws; (2) market-based measures such as water prices and tariffs; (3) non-market measures such as education and public participation; (4) direct intervention from governments and water authorities.¹⁶⁵ It is apparent that these proposals share much in common, reflecting the trend of the contemporary water world: the combination of market-based measures and non-market measures such as legal and institutional approaches; and the balance of top-down and bottom-up management approaches. These measures and approaches are expected to improve the capacity of water resources management in responding to changing water demand due to socio-economic development and the emerging climate change.

As mentioned in the previous part, there is a clear requirement in the 11th FYP that water management should shift from supply-driven to demand-driven. In order to achieve that goal, at a central-level government conference about water reform in 2009, a water policy ‘implementing the most stringent water resources management system’ (SWRM) was proposed to address current water problems and promote sustainable water use.¹⁶⁶ Three objectives (so-called ‘three red lines’) were announced to establish clear and binding limits on water quantity usage, efficiency, and quality—a water volume control goal which requires to consider the availability of total water volume; a water efficiency improvement goal to improve water use efficiency to save water; and a water-functional-zone pollution control goal which sets aquatic environment as a high priority. According to its content, SWRM actually requires a demand management approach through water availability considerations, water efficiency improvement and water pollution prevention.

At the backdrop of pressing water crisis in China, the requirement to implement the SWRM has been set out in the 12th FYP as an approach to realize a water-saving society.¹⁶⁷ Series of regulations have been enacted to ensure the achievement of stated target. In January 2012, the State Council released the ‘Proposal on How to Implement the SWRM’.¹⁶⁸ It not only sets the general principles and goals of water utilization, but also puts forward corresponding measures of managing those ‘three red lines’. Safeguarding measures are brought out as a significant part of this proposal, mainly including responsibility distribution and assessment mechanism, water monitoring, water legislation and institutional arrangements as well as the financial support. A year later, the ‘*Evaluation Methods of Implementing the SWRM*’ (Methods) was adopted by the State Council to set the goal of total water volume control, water use efficiency control and water quality

¹⁶⁵Wang et al. (2011, 562–564).

¹⁶⁶People Net (2011).

¹⁶⁷The Twelfth National Economic and Social Development Five-Year Plan (2011, Chap. 22).

¹⁶⁸Proposals on Implementing the Most Stringent Water Resources Management System (2012).

control of each province by 2030.¹⁶⁹ According to the Methods, the completion of the allocated goals and the implementation of SWRM are regarded as an important index of assessing local economic and social development performance.¹⁷⁰ It implies that water security has been recognized as strategically important to national security as is food security.¹⁷¹ Yet, this ambitious water management initiatives should be endorsed with three pillars—clarified legal statements on responsibilities to avoid bureaucratic fragmentation and capacity discrepancies threaten; a market mechanism to alleviate administrative cost and optimize water allocation; and most importantly, advancing to an IWRM regime to manage water quantity and quality in a holistic manner in the context of institutional coordination and cooperation.

2.5 Conclusions and Recommendations

2.5.1 Conclusions

The IWRM in China: Still Struggling

The above analysis shows that Chinese water managers have been aware of the importance of managing water in a holistic and proactive way and have started the transition towards the IWRM regime through a series of water-related policies, legislation and institutional settings. Nevertheless, we have to acknowledge that the whole transition is not an easy process. Existing water management framework is influenced strongly by the historical legacy of the planned economy, strong administrative control and weak civil society. As a result, China's water policies, legislation and institutional settings are largely engineering-based, supply-driven, fragmented and usually have limited involvement of stakeholders.¹⁷² Many scholars and water managers reach a consensus that ill-designed legal framework, fragmented institutional arrangements and the ineffectiveness to implement IWRM accumulate to the root causes of current China's water crises.¹⁷³

Implementing the IWRM regime is a long-term, progressive and innovative process for Chinese water managers. It requires an improvement or even a shift in present legal and institutional thinking and arrangements, in order to provide an effective enabling environment. Unfortunately, revising legislation and reforming institutions are subjected to certain social and political context, making it difficult to

¹⁶⁹The Evaluation Methods of Implementing the Most Stringent Water Resources Management (2013).

¹⁷⁰The Evaluation Methods of Implementing the Most Stringent Water Resources Management (2013, art 4).

¹⁷¹Xu (2012).

¹⁷²Cheng and Hu (2012, 253, 272).

¹⁷³Zhang et al. (2011).

keep pace with the requirement of IWRM. At the basin level, the IWRM regime in China has undergone a different evolutionary path from other countries where enforceable legal and institutional frameworks have been established and where IWRM has a better story.

A prominent example is Murray-Darling Basin (MDB) located in dry Australia continent. To redress rivalrous water use among riparian states, the federal government initiated the IWRM regime by negotiating the 'Murray-Darling Basin Agreement' with relevant state governments. Aiming to 'promote and co-ordinate effective planning and management for the equitable, efficient and sustainable use of the water, land and other environmental resources of the MDB', this agreement established the political (cooperation between federal and state governments), institutional (Murray-Darling Basin Ministerial Council and Murray-Darling Basin Commission), legal (Murray-Darling Basin Act 1993) and financial (annual investment of AUD \$8 million) mechanisms for implementing IWRM.¹⁷⁴ In the meantime, the Community Advisory Committee was set up, providing the Murray-Darling Basin Ministerial Council (Council) with advices and perspectives in order to build a two-way communication channel between the decision makers and communities.¹⁷⁵ Firstly framing the water problems and then establishing related policy, legal and institutional frameworks, this path is able to minimize conflicts and inconsistency at a very early stage.

On the contrary, China develops its IWRM regime by integrating the concept of IWRM in the context of existing legal and institutional frameworks that are oriented by a fragmented management mentality. Cautious and prudent steps on legal framework and institutional arrangements have been taken to cater for the requirements of IWRM. However, these tentative steps do not entail unequivocal and systematic support for IWRM. IWRM still struggles to survive within current fragmented and sectoral legal and institutional frameworks. In many cases, the inconsistencies between IWRM requirements and the current legal and institutional frameworks create most of the problems. As a result, the government continues to tinker with water legislation and tweaking institutional system to eliminate conflicts and promote IWRM. Compared to Australia, this path of implementing IWRM is more likely to lead to conflict and contradiction. This can be attributed, in part, to the extraordinary transition in China's politics, economy and social development. Progress will be inhibited undoubtedly, to some extent, during a transition stage. However, if Chinese water managers are able to grasp this opportunity to embrace IWRM through continuously improving legal and institutional frameworks, sustainable water development still could also be achieved at a lower cost. Although political, economic and social scenarios are distinctive between Australia and China, and thus complicate the efforts to draw useful references and lessons, understanding these different evolving paths could help Chinese water managers

¹⁷⁴Department of Environment and Heritage, Australia Government (2004).

¹⁷⁵Ibid.

better understand the reasons of the current IWRM dilemma and reorient future focus and development.

Hope of the IWRM in the Future

Research in this chapter reveals that IWRM at the basin level has made some progress, but it is by no means ambitious enough. By contrast, some lower level pilot programs have manifested their effectiveness in resolving local water crises, such as the IRBM cases studies at the tributary level with the help of the WWF and CCICED. Their effective and thriving applications in practice indicate that integrated sub-basin management may be a feasible and promising approach for most river basins. This approach of pilot schemes could also be regarded as a way of exploring uncertainties in the context of economic, social and political transition. Nonetheless, it must be adopted and implemented along with proper coordination with actions taken at the basin level. Only with clarification of responsibilities and effective coordination mechanisms will these pilot programs be able to deliver effective IRBM at a sub-basin or basin scale.

Pilot programs at the tributary level, however, are significantly different from the historical management regime which operated at local level without due consideration of its impacts at the basin level. It has been acknowledged that, based on a basin level vision and planning perspective, decentralizing management responsibilities to local governments is the key to successful IRBM.¹⁷⁶ Focusing on and starting from the interests of the whole basin, implementing IRBM at the local level signifies a paradigm shift compared to historical fragmented management.

2.5.2 Recommendations

To achieve sustainable water management in China, implementing IWRM, improving existing legal framework and reforming institutions are regarded as three fundamental priorities. To be more specific, as previously emphasized, the effective implementation of the IWRM regime is determined by an integrated legal framework, strong institutional capacity, systematic planning and effective coordination as well as institutionalized public participation.¹⁷⁷ Therefore, streamlining the move to an IWRM regime requires a range of policy, legal, institutional and management reforms at national, river basin and local levels. The previous analysis, however, indicates that IWRM reforms have been insufficient, incomplete and largely unsuccessful to this point in time. Recommendations in this part will focus on coordinating existing and conflicting legislation, building collaborative mechanisms and establishing a viable platform for public participation.

¹⁷⁶CCICED Taskforce on Integrated River Basin Management (2004).

¹⁷⁷Song et al. (2010, 504).

Improving Water-Related Legislation

While specific legislative provisions are updated continuously to facilitate the new requirements of good water governance, the mindsets underpinning water laws must be updated as well. Majority of Chinese water laws enacted in the last century have been stipulated and implemented with the perception that water resources is a tool to ensure and enhance economic and social development. Decades later, water managers have developed modern water concepts of which the inherent value of water resources in preserving ecosystem has been recognized. Although existing water laws have taken some modern water management approaches, they are still steered by a traditional water management mentality.

Moreover, definitions often have a decisive impact on the quality of legislation. Related water legislation should clarify the definitions of crucial terms, such as water rights, institutions and stakeholders. Obscure language such as ‘relevant departments’, ‘relevant regulations’ and ‘encourage’ should be avoided to prevent misunderstandings and responsibility evasiveness. A strong and cohesive national legislative framework is also very important for the implementation of the IWRM regime. Regulations related to the river basins needs to be overhauled to reduce inter-institutional or inter-jurisdictional contradictions and to provide the RBCs with legal power of formulating plans and enforcing laws. Different functional departments involving different aspects of water resources at various levels (including local government) should take a more coordinative and collaborative approach in drafting water-related laws and regulations, so that any water-related law or regulation is made or amended by relevant authorities on a consensus basis before it is submitted to the legislature for deliberation and approval.¹⁷⁸ This approach could significantly minimize conflicts and improve law enforcement.

Reforming Institutional Settings

An integrated, efficient and coordinated institutional system is at the heart of enforcing IWRM requirements. This can be approached through two different paths: (1) reforming current institutional system to develop a super-ministry for the national water management; or (2) establishing effective cooperation and coordination mechanisms. The former is more of a long-term goal while the latter can be undertaken in the short-term to facilitate cooperation.

For the first approach, there has been some successful example in other countries. For example, a super-ministry system has been effective in delivering sustainable water management in France through the Ministry of Ecology, Energy, Sustainable Development and Sea.¹⁷⁹ By adopting a cross-sectoral and cross-departmental approach, this institutional structure is able to cope with comprehensive and complicated water problems from multiple perspectives. Recently, with the progressive transition to a market-oriented economy, institutional reforms

¹⁷⁸Xie (2009, 46).

¹⁷⁹Yang (2013).

to establish a super-ministry system at the central level are in progress in China. The focus of this reform is to amalgamate those departments with overlapping or similar responsibilities in order to simplify and standardize administrative approval procedures and improve management efficiency.¹⁸⁰ Although some positive proposals were discussed in water management area, such as the integration of the Ministry of Land and Resources within the MEP and the combination of the MWR with the MOA,¹⁸¹ they eventually were not approved by recent institutional reform plan. Nonetheless, it is important to emphasize that the super-ministry reform should not signify a simple consolidation of correlated departments. More importantly, institutional reform in China should be accompanied by the redefinition of the nexus among government, market and society. In line with that, government's role is supposed to transform from 'controlling and administering' to that of 'regulating and serving'. Clear responsibility allocation among various departments should also be taken as an essential part of reform, which could contribute to the coordination, consistency and balance between planning and implementation, as well as between river basin interests and local interests.

Another reasonable option in the short term is to enhance the coordination and collaboration among different departments and with various levels of government. This is necessary even in the context of the aforementioned super-ministry reform. The effective achievement and implementation of certain goals depends on the coordination and collaboration of a variety of actors.¹⁸² While some scholars advocate the establishment of a unified coordination institution or commission for water management of a particular region,¹⁸³ this book argues that it is better to take advantage of existing mechanisms or institutions by making some crucial improvements or reforms. At the central level, a 'Joint Inter-ministerial Meeting' is usually introduced to deliberate and review the comprehensive plan of river basins to coordinate interests of different ministries and seek their advices. However, there has not been any statutory framework on how this meeting operates. In practice, the ministry that initiates the action usually dominates the process while the participation of other ministries is often pro forma.

In the future, it should be improved by institutionalizing coordination procedures and mechanisms to deliberate basin-level policies, plans and regulations. Through these procedures and mechanisms, information and knowledge should be shared, coordinative water visions and goals should be discussed and developed, mutual dependence and trust among these ministries should be built and actions should be adjusted to deal with water crises and achieve the joint management of water resources. At the basin level, the RBCs could play a greater role in coordinating central and various levels of local government. Different from the traditional perception on coordination, which is conducted from top-down or among equivalent

¹⁸⁰Xinhua (2012).

¹⁸¹360doc (2012).

¹⁸²Scharpf (1978).

¹⁸³Feng et al. (2006).

entities,¹⁸⁴ the RBCs could be a coordinator or facilitator to bring together the central government who makes policies and plans, and local government who implements them. Developing the RBCs to be fully-fledged river basin commissions is crucial to build an institutional structure to coordinate basin interests and local interests.

The RBCs should be empowered to formulate river basin plans, decide important basin issues, mediate conflicted interests and invite affected public to participate in the decision-making process. They should be comprised of representatives from the MWR, the MEP, local levels of government and their related departments, water users, public representatives, specialists and other social beings.¹⁸⁵ Contrary to the suggestion of establishing a completely new institution like a Water Resources Management Committee,¹⁸⁶ this book argues that RBCs are able to provide a good platform for integrated planning, effective coordination and public engagement if it is authorized to carry out its responsibilities as a real river basin commission.

In addition, some platforms could also contribute to the coordination and collaboration among a variety of parties. The biennial ‘Yangtze Forum’ and has been established to bring together national and provincial officials and non-experts to discuss coordinated management of the YRB. The ‘International Yellow River Forum’, however, is not feasible for non-expert due to its strong international and scientific focus. More forums should be developed to bring various interests and voices. Nonetheless, the following aspects should be emphasized to make better use of these forums:¹⁸⁷

- (1) they should establish a coordination mechanism to involve various levels of government in the decision-making process;
- (2) they should develop a dialogue and participation mechanisms for stakeholders and the public to participate in decision-making process;
- (3) they should regularize its meetings by holding them on an annual basis.

Another quasi-government platform, the CCICED, could also play a greater role in facilitating the IWRM regime. On the one hand, it has the privilege to advise the State Council on water reform, while on the other hand it includes the WWF and International Union for Conservation of Nature and Natural Resources (IUCN) as members. The close relationship between the Chinese government and these international environment-oriented NGOs could contribute significantly to the implementation of IWRM by providing advice and incorporating international

¹⁸⁴Hanssen et al. (2013).

¹⁸⁵Yang (2012).

¹⁸⁶Song et al. (2010, 504).

¹⁸⁷Changjiang Water Resource Commission (2007).

experiences into the China's context.¹⁸⁸ These mechanisms and platforms should assist related governments, departments and water users to develop a common vision of sustainable water management as well as to formulate a consensus plan of action.¹⁸⁹

Advancing Stakeholder Participation

Lastly, successful implementation of the IWRM regime relies on participatory water management, which is absent in China's current IWRM practices. Since the development of stakeholder and public participation in the IWRM regime shares much in common with the requirements of climate change adaptation, these issues will be analyzed later in detail in Chap. 6.

The imbalance between human needs for predictable regular flows of water and the variable natural hydraulic patterns determines that water resources management regime and practices should be reflected and improved continuously.¹⁹⁰ It is further argued that only a combination of appropriate hard infrastructure, proper policy and legal instruments, adequate institutional capacity and committed management (including enforcement of policies, laws and regulations) will lead to an effective water management regime.¹⁹¹ This ultimately will determine the capacity this regime to respond adequately to external challenges, of which climate change is an emerging one.

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