Irrigation Management Transfer in Laofangqiao Town of Yuyao City in China

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NATURAL ENVIRONMENT AND CLIMATE

LAOFANGQIAO, ON THE longitude of 121°01' E and the latitude of 30°01 N, is a town of Yuyao City which is located in the northeast of Zhejiang Province. Its total area is 15 square kilometers (km^2). Topographically, Laofangqiao Town lies in a plain area at river network zones. The total cultivated area of this town is 1,008 hectares (ha) and the percentage of area occupied by water surface of river [surface] is 70 percent. The average yearly temperature is 16.2°C and the average yearly rainfall is 1,300 millimeters (mm). Approximately 70 percent of the annual rainfall is concentrated from June to September. However, annual rainfall varies a great deal between years. In dry years, annual rainfall is 800 mm while in a wet year, it is 1,500 mm. Within the boundaries of this town, water supply for irrigation is inadequate. Therefore, water from the Siminghu Reservoir, which is 20 kilometers (km) away, is imported through networks of rivers to serve local irrigation. The elevation of this town ranges from 1.63 meters (m) (taking the Yellow Sea as datums plane) to 3.13 meters. The irrigated areas with an elevation lower than 2.9 m account for 600 ha. Laofangqiao is also a town that is frequently threatened by natural disasters such as drought, flood and waterlogging.

DEVELOPMENT OF IRRIGATION

In Laofangqiao Town, rice is the only grain crop grown by farmers. Double cropping is practiced. Rice fields as a whole are under lift irrigation. Before 1949, irrigation was conducted by the use of manpower-driven or animal-power-driven lifting tools. Starting from 1956, diesel-driven pumps were installed. In 1966, electric pumping stations were constructed. The construction of flood control dykes was initiated in 1984 and the electric, drainage pumping station with a lift ranging from 0.5 m to 1.1 m was completed thereafter. [Beginning from 1991,] the U-shaped concrete-lined canals were constructed. A new irrigation method of "shallow submerging and moistening" of rice fields became locally popular in 1993. This method saved 20-30 percent of water, while rice yields increased by 7-13 percent.

In China, a town government is an organization with state power at the local level. The government of Laofangqiao Town administers 17 villages and dozens of township enterprises. The gross output value of industry in this town amounted to US$23.8 million in 1993. Each year, the town government takes a proportionate sum of money from the profits that are turned over by township enterprises to subsidize the construction and management of irrigation and drainage systems. The annual subsidies vary from US$10,000 to US$30,000. Since 1982, the investment in irrigation and drainage projects in Laofangqiao Town totaled US$130,000. Government subsidies accounted for 38 percent, agriculture allowances provided by township enterprises accounted for 50 percent, while the remaining 12 percent was collected from farmers. The main irrigation systems in Laofangqiao Town are listed in Table 1.

IRRIGATION MANAGEMENT REGIME AND ITS PROBLEM IN THE PAST

Individual Village Management of Pumping Stations and Canals

Specified persons were assigned as pumping stations operators. These operators are water users at the same time. Maintenance costs were borne by the villages. Electricity fees as well as the salaries of the operators were paid in three modes. Depending on the collective economic performance of each village they are:

1. Full payment by their villages (two villages).

2. Partial payment by both farmers and their villages. Farmers had to pay US$8.8 to US$10.6 per hectare. The remaining sum was paid by their villages (total of three villages).

3. Full payment is done by farmers (most of the villages).

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These different approaches of irrigation management led to many problems, such as serious seepage of earth canals, overgrowing of weeds, insufficient capacity of water delivery and high irrigation cost. Power consumption was as high as 563 kw·hour/ha on average. The cost of irrigation was US$17-26 per hectare.

Joint Villages Management of Irrigation and Drainage Systems

The facilities that had to be managed include drainage pumping stations and irrigation pumping stations that serve more than two villages, waterlogging control dykes and water gates. Before 1990, there were no specified persons in charge of irrigation management in each of these villages. As a result, responsibilities were shifted to other villages and irrigation management was neglected. Before 1990, a technician was assigned who was responsible for the communal management of irrigation and drainage projects in each village in Laofangqiao Town. However, there were neither irrigation management agencies nor management staff at the local level. Therefore, the technician could hardly do his duties. Irrigation projects could not meet their potentials.

IRRIGATION MANAGEMENT TRANSFER

The Irrigation Management Organization

The Irrigation and Drainage Management Station of Laofangqiao Town was established in 1990. Owing to the irrigation and drainage systems, villages boundaries were crossed and the town area was divided into 7-drainage sub-areas and 3 irrigation sub-areas. Ten management groups were formed. Each project got persons that were specifically in charge of water management (Table 2). Village cadres and farmers who are dedicated and who possess mechanical and electrical skills were chosen as managers. Eventually, 61 farmers took part in the irrigation organization.

Payment of Management Staffs

Depending on the type of work undertaken, management staff were paid in two modes. One was to pay fixed salaries. The other was to pay hourly wages (Table 3). At fixed times arrangement for labor protection were provided by the irrigation and drainage management station.

Maintenance Costs

Agriculture allowances cover the maintenance costs. These are turned over to the town government by local township enterprises. The costs of US$1.7 to US$3.5 per hectare for electricity and the salaries of management staffs were covered through irrigation and drainage service fees, which were collected by the Irrigation and Drainage Management Station. If the collected fees were not sufficient the town government would make up the balance.

DEVELOPMENT OF DIVERSIFIED ECONOMY IN IRRIGATION AND DRAINAGE MANAGEMENT STATIONS

The staff members of the Irrigation and Drainage Management Stations were responsible for managing irrigation and drainage systems in Laofangqiao Town. At the same time, they made an effort to develop a diversified economy. For example, they were actively engaged in the design, construction and management of small irrigation and drainage systems. They were also involved in the promotion of new irrigation technologies and supplying materials needed for irrigation and drainage. From there activities, they could make an income, mentioned as technical services and administrative fees. Their income from the above sources in 1993 are as shown in Table 4.

These sources of income were used to cover daily expenses of the station, such as administrative costs, and expenditures on meetings, to pay the salaries of management staffs and to make up for any deficiencies in irrigation and drainage costs.

RESULTS OF IRRIGATION MANAGEMENT TRANSFER

Improvement of Irrigation and Drainage Performance

The organization of irrigation and drainage management, with the Irrigation and Drainage Management Station as its main body and village cadres as its backbone, has taken shape. Each post has been assigned to specified persons. Damages to irrigation and drainage projects caused by human factors could be avoided. Damages could be identified

at an early stage and be looked after immediately. As a result, irrigation and drainage facilities that are in good shape will be around 95-98 percent.

The Initiative for Management Work Was Stimulated

Each member of the management organization was assigned with specified responsibilities. Their responsibility, authority and interests were stipulated clearly. This stimulated their sense of responsibility and initiatives in irrigation management and their exposure to farmers.

Management Staffs Could Keep Their Minds at Their Work

Owing to a regular income from diversified activities, staff could keep their minds at their work. Consequently, a stable team of irrigation management was developed by the Irrigation and Drainage Management Station of Laofangqiao Town. This situation improved the management of irrigation and drainage systems, which relieved farmers. Furthermore, leaders of the town governments and villages, as well as farmers were delighted to pay more attentions to irrigation management.

PROSPECTS OF IRRIGATION MANAGEMENT TRANSFER

Establishing Irrigation Cooperation

The Irrigation and Drainage Management Station planned to establish an irrigation cooperation in 1994. Of the farmers' own free will, the Station will steadily extend its management to the pumping stations of each village. They will also implement the contracting of irrigation to farmers.

Experiments with Irrigation Management Transfer and the Training of Operators and Farmers

In 1994, the Station will make further experiments on the adoption of irrigation management transfer. According to the actual costs of irrigation in the past 3 years, a base price of contract will be fixed. Operators will be invited through proficiency assessment. The operators and farmers will receive a training. The new irrigation method of "shallow submerging and moistening" of rice will be promoted in all rice areas in Laofangqiao Town. As a result, both rice yields and farmers' income will dramatically increase.

Forming a Management Regime of [Sound Circle] With Self-Development

Irrigation management transfer will result in the productivity of irrigation water. Consequently, irrigation water can be saved, power consumption can be cut down, cost of irrigation can be reduced and more profits will be made through contracts. In addition, new approaches to develop a diversified economy, which vitalize the framework of irrigation management, will be tried out. Hence, a management regime of [sound circle] with self-financing self-development will be formed. Ultimately the irrigation district will become more productive and contribute more to the society.

Table 1. Major irrigation systems in Laofangqiao Town, 1994.

Type	Quantity	Unit	Power (Kilowatt)	Size
Earth canals	60	km		Width:0.5-1.2 m
Concrete-lined canals	7	km		Width:0.3-0.6 m
Irrigation pumping stations	125	in No.	1,066	D*:100-300 mm
Drainage pumping stations	12	in No.	411	D*:300-950 mm
Flood control dykes	16.1	km		Height:0.8-2.0 m
Water gates	27	in No.		Width:2.8-3.0 m

* Diameter of pump intake.

Table 2. Irrigation facilities and number of management staff in each subarea.

No.	None	Name of sub-area	Area (ha)	Pumping stations		Water gates		Waterlogging control dykes		Total No. of managers
				Stations	Managers	Gates	Managers	Length (km)	Managers	
1	Drainage sub-areas	Chuanshan	104	4	4	2	2	2.4	2	8
2		Zhishan	105	1	1	3	3	0	0	4
3		Yujiachao	77	2	2	7	7	4.4	5	14
4		Dazhatou	81	1	1	3	3	2.6	5	9
5		Xiaoyiyan	106	2	2	5	4	2.7	5	11
6		Xijie	33	1	1	0	0	2.0	2	3
7		Hongqi	100	1	1	3	3	3.0	3	7
8	Irrigation sub-areas	Dongjie	17	1	1	1	part-time			1
9		Pengcheng	47	1	1	2	2			3
10		Xhishan	53	1	1	1	part-time			1
	Total		10	723	15	15	27	24	17.1	22	61

Table 3. Management cost and staff salaries.

Type of work	Difference	Payment	
		By fixed salary (US$/year)	By the hour (US$/hour)
Operation of pumping station	with electric skills		0.1
	with mechanic skills		0.12
Management of water gates	gate leaf	6	5
	gate lift	4	2.6
Management of dykes		4	

Table 4. Income from a diversified economy at the Irrigation and Drainage Management Station in 1993.

Items	Scale	Income (US$)
Dealing in goods and materials needed in irrigation and drainage	US$2,000	388
Contract to construct concrete-lined canals	3,200 m	1,900
Construction of bank protection work	1,160 m	272
Administration of highway construction	US$3,400	130
Total		2,690