

Performance of Water Users Associations in the Operation and Maintenance of Irrigation Districts in Mexico

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BACKGROUND

THE SUBSECTOR OF irrigation agriculture is of crucial importance for the Mexican economy. Irrigated land cover about 5.5 million hectares, a third of all lands harvested, and contributes about half of the total value of agricultural production. The irrigated land is classified according to the size of its works as well as to the form of organizing its operation into two types: a) the "irrigation units," conformed principally by small irrigation systems which exceed 25,000 and annually irrigate nearly 2.5 million hectares, (in general they have always been operated and maintained by the users); and b) the irrigation districts consisting of large-scale irrigation, numbering about 80 and yearly irrigating about 3 million hectares, (the latter have been operated by the government, until recently).

Several years ago an attempt was made to transfer the responsibility of operating and maintaining the irrigation infrastructure to the districts' users, and so it was considered under the former Irrigation Law of 1947. However, when the governmental policy changed in the Federal Water Law of 1971, it was clearly indicated that the operation and maintenance (O&M) of these districts, should be the direct responsibility of the Federal Government. Therefore when the transfer process was initiated in 1988, it met a legal obstacle; considering this problem, the districts were artificially divided into "irrigation units," in order to act in accordance with the existing law and make it possible to transfer its operation to the water users association (WUA), which had been previously created. In order to avoid confusion with the real irrigation units, they were called "modules."

THE TRANSFER PROGRAM

Although the transfer process was initiated in 1988, it did not really begin until 1989. With the creation of the National Water Commission (NWC), a national program for transferring the irrigation districts to water users associations was organized, and in order to support this process, for repairing the deteriorated infrastructure and to strengthen the water users organizations a loan from the World Bank was obtained.

Transfer of irrigation districts to users associations can be attributed to varied reasons. The most important among these is the deterioration of the irrigation infrastructure for lack of adequate maintenance, reduction of funds allocated to O&M over the years as the participation of its users also decreased, and the reduction of governmental subsidies; so that in 1988 water charges only covered a 15 percent of the O&M costs. Additionally, this situation put the irrigation district users in an economic advantage over the producer of the small irrigation scheme, who had to pay the full cost of the irrigation service, creating a privileged sector of producers. On the other hand, the government was not able to pay out the considerable amount of money required for the operation and the adequate maintenance of the works. Finally, it was considered that the only way to guarantee the good operation of the infrastructure, was by giving the responsibility of district management to its users, since they are the people who directly benefit from the profit of these works.

The program was originally formulated to carry out into two different steps. In the first one, the water users association (WUA) would be organized as a Civil Association with juridical personality and its own patrimony, for the O&M of the "module," and would be given a Concession Title for the use of water as well as permission for the use of infrastructure and machinery for the maintenance of the works. Later on, in a second step, a Society of Limited Responsibility and Public Interest (S of LR & PI) would be created, integrated with the different WUAs in the same district, which will be authorized the use of the main infrastructure and the rest of the machinery. However, due to some problems observed in the first districts transferred, it was decided to adjust this program, as well as to postpone the creation of the S of LR until the first step is perfectly affirmed.

A necessary condition for the transfer has been that the WUA achieve economic and financial self-sufficiency, in order that they be able to pay totally the O&M costs of the module, [as well as cover up the relative ones to the head works,] paying therefore a fixed price to the S of RL, and/or to the CNA, for the O&M of the main infrastructure.

Recently, as an additional support to this process, significant changes in the Water and Income Tax Laws have been made by the Federal Government. The new National Water Law permits, within certain limits, a free market for water

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rights in order to improve the efficiency of water use; and changes in the Federal Income Tax Law reduces the level of taxation for WUAs which deal with water distribution.

FIRST RESULTS OF THE TRANSFER PROGRAM

Originally, the program considered the transfer of only 20 irrigation districts to the WUAs; however due to the good performance of most of the users observed in the first round and the requests from the other WUAs in districts not covered by the program, turnover was extended to 51 districts. Up to the end of March 1994, the main results of this program could be summarized as follows:

- * Complete transfer of the total secondary canals and drainage networks of 35 irrigation districts to users organizations and partial transfer in another 16 districts were effected.
- * Modules or WUAs organized and which received the irrigation infrastructure for O&M were 293.
- * The irrigated area within these modules is 2,314,870 hectares, which represents almost 75 percent of the total area of the irrigation districts, and more than 120 percent of the area considered in the original program.
- * In these modules 300,128 users are registered representing more than 56 percent of the total users of the irrigation districts.

In addition, it has created and authorized for the O&M of the main canals, drains and roads, four S of LR & PI. They are: the Rio Mayo and the Rio Yaqui in the state of Sonora; The Carrizo Valley in the state of Sinaloa; and The Rio Conchos in Delicias, state of Chihuahua. The first three districts, are totally operated by the users organizations. In the Delicias District the NWC is operating part of the works, but in the very near future another society in this district, The Rio San Pedro, will be in charge of the O&M of the remaining canals and drains, completing the transfer. Another S of LR & PI will be also operating in the near future, to finalize the transfer process in several of the most important districts of the country.

ASSESSMENT OF OPERATIONAL PERFORMANCE OF THE WATER USERS ASSOCIATIONS

Considering the importance of the transfer process, the Graduate College of Chapingo using a grant from the Ford Foundation, has carried out a study in four of the first irrigation districts which were turned over to the WUAs (Palacios et al. 1993), to assess the performance of these WUAs in the O&M of the irrigation infrastructure. The Rio Mayo in the state of Sonora, Delicias in Chihuahua, Culiacán in Sinaloa, and El Grullo in Jalisco, were the chosen districts for the study, with a total area greater than 450,000 ha, where almost 50,000 users are organized into 42 WUAs, and two S of LR, which are responsible for water management and maintenance of the hydraulic works. A summary of the main characteristics are shown in Table 1a.

In this study, in order to investigate the opinion of the Board of the WUAs and the users in general, a survey in each case was carried out, using the random sampling methodology. A questionnaire considering 9 different topics, with several questions in each of them, was used. In addition, economical and hydrological data to analyze the operative performance of the WUAs were also collected.

The first results in three of the considered irrigation districts, show the positive aspects of the transfer. The main opinion of the users, is that water management and the maintenance of the infrastructure are improving since the WUAs are in charge of the operation of the irrigation districts. A brief summary of the opinions collected from the survey of the users and the Board of the WUAs is shown below:

- i) [They] do not loose time in paying the water charges.
- ii) Water is delivered oportunely.
- iii) The WUA staff can attend to the users' complains in a better way.
- iv) The users know what is happening with respect to the O&M of the system.
- v) All the users are able to participate in the decision-making process.

- vi) Any water user is aware of the use of his money in the O&M costs.
- vii) Improvement in the administration contributes to the reduction of these costs.
- viii) Corruption is rapidly declining, as the operational staff [become more professional].
- ix) Users observe the improvement in the maintenance of the infrastructure, as well as in the water service.
- x) Users receive technical support from the operational staff, which mostly consists of the agricultural engineers.

Some relevant answers given to the questionnaire are shown in Figures 1, 2, 3, 4, 5 and 6 at the end of this paper. In the first one, the question is: whether the irrigation service has improved. Almost 80 percent of the users in the districts answered "Yes," but in the Rio Mayo around 28 percent answered "No," because they have problems in the lower part of the district, due to the lack of capacity in the main canals. The second one is related [with the opportunity of water delivered to the users], and again in El Grullo and Delicias, almost 90 percent of the users answered "Yes," but in the Rio Mayo 30 percent answered "Sometimes;" and only less than 5 percent of the users of all the districts answered "No."

Questions 3 and 4 in the questionnaire, seek the users' opinion on the cost of water charges in the Delicias and Rio Mayo districts. In Delicias 43 percent of the users consider it to be expensive, as well as three quarters of the users of Rio Mayo. The main reason for this [is] the [relatively high increase of the water charges to reach economic self-sufficiency].

Finally, questions 5 and 6 in the questionnaire, are related to the maintenance of the hydraulic infrastructure. In Delicias almost 90 percent of the users consider it to be well maintained by the WUA as well as 72 percent of the users of the Rio Mayo. Again in this last district, around 25 percent feel that the S of LR, is not working well.

Besides, the WUAs are trying to achieve a higher level of technology. In the Rio Mayo District, more than 50 percent of the staff are engineers and 75 percent are professionals; before the transfer only 7 percent of the official staff were engineers and less than 10 percent had a BS degree. On the other hand, the size of the labor force has been reduced to almost 50 percent, as is shown in Table 2, and a similar condition prevails in the other districts. In Table 3, the distribution of the staff according to the type of activity in the Rio Mayo are shown.

The analysis of the hydraulic data, point out an important improvement in the conveyance efficiency, as is shown in Table 4 and Figure 7. In the Rio Mayo an increment of almost 10 percent, and in Delicias of more than 20 percent in the conveyance efficiency, have been achieved after water management was turned over to the WUAs. In other districts these increments have been even more important, but in some cases, as in the Rio Lerma Irrigation District in the Guanajuato State, the increment in the conveyance efficiency, after the transference, has been the result of a significant reduction of the so called "administrative losses," of which the principal cause is the corruption of some persons working in the distribution system, who sell water without reporting the volume delivered; therefore, when the WUAs received the responsibility of water distribution, [have changed all this persons for Agricultural Engineers, and an improvement in the conveyance efficiency was immediately observed.]

It is important to point out, the increase in the participation of the water users in the improvement of water management and the maintenance of the hydraulic works as well as in the organization of the WUAs, beginning with the process of electing the board of directors by a very democratic way in which the users send representatives of each community in the module to the assembly for the election, selecting the best leaders for the positions of president, secretary and treasurer. According to the answers in the questionnaires, more than 90 percent of the users support the decisions of the board.

In relation to the costs of O&M, all the transferred irrigation districts are self-sufficient and the average water charge in these irrigation districts is between US\$ 40/ha to 50/ha. This amount is divided into two or three parts, in the first condition, the S of LR does not exist, and usually the WUAs take around 70 percent and pay to the NWC 30 percent. When the S of LR exists, the WUAs take 65 percent, the S of LR takes 25 percent and 10 percent is for the NWC. In some cases a different distribution is considered, as in the case of the Rio Mayo District, where the S of LR takes a more important part, as is shown in Table 4.

Another important question considered in the survey, was in relation to the user's income. The question was: whether the user's income improved since s/he became responsible for the O&M of works. The answer in more than 50 percent of the cases was "Yes," it could be explained because the conveyance efficiency increased and more water was available for higher crop intensity, as well as an improvement in the irrigation service; however, actual condition with agriculture in general is not so good, mainly because subsidies have been reduced and prices are going down. According to Figure 8, based on the information provided by the survey, 19 percent of the Rio Mayo users, have a negative income, as well as 11 percent in Delicias. In addition it is possible to differentiate the levels of income from each district: Delicias has a greater income because it has more returnable crops than Rio Mayo.

On the other hand, one of the more important problems of the WUAs is the amount of deferred maintenance. Originally, the government promised to invest in the transferred districts to solve this problem; however, there was not enough money available to finalize this problem in most of the districts.

In 1990, the Graduate College of Chapingo, carried out a study for the NWC, to evaluate the investment requirements for the rehabilitation of the 80 irrigation districts. The estimate was around 725 million of US\$, without taking into consideration the necessary investment to substitute the old machinery. The NWC got a loan from the World Bank, but has only been able to rehabilitate and modernize 10 irrigation districts and reduce the deferred maintenance in another 11. Additionally, it has purchased machinery and equipment for maintenance, to substitute the older one in most of the transferred districts. Therefore, the WUAs have had to invest from its own funds, an important amount, to reduce the deferred maintenance.

CONCLUSIONS

Although the study has not been finished yet, some conclusions could be obtained, which are presented below:

- i) The users' general opinion is that the transfer of the O&M of the irrigation infrastructure to the WUAs, has had a very positive impact.
- ii) The technical personnel of the NWC have been continually supporting the WUAs to achieve a successful transfer of the responsibility for the O&M of the irrigation districts, as well as the Mexican Institute of Water Technology, which has been training the WUAs' Board of Directors and technicians. Perhaps this support could be improved if more governmental money were available.
- iii) The WUAs have been learning from the errors of a feedback process, so that actually their performance has improved impressively.
- iv) Water conduction, distribution conveyance efficiency as well as crop intensity are increasing due to better water management by the WUAs.
- v) The infrastructure maintenance is cheaper and opportune. In general, according to the opinion of most of the users, hydraulic works are in a much better condition than before transfer.
- vi) In order to reduce the administration costs the size of the modules should be greater than 5,000 ha, and in the greater districts more than 10,000 ha is an adequate size.
- vii) The WUAs in addition to its responsibilities of O&M of the modules have carried out other important activities related to obtaining inputs at lower costs, product marketing and industrializing some of the agricultural products, to increase the users' income.

Table 1. Characteristics of the irrigation districts selected.

DISTRICT	GROSS AREA ha	USERS Num	NUM OF MODUL.
RIO MAYO, SON	97,051	11,582	16
DELICIAS, CHIH	72,491	8,740	9
CULIACAN, SIN	272,805	27,627	16
EL GRULLO, JAL	11,933	1,821	1
TOTAL	454,280	49,770	42

Table 2. Number of staff before and after transfer of Irrigation District No. 38, Rio Mayo, Sonora.

CONDITION	OPERATION	MAINTAIN.	ADM.	TOTAL
BEFORE	136	137	46	319
AFTER	79	54	36	169
DIFERENCES	57	83	10	150
% DECREASE	41,91	50,58	21,74	47,02

Table 3. Number and distribution of staff, Rio Mayo Districts.

PLACE	OPERATION	MAINTAIN.	ADM.	TOTAL
S. of L.R.	29	38	12	79
MODULES	50	16	24	90
TOTAL	79	54	36	169

Table 4. Distribution of costs in Rio Mayo Irrigation Districts.

CONCEPT	MODULE	S of L R	N.W.C.	TOTAL	%
OPERATION	838.66	695.10	178.03	1,711.78	42.68
MAINTENANCE	304.24	1,168.21	170.91	1,643.36	40.97
ADMINISTRATION	395.00	192.43	68.18	655.62	16.35
TOTAL	1,537.90	2,055.74	417.12	4,010.76	100.00
%	38.34	51.26	10.40	100.00	
WATER CHARGES:					
AREA US\$/ha	15.85	21.19	4.30	41.35	
VOLUME US\$/Dm3	2.22	2.95	0.60	5.77	

Figure 1. Improvement of water service.

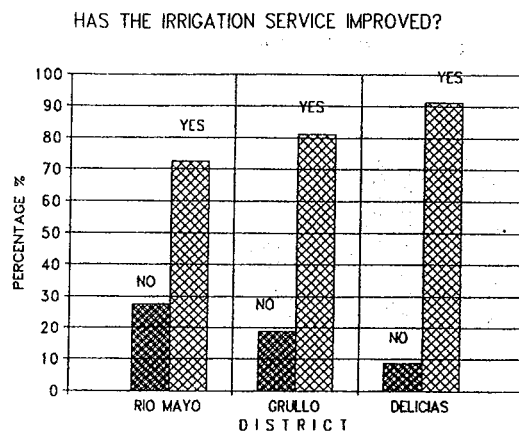


Figure 2. Opinion on water delivered.

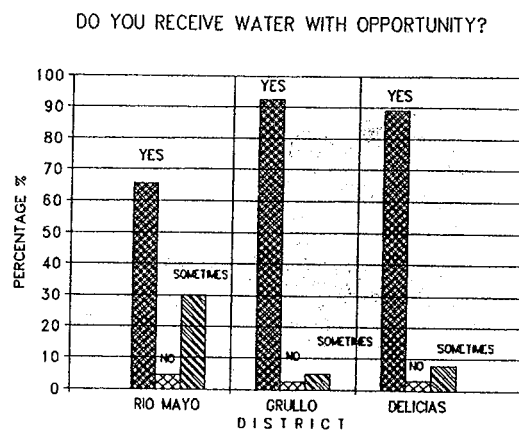


Figure 3. Opinion on water charges, Delicias.

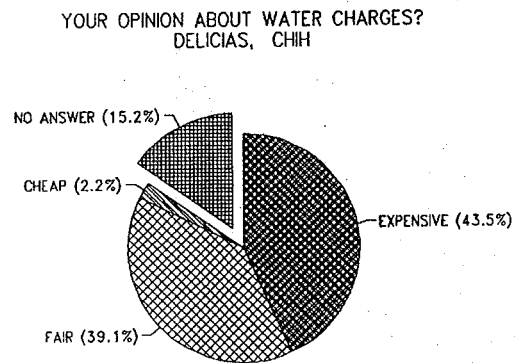


Figure 4. Opinion on water charges, Rio Mayo.

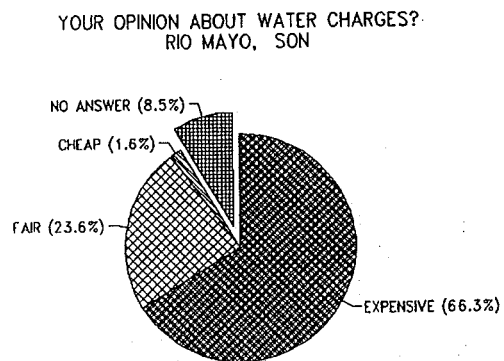


Figure 5. Opinion on maintenance, Delicias.

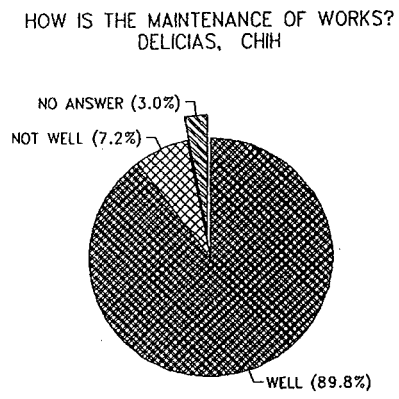


Figure 6. Opinion on maintenance, Rio Mayo.

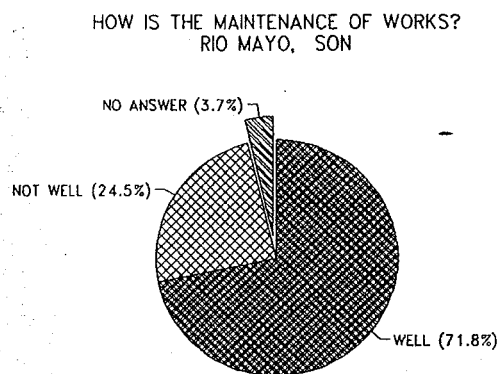


Figure 7. Improvement of the conveyance efficiency.

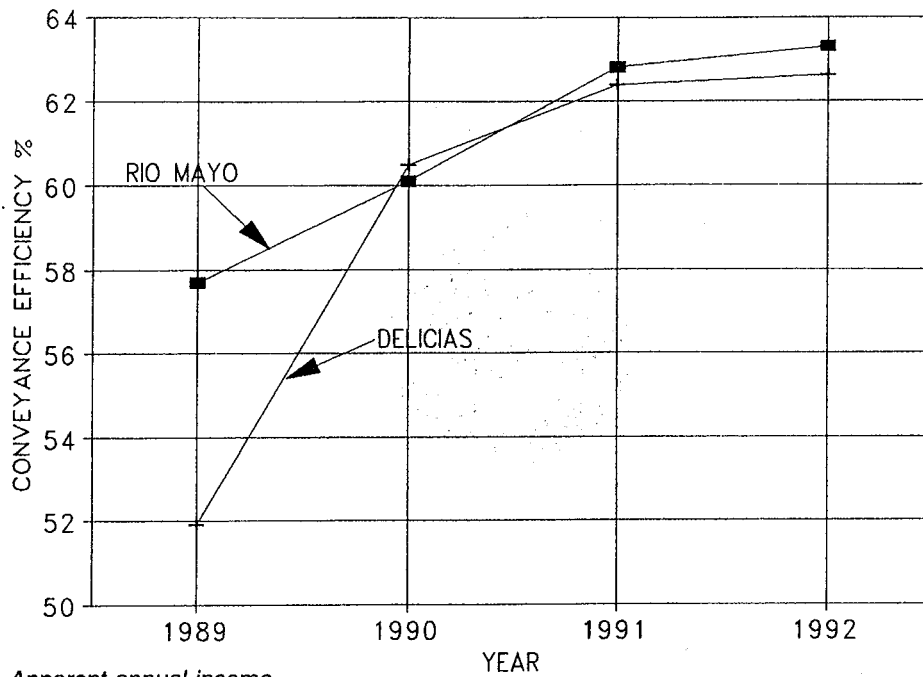
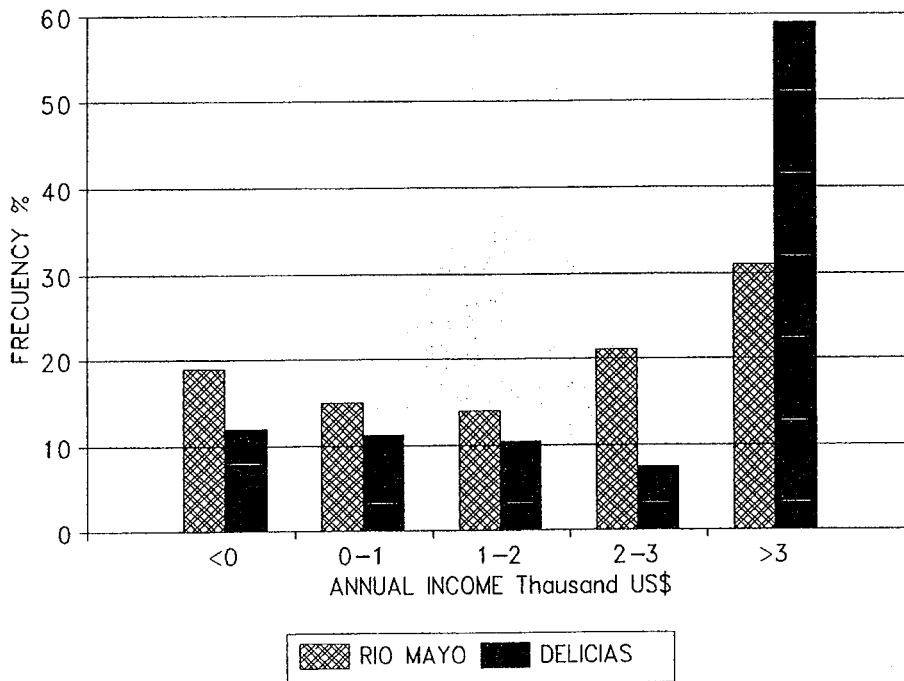


Figure 8. Apparent annual income.



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