Institutional Arrangements for River Basin Management: A Case Study Comparison of the United States and China

Abstract

This note compares institutional arrangements for water resource management in two river basins, namely, those of the Susquehanna River in the United States and the Changjiang (Yangtze River) in China. The Susquehanna River Basin Commission is composed of the US federal government and the three states of New York, Pennsylvania, and Maryland through which the Susquehanna River passes. Under the authority of the Susquehanna River Basin Compact, the Commission deals with water resource problems throughout its vast drainage area. In contrast, the Water Resources Commission of the Yangtze River, which runs through nine provinces and two provincial-level municipalities, has no representative of those provinces in the Commission. The Commission is under the authority of Ministry of Water Resources. As a result, Yangtze River Commission is relatively ineffective in mobilizing provincial governments in cross-boundary water resource management.

A well established regulatory framework for river basin water resources management and a river basin agreement by key stakeholders is essential to water conservation, development, and administration. Establishing river basin commissions with memberships and active involvement of major stakeholders including provincial governments can provide an effective mechanism and is strongly recommended. As a sub-national, inter-provincial administrative agency, the commission should engage in comprehensive planning, development, and management of water and related resources basin-wide. Its plans should focus on public goods and common interests across the river basin such as inter-province water quality, protection of wetlands, and migratory fish restoration, which local governments have inadequate mandates, capacity, or interest in handling. Clarification of water rights and use of economic instruments, in particular pricing
policies to reflect real economic costs of water, are essential.

1. Introduction

Both China and the United States have to deal with a wide range of water resource management issues in their river basins, such as flood control, ecosystem restoration, water pollution control, and water conservation and utilization. Effective institutional arrangements are critical to their success. Making a comparison of their experiences can benefit each other, especially China in the case of river basin water management. Based on a case study review of the Susquehanna River Basin in the U.S.A. and the Yangtze River Basin in China regarding their institutional arrangements, this paper summarizes both successful experiences and lessons learned. It aims to help improve understanding of how institutional arrangements for water resources management can be effective, and provides recommendations for enhancing river basin management in China.


Although there are different models for river basin water resource management in the United States, the Susquehanna River Basin is a typical case. It is therefore used as a case study to be compared with the typical situation in China.

2.1 Susquehanna River Basin

The Susquehanna River is the sixteenth largest river in the United States and is the largest river lying entirely in the country that flows into the Atlantic Ocean. The Susquehanna River runs through some populous areas of the states of New York, Pennsylvania, and Maryland and is classified as a navigable waterway by the federal government. The river and its hundreds of tributaries drain 27,510 square miles.

The Susquehanna River Basin, though still relatively wild and partially undeveloped, has a history of past environmental negligence. The river used to be polluted and water resources were over-exploited. Vast areas of its virgin forest have been stripped and huge quantities of coal have been mined. The land was left scarred by erosion and many streams were polluted with acid mine drainage. Industrial wastes and raw sewage were indiscriminately discharged into the waterways. Years of water pollution, dam building and over-fishing virtually destroyed the vast runs of migratory fish that once extended to Binghamton, NY.

2.2 River Basin Compact

Because the Susquehanna River runs through three states, it became clear that there was a strong need to coordinate the efforts of the three states, together with the federal government. It became necessary to establish one management system to oversee the use of water and related natural resources throughout the basin.

The federal and local governments have worked closely to solve the problems in Susquehanna River Basin. Strict laws have been introduced to prohibit point source pollution, regulate mining, and control erosion. This collaboration also led to the drafting of the Susquehanna River Basin

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1 The information is from the web page of The Susquehanna River Basin Commission [http://www.srbc.net](http://www.srbc.net)
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Compact (referred to hereafter as the Compact). The Compact, as adopted by the Congress of the United States, and the legislatures of New York, Pennsylvania and Maryland, was signed into law on December 24, 1970. The Compact provides the management mechanism to guide the conservation, development, and administration of the water resources of the river basin. Under the Compact, the Susquehanna River Basin Commission (SRBC) was established as the agency to coordinate the three states and federal government.

2.3 The River Basin Commission

Jurisdiction of the SRBC within its 27,510 square miles drainage area is determined by the watershed of the Susquehanna River and its tributaries instead of political boundaries. As an established interstate watershed agency under the authorization of the Susquehanna River Basin Compact, SRBC is responsible for any water resource problems within its boundary. The Commission has adopted a comprehensive plan to guide not only its own policies, but those of its members – New York, Pennsylvania, Maryland and the federal government. It is an official blueprint for the management and development of the basin’s water resources.

Each member is represented by a commissioner who serves as the spokesperson for the government that he or she represents. In the case of the federal government, the commissioner and his alternate are appointed by the President of the United States. For the three states, the commissioners are the governors or their designees. The governors also appoint alternate commissioners.

The commissioners, or their alternates, meet periodically to act on applications for water-using projects, adopt regulations, and direct planning and management activities affecting the basin's water resources. Each of the four commissioners has a single vote. Under the leadership of an Executive Director, technical, administrative, and clerical personnel support the daily operations of the Commission. One of the accomplishments has been the advancement of public information and education, a major goal of the Commission.

More importantly, the Commission fills water management gaps in state water laws. The Commission manages the amount of water that is consumed during low flows, something that no other agency in the basin addresses. The Commission reviews all proposals for large withdrawals from surface and ground water. Both of these functions help to ensure that all water users and the Chesapeake Bay will receive a sufficient amount of water. This not only protects the environment, but promotes economic development and progress for businesses and industries that depend on water. After years of effort, the water quality of the Susquehanna River has improved greatly.

3. River Basin Management in China: the Yangtze River

The Yangtze is the largest river, not only in China, but in Asia. It stretches for more than 6,300 km and drains an area of 1.8 million km², with its main stream running across nine provinces and two province-level municipalities. The Yangtze Basin possesses the largest total water availability among the seven major river basins in China, and it is
bestowed with very rich natural resources, which have considerable development potential. In view of the Basin’s geographical location and regional advantage in terms of resources and economic development, efficient utilization and management of the Basin’s plentiful water resources becomes critical.

For many years the focus of the Yangtze’s harnessing and development has been hydropower development in the upper reaches and flood defense construction in the middle. In recent years, with the change in approaches to water management, more attention is being paid to integrated water management, ecological restoration and water protection. For instance, the current water use strategy does not advocate “all out development” any more but emphasizes “rational development” instead. With regard to flood control, building necessary facilities is now coupled with concurrent adoption of other broad measures, such as returning farmland to lake areas and removing polders to make room for flood discharge. Water saving and conservation is also being emphasized.

The Changjiang (Yangtze River) Water Resources Commission (CWRC) is one of seven river basin commissions established in China. CWRC is a subordinate agency of the Ministry of Water Resources (MWR) and its jurisdiction includes the Yangtze Basin and other adjacent river basins in southwest China. Stipulated by relevant national laws and regulations (China Water Law,, 2000; Flood Control Law of the People’s Republic of China, 1997), CWRC is responsible for water administration, law enforcement, integrated management, conservation, distribution and protection of water resources, water resources planning, flood control and drought relief, river channel management, water project construction and management, sand extraction management, soil and water conservation, hydrological information, and survey and research within its areas of jurisdiction. However, compared with the SRBC, CWRC faces institutional limitations which hinder it from effectively managing water resources in the river basin. These limitations are highlighted below.

3.1 No river basin agreement and representation of local governments in the river basin commission

Although the water law in 2002 adopted the concept of comprehensive river basin management and regional administration of water resources (China Water Law, 2002), there are no river basin agreements like the Susquehanna River Basin Compact in China. There are several immediate constraints faced by the CWRC. First, in common with other river basin commissions in the country, the CWRC has neither representatives of local stakeholders including provinces and municipalities nor any inter-province river basin agreements with concerned local governments Second, due to the lack of a clear administrative relationship between the river basin commission and local governmental water bureaus, it is difficult for the river basin commission to reach an agreement with local governments when water-related conflicts arise. Third, the commission has no effective tools to monitor and supervise water development and utilization activities that are not consistent with comprehensive river basin planning.

3.2 Water resource management is fragmented among various line government agencies

Although the river commissions are supposed to coordinate water policy at the regional level, water resources authority is
scattered among several agencies outside the MWR and its river basin commissions. First of all, quite a number of central government agencies play a role in water resources management. Each of them has different priorities and its own provincial and municipal level sub-agency. These agencies include the State Environmental Protection Administration (SEPA), which regulates water quality; the Ministry of Construction, which is responsible for municipal water supply; the Ministry of Agriculture, which handles irrigation; and the Ministry of Mines and Minerals, which has responsibility for groundwater, and so on. Such a mechanism has led to the segmentation of management at the national and regional levels and among different sectors. Second, water resource management has been largely confined within each jurisdictional administration, and different authorities may handle it differently. Conflicts have been observed between central and local governments and among local governments concerning drought relief, flood control and loss reduction, rural and urban water uses, pollution prevention and control, ecological environment preservation and so on. For example, both SEPA and MWR have responsibilities for river pollution prevention. Both have established river policies for pollution prevention, and have issued inconsistent statements to the press, which has confused the public. Moreover, there has been much dispute among jurisdictions about water use, which has frequently resulted in inefficient water resource management.

3.3 Lack of effective instruments for water resource management

Economic instruments have not been fully employed in water resource management and a market mechanism in the water sector has not taken shape. After the promulgation and enforcement of the Water Law (first in 1988 and amended in 2002), the “user pay” principle has been introduced but water prices remain far below costs and do not reflect the real value of water resources. Meanwhile, property rights for water resources have not been defined. Rights, obligations and benefits concerning the ownership of water resources are unclear. It is therefore difficult to introduce a market mechanism to play an effective role in water resource allocation, with consequent inefficiency in water use and pollution management. These considerations severely weaken the implementation and enforcement capability of the river basin commissions in China.

4. Comparison of the US and China and Lessons Learned

The Susquehanna River Basin Commission is much more powerful and effective than the Yangtze Water Resources Commission. Under the authority of the Susquehanna River Basin Compact (Public Law 91-575), SRBC is capable of dealing with all water resource problems occurring interstate in its basin. However, under the authority of Ministry of Water Resources, Yangtze River Commission’s leverage over the provincial governments is insufficient and it is very difficult for it to work effectively with provincial and local governments.

In the United States, there are mainly three levels of water resource administration, i.e. at the federal, state and local levels, plus some river basin commissions. But, in China there is a five level water resource administration, with relevant agencies at the national, river basin, provincial, city and
county levels.

The Susquehanna River Basin Commission has the states in its drainage area as members but the Yangtze River commission does not. Under the authority of the Susquehanna River Basin Compact, the Commission can deal with water resource problems in the entire drainage area effectively. The Yangtze River runs through nine provinces. But the Yangtze Water Resources Commission has none of the provinces as its members, and there is no a river basin compact or agreement. Although the Yangtze River Commission is supposed to coordinate water policy in the whole river basin, both its authority and its representation are limited, crippling its ability to perform effectively.

Both countries pay attention to laws and regulations, but enforcement differs greatly. In the United States, the Clean Water Act, Safe Drinking Water Act, Susquehanna River Basin Compact, etc, encourage the involvement of the states and general public by consulting all stakeholders, and clearly define the composition and role of the River Basin Commission. Although similar framework laws exist in China, the implementation details and enforcement are weak.

Both basins develop comprehensive plans to guide water development and management, but the focus of the plans is different. The comprehensive plan of the Susquehanna Basin pays more attention to water quality, protection of wetlands, migratory fish restoration and propagation of indigenous species, and the impact of water resource projects on cultural values. In contrast, the comprehensive plan of the Yangtze Basin just focuses on the allocation and utilization of the basin’s water resources.

Both the Yangtze and Susquehanna rivers face flood issues but the solution of the Susquehanna is more comprehensive. The Yangtze River Basin focuses only on narrowly defined flood control facilities, such as dams and reservoirs, floodwalls and levees, channel excavation and modification. Experience with the Susquehanna shows that flood management programs work best when structural and nonstructural measures are combined. Non-physical flood protection programs, such as flood forecast and warning systems, flood insurance, flood education and training, flood-proofing, flood plain management, can be extremely cost-effective.

A permit system for water withdrawal and wastewater discharge is adopted in both basins. But the Susquehanna’s have been more effective through implementation of economic incentives. Moreover, water rights are clearly defined in the United States, but not in China.

The Yangtze Water Resources Commission pays much attention to point-source pollution but has implemented no effective measures for non-point source pollution, whereas efforts to reduce polluted runoff in the Susquehanna have increased significantly since the late 1980s. Voluntary programs, including cost-sharing with landowners, have been key tools to reduce non-point runoff. A regulatory approach has been employed to reduce “wet weather” point sources.

5. Policy Recommendations

Some recommendations for river basin water resource management in China can be drawn from the comparison of river basin management between the United States and
China.

Enhance the role of water laws and regulations for river basin management. River basin commissions should be established based on agreement between major stakeholders, especially the central and provincial governments. Laws and regulations for water resource management in river basins should be further strengthened.

Establish a river basin commission with active involvement of provinces. As a sub-national, inter-provincial administrative agency, river basin commissions should have members in its management not only representing the central government but also the provinces and other major stakeholders. It should engage in comprehensive planning, development, and management of water and related resources basin-wide.

Clarify definition of responsibilities. The current responsibility allocation of line ministries and bureaus constrain the development and protection of water resources in China. For example, it is necessary to better define the responsibilities of MWR, SEPA and MOC in water resources management.

Promote the use of water use permits basin-wide, and make greater use of economic instruments. Approval to abstract water, in particular by high water consumption industries, should be based on a water permit system. As water scarcity is becoming more severe, greater use of economic instruments – especially pricing policies that reflect the real cost of water and its adequate disposal – are required to improve water use efficiency. Public education is needed to complement these policies by increasing awareness of the importance of water saving.

References and useful weblinks:


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