

Research on Standard of Irrigation Service Fees

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ABSTRACT

A RATIONAL, STANDARD of irrigation service fees (ISF) is an issue which has caused concern both in the government and among the farmers in the irrigation districts. If the standard of ISF is too low, it will result in a shortage of funds for operation and maintenance of irrigation systems. This would require more subsidies from the government to the professional management agency. If the standard of ISF is too high, it will be difficult or unable for farmers to afford the fees. Thus, they will hesitate to participate in the management of irrigation systems. Consequently, collection of fees may be problematic. Therefore, it is necessary to work out a reasonable standard of ISF.

This paper presents the results of a study on ISF carried out in three irrigation districts in the Hunan and Hubei provinces. The present situation of collecting water fees and the actual cost of irrigation water are discussed. Based on the findings of the study, an improved formula for calculation of irrigation water fees is proposed.

INTRODUCTION

The amount of irrigation service fees (ISF) is an important issue which concerns the professional irrigation management organizations and the farmers in the irrigation areas. If the standard of ISF is too low, it would have an adverse effect on farmer's enthusiasm to participate in water management. Furthermore, it would be impossible to mobilize adequate funds for regular maintenance of the irrigation system. This would inevitably lead to the poor performance of irrigated agriculture and also increase the financial burden of the government. On the other hand, if the standard of ISF is too high, it may be beyond the farmers' ability to pay and may also increase their cost of production. It may also act as a disincentive for farmer participation in water management. Therefore, it is necessary to set up a reasonable standard of ISF which would guarantee enough funds for normal operation and maintenance of irrigation projects and also lessen the economic burden of the farmers.

In China, the standard of ISF at present is based on the National "Disciplines on Re-assessing, Collecting and Managing of Water Fees for Water Projects" issued by the Chinese State Council, in July 1985. The main provisions of the Disciplines are as follows:

1. The rate of water charge should be determined on the basis of the actual cost of supplying water.
2. The cost of irrigation services includes O&M costs, cost of heavy repairs and depreciation of fixed assets built by state funds (excluding assets created by the voluntary labor of farmers).
3. Irrigation water fees for grain crops were equal to the actual cost of supplying water. For cash crops, the rate may be a little higher than the actual expenditure.

The abovementioned Disciplines has been implemented for about 10 years. There is now a growing recognition amongst the irrigation fraternity that the present system of water charges is outdated. The present view is that water should be considered as a commodity and the cost of water should be determined on the basis of market prices. The level at which ISF is set should be equal to the cost of water supplying plus profit. This level of ISF would guarantee adequate funds not only for routine O&M expenditures of the irrigation project, but also for expanded reproduction.

Could this standard of ISF be carried out in practice? Would it promote farmers' enthusiasm for participation in irrigation water management? In order to gain a clear idea of these questions, a study on irrigation water fees and the paying ability of farmer was carried out in several reservoir irrigation areas in the Hunan and Hubei provinces.

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INVESTIGATION OF TYPICAL RESERVOIRS' IRRIGATION AREAS

Three projects were selected for detailed case studies, as given below:

No.	Province	Name of project	Characteristic
1.	Hubei	Zhanghe Irrigation System	large-sized
2.	Hunan	Songbai Irrigation System	medium-sized
3.	Hunan	Dating Irrigation System	small-sized

These projects are typical of the rice-producing area in the hill regions with annual rainfall ranging from 646 to 1,267 mm and where supplementary irrigation is required during the dry season or in a dry year.

Investigations focused on the following matters:

(1) The actual cost of supplied irrigation water (C_a).

According to Document No. 94, issued by Chinese State Council in 1985, the actual cost of irrigation service was calculated according to the following formula:

$$C_a = \frac{O+M+d+R}{W} \quad (1)$$

where:

$O + M$ = annual expenditures for operation and maintenance of professional managed facilities.

d = annual depreciation charge of fixed of State assets. It is usually set at the standard rate of 2-3 percent.

R = annual charge for heavy repair of professional fixed assets at the rate of 0.75-1.5 percent.

W = the amount of water supplied annually by the reservoir or upper diversion system.

(2) Standard of ISF for grain crops (C_g).

In accordance with the abovementioned Document, the standard of ISF for grain crops was calculated according to the following formula:

$$C_g = C_a - \frac{d_f}{W} \quad (2)$$

where:

d_f = annual depreciation charge of fixed assets created by farmers' voluntary labor.

(3) Actual standard of water charges implemented by the local professional management agency (A_s).

(4) Actual revenue from irrigation fees (A^D) collected from water users (Yuan/cum).

The four indices indicated above were estimated in different reservoirs' irrigation areas. The results are listed in Table 1.

Table 1. Current water price (US cents/m³)*.

Name of Reservoir	C _a	C _g	A _s	A _r	A _r /C _a
No.1	0.686	0.50	0.50	0.22	33%
No.2	1.27	1.09	0.49	0.25	20%
No.3	0.01	0.74	0.41	0.32	36%
Average	0.95	0.80	0.47	0.27	30%

* Currency equivalent (as of 1 July 1986): US\$1.00=RMB ¥3.202.

As indicated in Table 1, both the standard of water charges (A_s) and the actual revenue (A_r) from ISF in the three irrigation areas are much lower than the actual cost of irrigation water (C_a) and the actual standard of ISF for grain crops (C_g) as determined in accordance with government regulations. The average value of collected water fees is only 30 percent of the actual cost.

As a result, these three irrigation projects were operated and managed with financial deficits every year.

From the above analysis we can see that the current actual standard of water charge determined by the local government is too low. The collection of irrigation fees from farmers has also been a problem. Therefore, it is very important to determine a reasonable standard of ISF. It should be determined on the basis of actual cost of supplied water by irrigation projects. On the other hand, the paying ability of farmers and also the acceptability of local governments should be considered.

PROPOSED STANDARD OF ISF

In order to understand the paying ability of farmers, we have investigated the economic situation of a sample of farmer households.

Table 2 gives the incomes and expenditures of the sampled households. From this table we can conclude that the average net income (ANI) of the 8 families is US\$882. Annual ANI for each member is about US\$157, which is lower than the average income per capita in the whole country. ISF levied from farmers is about 3.3 percent of the total agricultural cost of a family, and about 1.7 percent of the total net income of a family. Therefore, raising the ISF is not reasonable as it would place additional economic burdens on the farmers.

Table 2. Farmer's income and expenses [RMB ¥ (US\$)].

Farmer	CL FM (m ²)	Cost of Agriculture								Year	Reservoir
		AI	WF	Tax	Total	VO	NI	AIEM			
Zhao	4	9,330	640.0	11.9	79.0	731.1	1,334.9	603.8	150.9	1992	No.1
Xiao	7	10,530	986.9	12.9	54.7	1,054.5	2,046.3	991.8	141.7	1992	No.1
Liu	5	11,600	702.7	13.2	39.7	755.7	2,089.1	1,333.5	266.7	1992	No.1
Wu	5	5,330	139.6	10.3	19.2	170.6	642.3	812.9	162.6	1991	No.2
Yi-A	6	5,330	151.4	13.7	19.7	184.8	854.2	669.3	111.6	1991	No.2
Yi-B	6	5,000	136.7	13.1	18.7	171.0	809.2	638.2	106.4	1991	No.2
Yang-A	5	5,330	74.2	15.6	29.3	119.1	807.6	926.7	185.3	1991	No.3
Yang-B	7	10,530	124.3	22.5	31.9	178.6	1,257.3	1,078.7	154.1	1991	No.3
Average	5.6	7,873	69.5	14.1	36.5	420.7	1,230.1	881.9	156.8		

Notes: FM--family member; CL--cultivated land; AI--agricultural input, including seeds, fertilizer, pesticide and others, excluding WF; WF--water fees; VO--value of output; NI--net income; AIEM-- average income for each member.

If the ISF is determined on the basis of actual cost of supplied water with a profit of 1.5 percent, the standard of ISF will be greatly increased. This is shown in Table 3.

On the basis of estimates given in Table 3 and Table 1, if ISF be collected according to the commodity price of irrigation water, the current ISF will be increased by 3 to 5 times of the actual standard of water charges. It is far beyond the farmers' ability to pay.

Table 3. Water prices for grain in typical reservoirs (US Cents).

Name of Reservoir	Zh.R	Sb.R	Dt.R	Average
Water Prices	1.09	1.72	1.12	1.31

For assessment of ISF in China, attention should be paid to the following conditions:

1. The headwork for storage/diversion of water, the water conveyance system comprising the main and sub-main canals, and the hydraulic structures are financed and constructed by the sponsoring government agency (state, province, prefecture or county).
2. The water distribution sub-system is constructed by the beneficiaries of the respective lateral or sub-lateral canals: usually through, voluntary labor with some financing assistance from the local government for purchasing construction materials or equipment.
3. The on-farm water distribution structures are normally constructed by farmers sharing the supplied water from a farm outlet.
4. The distribution sub-systems are partly operated and managed by farmers, and the on-farm irrigation systems are wholly operated and managed by beneficiaries.

Given the foregoing situation, we consider that the depreciation charge of fixed assets should be excluded in the assessment of irrigation cost as the permanent hydraulic structures, such as dam, earth canals and other concrete structures can serve quite a long time (more than 50 years) with normal maintenance, regular repair and occasional heavy repairs. The proposed formula for calculation of the cost of irrigation water fees is as follows:

$$C_o = (O+M+R)/W \quad (3)$$

where :

C_o = the cost of irrigation water fees. It is determined in terms of normal operation and maintenance expenditures, and heavy repair expenses. The other symbols are the same as in formula (1).

Table 4 shows the calculated results in the investigated irrigation areas: Comparing Table 4 with Table 1, it can be seen that the standard of ISF calculated with formula (3) will be almost double the increased actual amount levied from farmers and only a slight rise on the actual standard adopted by the local government.

Table 4. Cost of irrigation water (US Cents).

Reservoir	No.1	No.2	No.3	Average
C_o	0.51	0.57	0.55	0.54

We hold that the improved formula and its results are more reasonable and hence easily accepted by farmers and local governments of different levels.

CONCLUSIONS

1. The current rate of irrigation fee calculated by formula (1) is unreasonably high, and the actual fees collected are much more lower than the set standard of water charges.
2. A reasonable standard of irrigation water fees should be set on the basis of actual cost of supplied water by irrigation projects, paying ability of farmers and the acceptability of local officers.

3. In irrigation projects, only some of the facilities need to be replaced in the course of service. These include pumps, hoist machines and other equipment with short economic lives. Dam, earth canals and other concrete hydraulic structures can serve quite a long time with normal maintenance, regular repair and occasional heavy repairs. Moreover, the earth dam and canals were partly contributed by farmers in the form of a labor force.

Therefore, it is unnecessary to include the depreciation of fixed assets as a part of irrigation cost.

4. The proposed formula provides a more reasonable basis for determining ISF and would be easily accepted by farmers and local governments of different levels.

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