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Irrigation Management Transfer (IMT) Systems: the Colombian Case

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RESUMEN

La agricultura de riego está enfrentando cambios en el mundo entero. Es cada vez más reconocido que la gestión del agua de riego es un servicio que se ofrece a los clientes con mejores resultados cuando es manejado por organizaciones descentralizadas, lo cual conlleva a la transferencia del manejo del riego. La transferencia del manejo del riego es un proceso complejo que implica posiblemente cambios en la infraestructura, las instituciones y exige además, unos requisitos en términos de legislación. La transferencia del manejo de los sistemas de riego se está realizando actualmente en muchos países, en especial, en los países en desarrollo de Asia, Africa , Europa del Este y en algunos países de América Latina. La transferencia del manejo del riego presenta algunos problemas, diferentes a los de otros casos de privatización, dado que la rentabilidad de la agricultura de riego se encuentra bajo presión y que es difícil atraer recursos adecuados y suficientes. El presente artículo expone la experiencia llevada a cabo sobre la transferencia del manejo del riego en Colombia.

ABSTRACT

Irrigated agriculture is facing organizational changes world-wide. There is a growing recognition that irrigation water management is a service provided to customers with better results when operated by decentralized organizations: this leads to irrigation management transfer. Irrigation management transfer is a complex process, possibly involving infrastructural changes, institutional changes and legislative requirements. Management transfer of irrigation systems is being undertaken in many countries at present, especially in developing countries of Asia , Africa, Eastern Europe, and in some Latin American countries. Iirrigation management transfer faces problems different from those in other privatization cases, because the profitability of irrigated agriculture is under pressure, and so it is difficult to attract adequate and sufficient capital resources for it. This paper presents the experience of the irrigation management transfer in Colombia.

KEYWORDS

irrigation management, management transfer, turnover, devolution, privatization

1. GENERAL ASPECTS OF IRRIGATION MANAGEMENT TRANSFER

Irrigation management transfer (IMT) can be defined as the transfer of the responsibility and authority for irrigation system management from government agencies to water users associations, or private sector entities. Irrigation management transfer may include the transfer of water rights from the government to water users associations as in Mexico; or it may only include turning over partial management responsibilities, such as water supply, canal maintenance and payment of irrigation services to water users as in Sri Lanka or Philippines, while the final approval of operation and maintenance plans and budgets is subject to government approval, as it has been the case with the first wave of irrigation management transfer in Colombia (FAO and INPIM, 2002).

The International Commission on Irrigation and Drainage (ICID, Yalta Declaration 2002) defines the Irrigation Management Transfer (IMT) as the process to delegate the management responsibility and authority for irrigation systems, previously held by governmental institutions, to farmers or organizations of water users. It may also include the transfer of ownership of parts of the systems. These transfers are driven by significant changes produced in the economy, moving from traditional centralized planning and production systems into a market economy.

The policy of irrigation management transfer began in the mid-1970s in a few developing countries, such as the Philippines and Colombia. It gathered pace through the 1980s and 1990s and in 1997 Vermillion identified 24 countries pursuing such policies, 10 of them in Asia, 8 in Africa and 6 in Latin America. Today, several other countries in Eastern Europe and Central Asia should now be added to the list. By now, there may be some thousands of organizations of irrigation farmers that have been set up under programs of this kind and in a large variety of developing countries (Abernethy, 2001).

Some of the main objectives for a transfer program are to ensure sustainability of the irrigation districts; reduce the financial burden on the government; pass responsibility for operation and maintenance to water users; increase efficient use of water, and improve and sustain system performance; and reduce the number of public employees in the irrigation districts.

2. DEVELOPMENTS IN COLOMBIA

Colombia has 287454 ha with an irrigation and drainage infrastructure developed by the public sector. This area is grouped in 24 irrigation districts of which 16 have been transferred to the water users associations for irrigation management and the remainders are still under the administration of the Government Agency.

In the 1970s the government decided that private provision of water services is the most efficient means of improving both economic efficiency and social welfare. In the case of irrigation and drainage, this means transferring the responsibility for operation and maintenance from the public agency to water users associations. Management transfer of irrigation districts in Colombia has been carried out during three periods. In 1976, the irrigation districts Coello and Saldaña were transferred by request of the water users. During the period 1989 – 1993 the irrigation districts Rio Recio, RUT, Samaca, and San Alfonso were transferred to comply with the IBRD (International Bank for Reconstruction and Development). Finally, during 1994 – 1995 most of the irrigation districts were transferred following the policy established by the Colombian Government.

64% of the area developed by the public sector has been transferred to the water users associations, 90% has an irrigation and drainage infrastructure and only 13% has a drainage one, while 10% of the not transferred area has an irrigation and drainage infrastructure and 87% has only a drainage one. Transferred area is mainly concentrated in the Tolima State (49%) and the Atlantic Coast (27%), while the remainder is in the North Santander (9%), Boyaca (10%) and Valle del Cauca (5%) States.

3. IMPACTS OF THE IRRIGATION MANAGEMENT TRANSFER

Five irrigation districts were visited in June 2004 in order to identify the current status of the irrigation districts after transfer was done and to obtain information on the impact of the transfer program after a relatively long period with new management. The visited irrigation districts included the Río Recio, Coello, and Saldaña Districts located in the Tolima State; the Zulia District in the North Santander State; and the María La Baja District in the Bolívar State.

3.1 Zulia Irrigation District

The Zulia Irrigation District is located in the northeastern part of Colombia in the North Santander State, near the border with Venezuela. It was built during the period 1962 – 1968 and its operation started in 1969. Initially, the Colombian Institute for Agrarian Reform (INCORA) was in charge of the administration, operation and maintenance of the district; in 1992 the Institute of Hydrology, Meteorology and Land Improvement (HIMAT, later INAT) delegated the administration to the water users association, named ASOZULIA.

One of the first consequences of the transfer was the reduction in personnel; it was reduced by 70%, namely from 150 to 45. The present organization mentions that the transfer process took place in a fast way and that during and after the transfer process there was not sufficient assistance from the Government. The economic crisis in the 1990s caused by the so-called "Economic Liberalization" affected in a negative way the agricultural sector. Moreover, the action of illegal groups, first the guerrilla and later the paramilitary groups, as well as the advanced deterioration of the hydraulic infrastructure of the Zulia Irrigation District were factors that led to a critical situation for the organization at the end of the 1990s.

The critical situation was apparently due to very poor socio-economic conditions of the farmers, with very low standards of living, to a serious deterioration of the hydraulic infrastructure and to a considerable amount of outstanding bills for the water services provided. At the end of the 1990s, the outstanding bills were even greater than the budget of the water users organization; Col $1.4 billion and Col $1.2 billion respectively for the year 1998.

In the year 2000 the users organization started a reactivation process with a high social content through the development of a pilot project for productive agriculture; it initially involved 20 users. After a successful and gradual development the program included 300 users in mid 2004 (25% of total users), expecting that the number would grow to 700 users by the end of 2005. The success of the program was based on the establishment of a vision for the future of the organization. Its main purpose was to improve the living conditions of the farmers through an integrated and participative approach for the *rice-production chain. In this way, the organization changed its traditional role as an administrative entity of the hydraulic infrastructure supplying water to farmers for* a new role. This new role has a much wider scope and is focused on the improvement of the farmers socio-economic conditions through the introduction of profitable irrigated agriculture practices. In this process farmers were to lead the future development and become multiplying agents of the program approach.

Strengthening of the management capability of the organization was a key factor. It improved the credibility of the organization in the eyes of the users. The organization established a number of criteria for the reactivation process. These were namely: the agricultural activity has to be a profitable business, an appropriate organization was to exist and all the phases of the production chain had to be taken into account; the inter-institutional relationships with public and private supporting entities had to be strengthened; all the actors involved will extensively participate; and the marketing of the agricultural products will be based on forward contracts.

On behalf of the users the association applied for the so-called "Associated Credit Line" offered by the Government Credit Agency, the Agricultural Financial Fund (FINAGRO), in order to finance the production costs of the rice. This credit, equivalent to 70% of the production costs, was transferred to the farmers through a credit supervised by the organization that gave technical support and agricultural inputs to the farmers; in some cases, especially for small farmers, the organization supplied food products for their subsistence. At the same time, the organization also applied for a credit for the acquisition of agricultural machinery, which allowed for improvement

of agricultural practices, increase in productivity and reduction of production costs. The savings obtained were transferred to and distributed among the farmers. The marketing of the rice is carried out through forward contracts with the National Agricultural Stock Exchange. In this operation the product price is agreed upon at the beginning of the season and the price can be increased at the moment of selling, but it can never be decreased. In this way the action of the middlemen is controlled.

Efficient use of financial resources and transparency of management actions supported the strengthening of the organization's management capability and increased the confidence of the government agency to such an extent that the associated credit line is automatically renewed by the Government Credit Agency every year. Successful management of financial resources led also to the approval of a credit request for the rehabilitation and modernization of the hydraulic infrastructure, which showed serious deterioration after management transfer. This credit of Col $10 billion was approved in 2004 and about 51% was used during the first phase (2004). The National Government contributed with 40% through the Incentive for the Rural Capitalization (ICR), and the State Government and the Mayor's Office with about 20% for the financing of this credit. ASOZULIA agreed with the farmers to establish a new and additional fixed tariff of Col $35000 /ha per user to be paid during 18 semesters.

The organization's credibility acquired by an efficient and transparent management of the financial resources, is reflected on its budget for 2003 and 2004. In 2003, the budget was Col $ 8 billion, for three main items: budget for administration, operation and maintenance; credit for agricultural machinery, and credit for the associated production. On the other hand, the budget for 2004 was Col$ 1.7 billion was divided in 65% for conservation activities, 12% for operation and 23% for administration. The budget difference corresponds to the value of the credit given by the Government Credit Agency (FINAGRO) to the organization in view of its efficient management of the previous credits. Concerning the financial aspects it is important to mention that from the beginning of the reactivation process the fee collection is almost 100% and the existing outstanding bills correspond to the period before the reactivation process.

An important fact was recognized during the visit to the Zulia Irrigation District. Management staff and farmers recognize that there is a direct relationship between the transfer program and the successful current condition of the organization. In spite of the fact that there was a difficult time after the management transfer and the organization got in a crisis by the end of the 90s, the farmers and leaders believe now that the management transfer brought in time some positive benefits for the organization, because the transfer gave major freedom of action to the organization. This freedom was a very important support to reach the current condition and it was a key factor to become a more efficient and productive organization. The organization was especially able to take full advantage of the financial support from the Government Credit Agency (FINAGRO) and it developed an agro-industrial enterprise that improved the socio-economic conditions of the farmers.

Nowadays, ASOZULIA has had a successful and large experience in the efficient and transparent management of economic resources provided by the Government Credit Agency. They have managed almost Col $9 billion during the last three years. Therefore, the organization ASOZULIA has become a reference for the management of financial resources for other organizations within the agricultural sector.

The present situation shows an organization that has developed a profitable agriculture focused on rice production; farmers with good socio-economic conditions are satisfied with the performance of the organization, they have a high sense of belonging, and are willing to participate in and support the proposals for improvement. Moreover, the organization has established strong inter-institutional relationships with supporting public and private entities; it has high management capability and high social development.

In summary it can be said that ASOZULIA represents a great organization of the community. It counts on a firm leadership from the Board of Directors, and great action capability from the Board of Directors to support the farmers productive activities: technological innovation in agricultural practices (land leveling by using laser equipment) in order to improve efficient use of irrigation water, e introduction of improved seeds (plant technology), administrative and credit support to the farmers, forward marketing, formulation of programs with a high social content, important role of women in the organization and a great capability to mobilize financial resources.

Learned lessons

The case of the Zulia Irrigation District offers several lessons to be learned. One of them is the fact that an irrigation system must not be considered as an hydraulic infrastructure that provides irrigation water to the farmers only, but also as an important component of a production system whose final objective is to contribute to the improvement of the living conditions of the farmers through irrigated agriculture under criteria of profitability, equity, efficiency, and an integrated and participative

management approach. The Zulia case shows that when economic benefits exist, the farmers are more sensitive to proposals for changes, they are willing to agree upon engagements and to participate in the development process of the proposed changes.

The present management approach in the Zulia Irrigation District changed the traditional production system within the agricultural sector. Traditionally, the Colombian Government offered land (via the agrarian reform) and financial resources (credit) to the farmers, who lacked training and agricultural experience. As a result, some farmers sold their land and invested the money coming from the credit in other activities than agricultural ones. A similar situation could be observed at the beginning of the transfer process. Farmers without any enterprise experience received also some financial resources from the Government and as a consequence many farmers misused the money and 90% of them got problems with credit payment. After that, agricultural activities were financed by the middlemen for relatively high interest rates resulting in a low profitability for the farmers and in an increase of outstanding bills for the water service provided by the organization. Before a total collapse of the district, the organization started a reactivation process that allowed for a direct relationship between FINAGRO-ASOZULIA-Farmer. Through a supervised credit and an integrated approach for the rice production chain it has been possible for farmers to become economically self-sufficient.

The formulation of a future vision by the organization was an important factor for the sustainability of the district. At the moment, the organization considers the creation of funds for education, housing and recreation for the families of the users as a means to strengthen social welfare in the near future. For several reasons, ASOZULIA considers the present mono-cropping of rice a major risk and therefore it will develop actions to increase rice productivity (from 5.5 to 7 ton/ha), reduce production costs and introduce more profitable crops like fruit trees and rubber trees for which good expectations exist in view of international markets.

3.2. Maria La Baja Irrigation District

The Maria La Baja Irrigation District is located along the Colombian Atlantic Coast, in the southern part of the Bolivar State, near Cartagena. The irrigation district was built during 1967 – 1972 for the total cost of US$ 20.1 million, of which 69% was financed by the Colombian Government and the remainder by the Inter-American Development Bank. Currently, the irrigation district supports about 1800 users, of which 385 are growers of African palm. About 75% of the farms is smaller than 10 ha, 25% is in the range of 10 – 50 ha, and 3% is larger than 50 ha.

Management transfer was agreed upon in 1994 between the Government Agency (INAT) and the Users Association of the Maria La Baja Irrigation District (ASODIMAR). However, the actual transfer only occurred in 1996 due to the reluctance of the water users and the distrust of the Government Agency in the management capability of the organization. The reluctance of the users was based on the very poor conditions of the hydraulic infrastructure at the moment of transfer and for this reason they demanded rehabilitation of the infrastructure. As a result a joint management was agreed upon for a period of 6 months, which was extended to a full year (1997). During this period training was given to the district staff and it was also agreed upon that a modest rehabilitation of broken-down structures would be done after the transfer and that the users association would have a main say in prioritizing the repair activities.

IWMI evaluated the functional condition of hydraulic structures and canals for the Maria La Baja Irrigation District, being this district under rehabilitation. A number of 55 structures out of 250 were inspected, 52% was found not to function, 30% was not functioning properly and only 18% was performing well. On the other hand 13% of the total length of canals has been inspected and about 19% was not functioning, 19% was not functioning properly and 62% was performing well (Vermillion and Garcés-Restrepo, 1998). These figures clearly show the deterioration of the hydraulic infrastructure and explain the reluctance of the users to accept the system at the moment of the management transfer.

Once the organization took the full control of the irrigation district, several factors caused a progressive deterioration of the system to such an extent that it caused a serious crisis that resulted in an intervention of the Government Agency, INCODER, in October 2003 and the dissolution of the Users Association ASODIMAR. This suspension of the organization seemed to confirm two facts: firstly, the doubt that the organization was competent to manage the district in a good way after the transfer; and secondly, the reluctance of the users to agree with the transfer given the deteriorated condition of the physical infrastructure. During the visit (June 2004) that took place within the framework of this research, the Government Agency was carrying out a strong rehabilitation program for the hydraulic infrastructure as part of the intervention program. Technical, socio-economic and environmental problems

were the main factors that caused the organization crisis. Some of these factors hindered the full establishment of the organization and the management transfer only accelerated the crisis. In other words, the transfer was not the only cause of the final suspension of the organization, for the risk factors already existed when the irrigation system was created.

Serious problems during the design phase, siltation of the reservoirs due to a progressive deforestation, floods, waterlogging and insufficient drainage caused a severe reduction of the irrigation area to the extent that only 20% of the potential area was cropped in 2003. The users expressed that the transfer process took a very short time; that the assistance from the Government side was insufficient, and that the deterioration of the hydraulic infrastructure was an important factor. They also mentioned that the "Economic Liberalization" had a negative impact on the economic capability of the farmers, because before the economic liberalization about 5000 ha of rice were cropped, but after that the product price decreased and the rice sector went bankrupt. As a consequence the agricultural activity was not stimulated and land use changed for cattle.

On the other hand, the organization reached a very low credibility in the eyes of the users due to corruption and misuse of subsidies from the Government, personal interests and influences, which caused the failure of the organization. Other factors that contributed to the critical situation of the organization included a low sense of belonging from the users side, non-official settlements along the canals, increase in outstanding bills, lack of entrepreneurship with social impact, ineffective actions of supporting entities, low management capability, marketing of products via middlemen, low profitability, low organizational culture and the influence of paramilitary groups in the region.

Under these conditions, the Government decided to intervene in October 2003 and created a new organization, called USOMARIA. The Government established a rehabilitation plan for about Col$ 5500 million with finance from The World Bank; the Government Agency INCODER and the Government of the Bolivar State were appointed as agents for the intervention. The rehabilitation involved the maintenance of canals, improvement of radial gates, improvement of road network and civil works. No money was available for community related aspects.

The Government plan was that after the rehabilitation of the irrigation district, it will be given in concession to a private enterprise for its administration. It was said that this enterprise would be constituted by partners, one of which would be the new users association. However, the organizational form is still not clear and the discussions about this topic continue. Therefore, it is expected that a privatization in a more aggressive form will be imposed by the government. This will cause conflicts and will deepen the social differences.

3.3. Rio Recio Irrigation District

Rio Recio Irrigation District was transferred to the Users Association ASORECIO in 1990. Almost 14 years after the management transfer, the organisation showed a stable condition and seemed to have acquired an autonomous management model, which was understood and accepted by the users of the organisation.

As a condition for the transfer, the users requested the Government to rehabilitate part of the hydraulic infrastructure, which was in poor condition at that moment. The Government rehabilitated the headwork and the main conveyance canal, repaired the tunnel in the conveyance canal, carried out maintenance works for the canals, built a pumping station for reuse of waste irrigation water and rehabilitated the road network among others. In general terms and taking into account that the irrigation works are more than 50 year old, it can be said that the current hydraulic infrastructure is functioning well. This means that the organisation was able to operate and maintain the system in a good way and that it had sufficient economic resources to carry out the maintenance activities in a timely and efficient way. It is important to mention that the irrigation system has a multiple purpose; it is used for irrigation, electricity generation and water supply. However, ASORECIO does not receive any economic benefit from the additional services.

The Board of Directors is involved in all activities concerning administration, operation and maintenance and in the farmers' eyes their credibility is so high that sometimes the manager is requested to solve family conflicts; this means an important acknowledgement of the authority of the organisation.

There is also a strong tendency to use the water in an efficient way. The district suffers from water shortage and for that reason an area of 3200 ha out of the 9546 ha is on average irrigated per season. A year has three irrigation seasons, namely January – April, May – August, and September – December. In this context the approval of requests for irrigation water and the end of an irrigation water season are the main causes for conflicts with the users.

In view of an efficient water use the discharge in the main canals is controlled by water level gauges; the main canals are lined and their conveyance efficiency is

estimated at 90%; the canal maintenance is done in time, measuring structures, type Ballofet, being installed at farm level to check delivered volumes. However, an inappropriate installation of the slide gates was identified in secondary canals. The canal maintenance is done manually due to the fact that the available machinery is inappropriate and it would modify the shape of the cross section. The canal maintenance is assigned by contract to the farmers.

The organisation recognises the fact that water resources conservation and protection is one of the key factors for sustainability, thus some activities have been developed to secure the water availability. In this way, reforestation, protection and conservation activities within the catchment area of the Rio Recio have been carried out by the ASORECIO. The organisation received a positive response from the inhabitants of that area. However, the activities have been hampered by the action of illegal groups.

In the irrigation district rice is still the most important crop followed by sorghum, corn and cotton. The cotton cultivation is not encouraged given low market prices. Rice cultivation is a profitable business for the farmers and therefore it is an economic incentive to pay water fees in time and that results in a high fee collection. Improvement of the agricultural and irrigation practices are required at farm level and for this reason the organisation gives support and advice to farmers in relation to farm improvement works, especially for land levelling for rice cultivation.

The irrigation development in the district is limited by several factors, such as water shortage, capacity of the conveyance canals, and the irrigation water quality. Before the transfer a project to regulate the Rio Recio was considered. However, nowadays and 14 years after the transfer the project is still being considered. The existing tunnels in the main canal limit its capacity and therefore the possibilities to enlarge the irrigation area; technical alternatives to solve this situation have not been considered in an effective way.

From an environmental point of view, ASORECIO faced several problems. The reuse of irrigation water is an alternative to combat water shortage. However, this practice has a risk given the water contaminated by agrochemicals and domestic wastewater. The high sediment load affects the physical quality of the irrigation water. The sediment load is caused by deforestation in the Rio Recio basin and the steep slope of the canals, especially in the Lérida sector. This causes major sedimentation problems in the downstream Ambalema sector. Soil salinization is another risk due to the lack of an appropriate drainage system at farm level and at main level.

As final conclusion for the Rio Recio Irrigation District, it can be said that the organization is consolidated around the supply of irrigation water in an efficient way in spite of some limitations due to water shortage and within the context of a profitable agriculture based on rice cultivation. The organization established rules and regulations, which were accepted by the users and are the basis for decision-making for the water service under water shortage conditions. Other activities concerning the organization of the marketing of products and social programs were not identified.

3.4. Coello and Saldaña Irrigation Districts

Management transfer in the Coello and Saldaña Irrigation Districts was requested by the users themselves; this is contrary to the transfer in most of the other irrigation districts where the transfer was considered as imposed by the Government. The experiences of the Coello and Saldaña Irrigation Districts are a reference point for the transfer process as followed later by the Government for the remainder of the irrigation districts. Almost 30 years after management transfer, USOCOELLO and USOSALDAÑA are highly consolidated organizations. They have reached autonomy and maturity in spite of the different problems they have faced.

Both irrigation districts maintain the typical organizational structure consisting of the General Assembly, Board of Directors and the basic departments for administration, operation, and maintenance; although the Saldaña Irrigation District has also technical and welfare and social security departments. About 2200 users and 2800 farms are involved in Coello, while 1600 users and 2450 farms are involved in Saldaña.

Rice is the predominant crop in the irrigation districts and it accounts for 80% and 100% of the irrigated area in Coello and Saldaña districts, respectively. In both areas two harvests per year take place. In Saldaña about 17000 ha have an irrigation infrastructure, but only 14200 ha are cropped per season; the expansion of the area for rice is limited by the incorporation at national level of new areas that have increased the national production and reduced the product price. So far the reduced number of experiences with other crops constraints the increase of the cultivable area and crop diversification.

In the Coello Irrigation District about 18000 ha are grown with rice and that corresponds to 80% of the irrigated area. The remainder is grown with sorghum, peanut and cotton, the latter one during the first season. Given the

water shortage the rotation of the rice is a compulsory practice for each farmer; this means that a farmer is allowed to grow rice once a year. This action also encouraged crop diversification, soil improvement and sanitary control. As compensation for the rotation, a only fixed tariff is charged to the farmers with rice. Before 1998 the water service was closed during one season in view of water shortage. This practice was interrupted when more water was available later with the opening of the Cucuana Project in 1998, which allowed for the expansion of the irrigated area to 6075 ha.

The Cucuana Project is a good example of the capability of the users association of the Coello Irrigation District (USOCOELLO) to obtain resources for the financing of the last phase of the project, which had been started by the Government Agency with an inefficient performance in relation to the project execution and management of the economic resources. USOCOELLO got the economic resources for US$ 6 million and they completed the project in a period of six months.

The inspection carried out for this research showed a good functioning of the hydraulic infrastructure of the two districts, especially the main and secondary irrigation network; the Coello Irrigation District presented the best condition of the two. As mentioned before, the users enlarged the Coello Irrigation District in 1998 with some important hydraulic works: headworks (capacity 26 m^3/s), conveyance canals (32 km) and special works as inverted siphons, viaducts, control structures, etc. In general terms, the irrigation works shows good maintenance, conservation, and operation conditions; therefore, it can be said that sufficient economic resources are available for the conservation and maintenance activities.

Water management and technical decisions are highly influenced by the rice culture. The procedures for water supply are defined on the basis of the long experiences the organizations have with rice agricultural practices. Requests of the farmers for water service, longer terms, agreements for technical assistance with professional experts, good conditions of the hydraulic infrastructure at farm level, actions and steps at the organization's office level, and finally, water delivery by the ditch tender are the most important steps for the irrigation water service.

An inefficient water use was observed at farm level. Water control and regulation is based on experience of the irrigation inspector. Nowadays measuring structures; when they have existed in the past they were destroyed by the farmers and other structures were installed in an improper way. Soil quality (light soils) and lack of land leveling contribute in great proportion to an inefficient water use. It is presumed that larger amounts of water, greater than needed, are delivered at farm level. In view of a more efficient water use USOSALDAÑA launched a pilot project in 2500 ha using laser technology for land leveling and rice transplantation. Training on irrigation practices has been another activity developed by USOSALDAÑA and a license as trained irrigator must be obtained in order to perform that activity.

Rice culture is a profitable business compared to other crops; the profitability for 2004 was Col$ 2.5 million/ha when the user is the landowner and Col$ 1 million when he is tenant; this means that rice culture is a good business whether the farmer grows directly or rents his farm. In the Coello Irrigation District most users are tenants, while in Saldaña 64% are tenants and 34% are owners.

On the other hand, rice is an important factor to increase the land value to the extent that the value of an hectare of rice land (Col$ 25 million) is 5 times higher than the one for other crops. Therefore, some users use their political influences within the organization to register their lands as suitable for rice so they can get water allocation in spite of the fact that their lands are not suitable for rice given the light soils. This aspect contributes to inefficient water use and also promotes corruption. It does not stimulate crop diversification and when the Cucuana Project started to operate some farmers stopped growing fruit trees and improved the lands for the rice crop.

The rice crop is a strong employment generator. Torres (2003) mentions that according to the Federation of Rice Growers the national average of day wages for rice cultivation is 32/ha and about 12´928000 day wages were generated for the year 2002. He mentions that in the Saldaña Irrigation District 55 day wages per ha were used and that the transplanting demanded 71 day wages. These figures were based on permanent rice production obtained by small producers.

As mentioned before, rice growing is a profitable activity, which allows the farmer to fulfill his financial obligations such as payment of water fees. For this reason, the outstanding bills are very low in the two organizations. Farmers financial self-sufficiency is based on a timely payment of the water fees, which has an additional incentive, namely the guarantee of a permanent water allocation, especially for the rice crop, which is also a good mechanism to give a high value to the land or to get a high renting value.

In general terms, the two irrigation districts show financial self-sufficiency, and in some cases, like the Coello Irrigation District, their functional budget is larger than

that for small municipalities. This situation has evoked the interest of political sectors and some user associations have become politicized. For this reason, corruption, conflicts from personal interests and individual influences are some of the problems faced by the users associations. Lastly, Coello had some internal disputes that were generated by the open disapproval of corruption and private interests, which needed specific Government intervention.

Bacause of the dynamics and development of the rice growth the main activity of the user's organizations is focused on irrigation water supply, while additional activities like marketing are developed by other interested parties. The rice agro-industry is well developed and rice processing enterprises act as intermediary agents within the production system; they offer agricultural inputs and financing to the farmers and they get in turn the production and establish the product value.

No cooperative forms for marketing exist in view of past negative experiences, which created distrust amongst the farmers and helped individual actions and particular interest. The user's organization complained about the minimal and inefficient presence of the government agencies that provide security and supporting services. The relationship with the Environmental Authority is poor in spite of the fact that Col$ 300 million were paid by USOSALDAÑA for water concession. The money for financing given by the Government agency is not sufficient to attend the financial requests of the farmers; and the security problems created by the action of illegal groups also affect the user's organizations to the extent that USOSALDAÑA mentioned the payment of an insurance against damage caused by attacks on the hydraulic infrastructure.

From an environmental point of view the user's organization faces serious threats caused by the potential danger of soil salinization. The user's organizations have not yet considered detailed salinization studies, but it is expected that salinization problems will develop given the inefficient water use and the lack of a drainage system at farm and at scheme level. The excessive use of agrochemicals and the inefficient management and disposal of solid waste are also risk factors for the health of the farmers and for the quality of the natural resources, especially water resources.

The two irrigation districts have serious problems with the water quality that is affected by the high sediment load as a result of the serious deforestation of the surface water basins. Saldaña and Coello Districts have heavy machinery at the headworks for sediment extraction which increases maintenance costs and generates an environmental problem due to the disposal of the sediment. In Saldaña two dredgers extract 200 m^3 sediment per day during the dry season and 1500 to 2000 m^3 per day in the wet season. As a consequence, USOSALDAÑA included in the water bills for 2004 a cost of Col$ 15000/ha per season for sediment control. In Saldaña the river course was changed and it required the construction of a new, additional intake. In the Coello District the water is now captured by a diversion channel due to the siltation of the original structure. Cucuana is a recent project with sediment control, including a sandtrap with an approximate capacity of 36000 m^3.

From a social point of view it can be said that the two irrigation districts have been influenced by the action of groups who act on the fringes of the law; in this case, paramilitary groups, which have displaced the guerrilla during the last years. However, the administrations of the districts and the users have reached some coexistence agreements with these groups.

An important concern is the apathy of the users to participate in the assemblies. As an explanation for this situation, the users mention that most of them are tenants and the landowners live outside the irrigation district; tenants are only interested in the economic profitability, while landowners are interested to receive the money from the rent of their lands. Also the shift of interest inside the organization, conflicts among small, middle and larger producers, corruption in the Board of Directors are some factors contributing to the apathy of the users.

4. CONCLUSIONS

One of main objectives achieved by the Transfer Program is related to the relationship between Government and the land improvement sector. From financial point of view, it can be said that the financial burden of the Government was significantly reduced since the total costs for administration, operation, and maintenance were transferred to the water users associations of the irrigation systems. The partial and in some cases the total elimination of the subsidies after the transfer of the systems also contributed to the reduction of the irrigation costs for the Government.

The Transfer Program also helped for further development of the new institutional structure for the land improvement sector and contributed even more to reduce costs for the Government and facilitated the implementation of the policy of decentralization and delegation for the land

improvement sector. The removal of power from institutions such as HIMAT first and then INAT, and the fusion with other institutions to form the current INCODER is an example of that policy.

The impact caused by power delegation from the land improvement sector to the regional and local institutions cannot yet be evaluated, as these institutions had just started to perform their functions. At present, the Government of the States of Atlantico, Bolivar and Tolima started their delegation function. In 2004, the Atlantico Government was assigned the contract for the rehabilitation works of the Repelón and Santa Lucia Irrigation Districts, and the Tolima Government the contract for initial works of a new project called "Triangulo del Tolima". Mid 2005, the Central Government transferred money to the Bolivar State Government for the rehabilitation of the Maria La Baja Irrigation District. The state in turn will delegated some of its functions to regional and local entities, such as the Agriculture Secretary and the Municipality Units for Technical Assistance (UMATA). Skepticism exists among the leaders of the water users organizations concerning this type of delegation, because they believe that the regional and local delegated institutions historically have not had an effective presence in the area of the irrigation districts, are influenced by political sectors, and have low credibility due to a high corruption level and low transparency in their activities.

The development of the transfer program showed a clear difference between the first stage of the transfer program and the following phases. It was clear that management transfer in the Coello and Saldaña Irrigation Districts was promoted by the users themselves, who believed that they were able to operate and manage the financial sources of the system in a more efficient way than the Government Agency. In this case the Government Agency was against the transfer, because they believed that they would lose the political management of the land improvement sector.

Action during the following phases of the transfer Program was especially promoted by the Government side, while the users only accepted the Government transfer proposal under certain conditions. From a detailed reflection about the role played by the Government in the following phases of the transfer program, it can be concluded that the transfer program was a kind of strategy used by the government to face the fiscal crisis of the 1990s and to obtain the necessary engagements with the international banking system, which required the implementation of a policy of decentralized and delegated functions. This seemed to be confirmed by visits to the organizations during this research; organizations said that during the process of management transfer the Government Agency was very interested in developing the process as quickly as possible and for that reason the support and training from the Government side were not sufficient.

According to the transfer program all the irrigation districts would have been transferred before 1997. At present about 67% of the systems have been transferred, which accounts for about 64% of the total area. An important fact is that 90% of the total area with irrigation and drainage infrastructure has already been transferred. 87% of the systems with only drainage infrastructure have not yet been transferred. It seems that there is no incentive for the management transfer of the systems with only a drainage infrastructure.

About 30 years after the beginning of the transfer program the users organizations under research presented different levels of development. Some of them, as in the case of the Coello, and Saldaña Irrigation Districts (transferred 30 years ago) and to a lesser extent, in the Rio Recio case (transferred 15 years ago), showed a significant organizational stability based on a financial self-sufficiency resulting from an adequate provision of the irrigation services and on a on focus on operational aspects as main activities, within the context of a profitable agriculture concerning one only crop: rice. This situation was due primarily to the presence of entities supporting the agro-industry and marketing, research and technology transfer activities implemented specially by private parties with particular interests. Therefore, it can be said that the transfer program contributed in a high degree to the consolidation of the production system, where the different phases of the production chain were developed by special parties and that allowed them to satisfy their wishes and interests and to devote their efforts to specific activities, and in the case of the water users association to the provision of irrigation water services.

However, Maria La Baja Irrigation District represented the other face of the coin. Today the organization has been shut down by the Government and is in a reorganization process. After its transfer, less than 10 years ago, the organization did not find an organizational model to adapt it to the new self-sufficiency conditions established during the transfer and therefore it arrived very quickly to a crisis. It seemed that the existing traditional culture of subsistence supported by a traditional paternalistic attitude of the government and the lack of a clear vision of the agricultural enterprise contributed to the negative impacts after the management transfer.

On the other hand, the Zulia Irrigation District that was transferred 13 years ago, showed five years ago great dynamic developments from an organizational point of view, after it reached a very critical condition almost directly after the management transfer. Contrary to the present conditions previously mentioned for the other irrigation districts, the Zulia Irrigation District has an organization model that is based on an integrated and participatory approach based on a profitable agricultural activity focused on rice production and on a clear vision for the future development of the organization and the district.

Consequently, it can be said that in the post-transfer process and from an organizational point of view three crucial phases seem to take place, namely adaptation, maturity or full development, and consolidation. Adaptation is a critical phase where the organization with the best capabilities will adapt itself in a good condition to the responsibilities demanded by the management transfer. Training quality during the pre-transfer and transfer processes and the effective assistance given through the adaptation phase proved to be key factors for a successful performance and future sustainability of the organization. The maturity or full development phase is the period in which the organization has developed its full capabilities and looks after the integrated development of its beneficiaries based on a profitable irrigated agriculture practice based on equity, efficiency, competitiveness and sustainability criteria. In this phase the leadership and an integral and participatory management approach are the most important requirements. The consolidation phase is the situation in which the organization as a whole has achieved its maximum development condition to the extent that some specific activities of the production chain can be carried out by other parties while the organization maintains the integrated management approach. Under this vision it can be said that the Coello, Saldaña and Rio Recio Irrigation Districts are now in the consolidation phase, but they lack an integrated management vision; the Zulia District is in the maturity phase and Maria La Baja District failed during the adaptation phase.

Management transfer must not be seen as a simple transfer of responsibilities to the water users associations with the purpose of freeing the government from its financial burden and to contribute to a lighter fiscal deficit. The management transfer must take place in those cases where there ar favorable conditions which allow for a complete development of the management capability of an organization and to exploit the existing socio-economic potential and the natural and human resources, in view of the improvement of the living standard of the users. If no favorable conditions exist, the organization managing the transferred system will have a relatively low performance and will have to carry the financial burden and fiscal deficit suffered by the government before the transfer was done.

Increasing water use efficiency is another clear objective of the management transfer to the water users associations. However, the researched irrigation districts plainly showed that the use of irrigation water is a critical issue hampering the environmental sustainability of the irrigation systems. In view of an efficient use of the irrigation water, most of the operation departments carry out discharge measurements and control of the irrigation water in the main and secondary distribution system, but there exists a series of difficulties to control the irrigation delivery to the users given the non-existence of measuring structures. Moreover, it is expected that there exist an inefficient use of irrigation water at farm level and the danger of soil salinization in view of the lack of an appropriate drainage system.

The water shortage in the Rio Recio Irrigation District called for a more efficient use of the available water and consequently Parshall flumes were installed at farm level. The installation of this type of meters in the Coello and Saldaña districts was not a success, because the farmers destroyed them all in a short time. In these two districts the water shortage is not so critical. From these observations, it seems that there is a close relationship between the availability of irrigation water and a tendency to use it in an inefficient way. Moreover, the availability of irrigation water as a key element to increase the value of the land and the social status is also a factor affecting the efficient use.

The financial self-sufficiency of the organization as a result of the water selling, especially for crops that demand a large amount of water like rice, does not seem to be a strong factor contributing to water efficient use. From this perspective it could be thought that the administration of the organization would not have encouraged water efficient use, because the more water is sold, the more revenues are received and the more the financial self-sufficiency. However, the promotion of efficient water use by the administration could generate additional revenues through the enlargement of the irrigated area taking into account that most of the irrigation districts have not yet developed all their potential land for irrigation.

From an environmental point of view it should be mentioned that the deforestation processes are still growing and that they affect in a negative way the watersheds of the

main surface waters as visits to most of the irrigation districts have shown during this research. These processes affect the maintenance quality and costs, the operation activities and the availability of water, among other things. Although, most of the river basins are outside the influence area of the irrigation districts, the organizations are conscious to develop necessary actions for re-forestation, protection and soil conservation in order to assure water security for the future. Some actions have been affected by the presence of illegal groups and ineffective action of the environmental authority.

Lastly of all, the experience of management transfer in Colombia opened the opportunity to consider a wider perception of the role played by an irrigation system. The systems should not only be considered as a simple technical infrastructure that only provides irrigation water to the farmers, but it should also be recognized as an important component of a production system, whose final objective is to contribute to the improvement of the living conditions of farmers through irrigated agriculture under the criteria of profitability, equity, efficiency, and an integral and participatory management approach. Under this approach, the management of the irrigation systems by the communities will increase the management capability of the organizations and when economic benefits exist, the farmers are more sensitive to changes in the situation, they are willing to fulfil engagements and to participate in the development process resulting from proposed changes.

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