

## PAYMENT SYSTEMS FOR IRRIGATION WATER IN ROMANIA

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### Abstract

The necessity of regulations concerning payment of irrigation water appeared at the time when the irrigation areas passed of half million hectares in the second half of 60s (20 century). The main judicial act was Ministers Council Order No.1279/1967, according to that act were established the following kinds of taxes and tariffs: 18 lei/1000 m<sup>3</sup> of delivered water; a charge depending of the crops 138 lei / hectare for field cultures, 195 lei / hectare for vegetables and 814 lei / hectare for rice. That for management and maintenance of the substructure of the irrigation systems.

For the maintenance of the substructures of inner-equipped area the agricultural units paid between 87 lei / hectare and 294 lei / hectare depending of the type of irrigation systems and socioeconomic kind of farm, state or cooperative farm. In all the cases the taxes and tariffs did not covered actual costs of the Services delivered by the state so that all these Services was subsidized in a proportion of 70-75%. After 1991 in the market economy systems there remains only 1 tariff by 1000 m<sup>3</sup> of water, but depending on the pumping height step by step, and the tariff must cover integral the costs of all Services. But the subsidy did not completely disappear.

**Key words:** tariff, water for irrigation, taxes, maintenance

### MATERIAL AND METHOD

There are numerous payment methods for irrigation water in the world, ranging from the integral payment, possibly with some profit for the water supplier – most often the state – to free of charge. The option for one method or the other depends firstly on the economic system of that state: market economy or planned economy, but also on the abundance or scarcity of water.

It is known that, at global level, approximately 70% of the total water consumption is directed towards irrigations and that an irrigated surface representing 18% of the farmland (approximately 276 million ha) produces 40% of the global agricultural production. However, it is also known that water, alongside food and energy, constitutes one of the global issues of mankind and in the future water will become a rare resource.

In Romania, the need to introduce a payment system for the irrigation water occurred in the second half of 1960s, when the first large irrigation systems were brought into service and the surface fitted for irrigation exceeded half a million ha. Officially, the regulation of the payment system for the irrigation water in Romania was enacted by the Decision of the Ministers Council no. 1279/1967 and the Order no. 112 PT/1975 of the Ministry of Agriculture and Food Industry (Lup A., 1997).

For the water payment methods used in other countries, the material is mostly bibliographic, using as source the FAO reports. Apart from these, we used information obtained by the first author on the occasion of research visits in France and California (USA). We also requested data regarding water payment systems in some European countries like Italy and Spain.

For Romania, we consulted the legislation in the field beginning with the second period of the 1960s (20<sup>th</sup> century) until the present day. Also, we calculated the influence of the water payment tariffs on the economic efficiency of agricultural production in the irrigation systems using techniques and methods specific to the economic research.

### RESULTS AND DISCUSSIONS

**1.1. The payment system for irrigation water used worldwide.** Regardless of the subsidy quota for the water cost, in practice, there are a number of methods and regulations for water payment, each of them attempting to be as convenient as possible in certain conditions, both for the supplier and the user, the purpose being to stimulate the use of irrigation water, but also to avoid waste, fraud and other illegalities. Among the most common payment methods for irrigation water are (3 xxx: 1998):

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- Payment depending on the actual water consumption (the volumetric method);
- Contractual method (flat-rate) the payment is done by a fixed tariff per irrigated surface unit;
- The method of a fixed percentage of the production obtained, paid in kind or money;
- Different mixed systems, by combining the first two methods, namely a fixed rate per irrigated surface and a tariff for 1 m<sup>3</sup> or 1000 m<sup>3</sup> of water measured by means of an adequate instrument or by evaluation (number of working hours etc.).

a) *The volumetric method.* It is considered the most correct, favoring also the rational use of water, based on the research recommendations. It has, however, certain shortcomings, such as:

- the relatively high cost of the measuring equipment;
- the frequent deterioration of the measuring equipment, often by the contribution of the beneficiaries;
- the lack of trust in the measuring precision.

b) *The contractual method.* It consists in the payment of a fixed tax per ha, assuming that the beneficiaries use similar average norms of irrigation, which, in reality, happens rarely. Still, the method is very popular in spite of the inequities and due to its simplicity.

c) *Payment through a share of the production.* It is practiced especially in areas specialized in monoculture (e.g. rice). The share may be fixed (per ha), regardless of yield or the harvest obtained (a percentage of the harvest). The payment in kind option eliminates the disadvantages of possible inflation effects. The shortcoming of the payment by harvest percentage is the need for an annual evaluation of the harvest, a problem that may generate controversies and sometimes fraud.

d) *The binomial tariff system.* It is one of the most popular systems and consists of applying a fixed rate per surface unit combined with a tariff per water volume unit. This method attempts to eliminate the shortcomings of the first two, so that the fixed tax will offer the water supplier a minimal income to cover maintenance expenses, while the water tariff ensures a proportionality between the payment and the actual water volume used.

The binomial tariff system may have versions adapted to given situations. One of these, for example, consists in the payment of a fixed tax that remains constant for a number of years and a tax that varies from year to year. The annual share serves to reimburse a part of the investment or the entire investment, as well as cover some fixed expenses. Once the investment was paid, this share is annulled or it is maintained, but in a smaller

amount, in order to support fixed maintenance expenses. The variable part covers functioning expenses (system exploitation) and is not constant year by year.

There are also countries in which a progressive or regressive payment system is practiced, depending on the volume of used water. For example, for a certain volume of water per ha, a constant tariff is used. Over that threshold, the tariff per water volume unit increases (to encourage the reduction of water consumption) or, on the contrary, the tariff may decrease (to convince farmers to use the recommended irrigation norms). There are also cases when the tariffs per water volume unit are differentiated according to water availability or the price of electricity.

The actual payment of water, regardless of the system used, ranges, as mentioned above, from free of charge (in the former Soviet Union, Poland and Czechoslovakia the state subsidized the water cost entirely) to its entire cost (Israel). It seems that the binomial tariff system is the most common, having the fewest disadvantages, a reason for which it is preferred in many countries that practice large-scale irrigation, such as: France, Italy, Hungary, China, Mexico etc. In what regards the quantum of payment, it is also different from country to country, but in most cases, the tariffs and taxes paid by farmers do not exceed 1/3 of the water cost. There has been, however, a tendency over the past few years, to increase these tariffs so that they will be closer to the real water cost.

The main conclusions drawn by the experts that studied the issue of water payment consist in the belief that the use of irrigation water may be improved by combining technical and economic measures with financial actions at various levels. Also, the economic feasibility of the irrigation projects remains an essential aspect that needs to be monitored systematically (4 xxx, 1987).

**1.2. The payment for irrigation water in Romania between 1965 and 1989.** With the launch of the great land improvement projects and the bringing into service of large surfaces equipped for irrigation, there occurred the necessity of regulatory documents that standardized the methods to recover, at least partially, the state expenses for the construction and exploitation of hydro technical systems.

These regulatory documents were materialized at the time by the Decision of the Ministers Council (DMC) 1279/1967, the Order no. 112/P171975 of the Ministry of Agriculture and Food Industry and the Decision of the Ministers Council 1686/1970 for the maintenance and exploitation of land improvement works set up

in systems (table 1). For irrigations, taxes and tariffs were established for two categories of performances:

- the distribution of irrigation water;
- the maintenance and exploitation of interior setup (at unit level) in the irrigation systems.

The system of taxes and tariffs was established in such a way as to encourage farmers, namely the state-owned and cooperative agricultural units, to use irrigation water, as to them they represented only a relatively small part of the real water costs. Thus, a fixed tax was

established and it was practiced undifferentiated in the state-owned and cooperative agricultural units, ranging between 138 lei/ha for field crops, 195 lei/ha for vegetables, and 814 lei/ha for rice. Similarly, undifferentiated on categories of units, the water tariff was established to 18 lei/1000 m<sup>3</sup>.

This symbolic value was the reason why the tariff was not differentiated on types of water distribution: under pressure or gravitational, even though the cost was higher for the former (Lup A., 1997).

Table 1

**Tariffs for the payment of irrigation water and for the maintenance of the interior network in the irrigation systems\***

Specification	Field crops		Trifoliates		Fruit trees and grapevine		Vegetables		Rice	
	State-owned units	Cooperative units	State-owned units	Cooperative units	State-owned units	Cooperative units	State-owned units	Cooperative units	State-owned units	Cooperative units
<i>I. Performances regarding the distribution of irrigation water</i>										
Fixed tariffs for the maintenance of canals and hydrotechnical constructions in the irrigation systems lei/ha	138	138	183	183	122	122	195	195	814	814
The tariff got water pumping lei/1000m <sup>3</sup>	18	18	18	18	18	18	18	18	18	18
<i>II. Performances regarding the exploitation and maintenance of works related to interior setups in irrigation systems</i>										
With underground conduits and centralized pumping stations to pressurize lei/ha	294	115	294	115	294	115	294	115	-	-
With underground conduits and semi-stationary aggregates to pressurize water, with supply through open canals and chutes	202	87	202	87	202	87	202	87	-	-
With mobile aggregates, supplied through open canals and chutes, as well as with open canals for irrigation through the furrows (surface irrigation)	217	102	217	102	217	102	217	102	-	-

\*) According to the annex to the D.M.C. 1279/1967, Order 112/1975 issued by the Ministry of Agriculture and Food Industry and D.M.C. 1686/1970 for the maintenance and exploitation of land improvement works, set up in systems.

However, it is no less true that the setups for sprinkler irrigation with pressurization stations were preferentially to the benefit of state-owned agricultural units, at least in the beginning. The symbolic payment for water was compensated by establishing taxes to maintain and exploit the last ramifications of the water distribution system (interior setups), which was in fact the property of the beneficiary agricultural unit and, as such, this unit had to support financially the routine maintenance and repairs. As the unit was not equipped with the necessary facilities, it was established that those works be performed by land improvement enterprises. Thus, for the sprinkler irrigation setup with underground conduits and pressurization stations, a tax was established of 295 lei/ha for state-owned agricultural units and 115 lei/ha for agricultural cooperatives. For the setup with underground conduits and aggregates with supply from open canals and chutes, the taxes were a little smaller, namely 202 lei/ha for state-owned agricultural units and 87 lei/ha for

agricultural cooperatives. For the surface irrigation (in-between furrows), as well as for the sprinkler irrigation supplied from open canals and chutes by means of thermal pumping aggregates, the taxes established were 217 lei/ha for state-owned agricultural units and 102 lei/ha for agricultural (Lup A., 1997)..

**1.3. Irrigation expenses and the subsidy for irrigation water in Romania between 1971 and 1989.** In the irrigation investment projects, the additional expenses were on the rise, their evolution following the normal increasing rhythm of the entire input set in the construction and exploitation of hydro-ameliorative developments.

The state invested more and more in each of them. In terms of the additional costs for irrigations between 1971 and 1989, there are two stages: 1971-1980, when the additional expenses for irrigations were evaluated at 3200-3400 lei/ha, and after 1980, when these expenses (both of the state and of the cooperatives) were evaluated at 5800-6000 lei/ha.

In the exploitation stage, due to the many disruptions – including the chronic lack of essential inputs like fertilizers or pesticides, the volume of additional expenses for irrigations was considerably lower than estimated. One of the main shortages being electricity for water pumping, which prevented both the irrigation of the entire surface and the application of smaller than recommended irrigation norms. Here is, for example, the level of additional expenses with irrigations accomplished by the water supplier – the state – and the agricultural units, compared to the estimated parameters (*table 2*).

Table 2  
**The actual expenses with crop irrigation compared to the estimated parameters (in the area of maximum concentration of the hydro-ameliorative developments)**

- % of the total estimated expenses -				
Specification	1971-1975	1976-1980	1981-1985	1986-1989
Total estimated expenses	45.1	48.8	40.9	44.9
of which:-water supplier	50.2	55.1	45.0	47.0
-agricultural producer	39.1	41.3	36.6	42.4

Source: Processed according to data from ISPIF, DGEIFCA and agricultural units

The failing to accomplish the volume of additional expenses, the number indicator of the quality of the irrigation systems in Romania, will be reflected in the end, in the productions obtained and in the reduced or absent economic efficiency. In regards to the expenses realized by the state for irrigation, these were subsidized in a percentage of 60-80% over the entire period of the planned economy table 3).

Table 3  
**The cost of water at the supplier, encashment from the beneficiary and the percentage of subsidy between 19871 and 1989**

- % of the total estimated expenses -					
Specification	U/M	1971-1975	1976-1980	1981-1985	1986-1989
Water cost	lei/ha	733	798	1132	1012
encashment	lei/ha	178	323	308	335
based on tariffs	%	24.3	40.5	27.2	33.1
Subsidies	lei/ha	555	475	824	677
	%	75.7	59.5	72.8	66.9

Source: Calculations according to DGEIFCA

As the Romanian economy seemed more and more exhausted, the political decision makers tried to reduce the subsidy percentage and even annul it. A first attempt to raise the water payment tariffs occurred in 1978 and then in 1987, when proposals were made for covering tariffs for the cost of water, but progressively, thus:

In 1988, the new tariffs were going to be applied 34%; in 1989, 60%; in 1990, 80%, while in 1991 the farmers were going to support the entire cost of water. The economic situation of the agricultural units, especially of the agricultural cooperatives, was so precarious (even the

minimum guaranteed income was provided from loans) it did not allow the introduction of new tariffs, so the ones established in 1969 and 1970 remained unchanged during the entire period of socialist agriculture. After 1989, given the change to market economy, the payment system per irrigated surface and per 1000 m<sup>3</sup> was dropped and differentiated tariffs per pumping levels were applied with different percentages of subsidy (Lup A., 2014).

## CONCLUSIONS

1. Water is the main factor on which depends the production of food, a reason for which the areas with insufficient precipitations are irrigated as a main method to fight drought.
2. At international level, the demand for irrigation water keeps rising, reaching 70% of the total water consumption, given that water itself is a rare resource.
3. In regards to the price of irrigation water, it varies in wide limits depending both on availabilities and on the method of collection from source, but also on the setup characteristics of the irrigation systems.
4. The methods of water payment by the users, as well as the subsidy percentage differ from one country to the next, especially according to the economic system.
5. In Romania, during the planned economy, the water price was strongly subsidized by the state, while in the conditions of market economy, irrigation water remains partially subsidized by the state, even though the tariffs are higher and differentiated on pumping levels (heights).

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