Chapter 3

Operation of the Zhanghe Irrigation System

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Abstract

This paper explores the water management of the Zhanghe Irrigation System (ZIS) tracing key decision points for water allocation and distribution. We outline the kinds of arrangements made at key points from the reservoir to farmers' fields, then consider the mechanism and the flow of money from farmers' fields to reservoir operators for the payment of services. We feel that delivery practices of canal water are very important to facilitate on-farm water-saving irrigation (WSI) practices. It is important to understand how water deliveries and payments are made in a large, complex irrigation system, so that lessons can be derived and applied elsewhere.

The ZIS, situated in the Hubei Province in central China, north of the Changjiang (Yangtze) river irrigates an area of about 160,000 hectares and is one of the most important bases of commodity grain in the Hubei Province. The main water supply is the Zhanghe reservoir. Apart from this reservoir there are tens of thousands of medium- and small-size reservoirs, small basins and pump stations in the Zhanghe Irrigation District (ZID) partly incorporated into the irrigation system but sometimes operating independently.

At the beginning of the irrigation season (end March, begin April) the Zhanghe Irrigation Administration Bureau makes a long-term forecast allocation plan for ZIS based on irrigated area, weather forecast and the condition of water sources (mainly storage in the main reservoir). The result is an overall scheme for water allocation and distribution. The water allocation to each main canal is based both on experience and on the requests coming from the water users in the command area. However, during the flooding season, the Hubei Provincial Government has the power to decide on the amount of water to be allocated to hydropower and flood-control release. As much water as possible is stored to meet the water demand for all sectors, but irrigation has first priority. In general, the Zhanghe reservoir has enough water to fulfill all requirements. About 42 percent of the total water release is allocated to agriculture and about 45 percent to hydropower while the rest is for industry and municipalities.

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The timing of the water releases from the reservoir depends on the weather situation. There are usually around three to five releases a year to any given branch canal. However in general, the third main canal receives water only twice a year, which is considerably less than what the fourth main canal receives. This difference is explained by the better local water sources (reservoirs and ponds) in the third main canal command area and light soils in some parts of the command area of the fourth main canal. The periods of water releases are almost the same every year.

While farmers do order water, many of the decisions about when to release water comes from higher levels in the canal-operations hierarchy. Thus it appears that the management of canal water has not only an element of farmer demand but also a strong element of a supply approach where reservoir operators make decisions based on available storage, rainfall and on an overall view of when crops need water. The ponds and small reservoirs located within the irrigated area allow farmers to get a much more flexible supply of water on demand. So the entire system functions as an on-demand system because of its in-built flexibility to store water close to the water users, which is a prerequisite for adopting WSI techniques like the AWD irrigation.

The Provincial Finance and Pricing Control Bureau determines the price per unit of water per sector. The price for agricultural use has more than doubled over the last decade. The Zhanghe Irrigation Administration Bureau charges the water fee on a volumetric basis. The water user groups and villages pay the water fee on a volumetric basis to the section office of the ZIS main canal. However, at the end of the season, the group and village heads convert this volumetric water fee into a water fee for the farmers based on area. The total volumetric fee paid to ZIS is divided by the total area of the group or village. Besides this water fee, which is related to the volume used by the group or village, farmers pay another type of flat water fee based on area, to be paid to the local government. People have to pay this water fee even if they do not use water.

Even though farmers pay a water fee per area they are quite aware of the link between the volume of water used and the price they have to pay for the water at the end of the season. For this reason, farmers minimize the amount of the Zhanghe irrigation water and catch rainfall to the maximum extent on their fields, use water from local sources that have no direct connection to ZIS and reuse drainage water, since this is for free.