Irrigation Management Transfer in Colombia: An Assessment of Seven Transferred Districts[1]

Carlos Garces-Restrepo and Douglas Vermillion

INTRODUCTION

BY 1975 FARMERS IN the Coello and Saldaña irrigation systems in Colombia had, over a 20-year period, repaid their 90% share of scheme construction costs and were pressuring the government to take over management of the systems. Farmers argued that they had a right to take over management after repayment and could manage the schemes more cost effectively by themselves (Vermillion and Garces-Restrepo, 1994). By 1976 the government transferred management to the users and officially recognized the two new farmer-managed irrigation districts.

Soon thereafter the severe economic problems of "the lost decade" beset Colombia and the government decided to postpone management transfer for other irrigation systems in the country. By the end of the 1980s however, the government renewed its interest in transferring management for the 21 remaining systems managed by HIMAT, the national irrigation agency. Since 1990, five additional irrigation systems have been transferred to farmer management. Whereas farmers initiated management transfer in the first two systems, the government is promoting transfer of all remaining systems as a national policy. It is expected that the remaining agency-managed systems will all be transferred to farmer management within the next few years.

The transfer of management for irrigation systems from government agencies to local farmer organizations has become an international trend, especially since the structural adjustment policies of the 1980s (Vermillion, 1992). Common reasons for the policy are to relieve governments of the financial burden of managing irrigation systems, to permit reallocation of scarce government funds to other needs which cannot be handled by the private sector, and to improve the sustainability of irrigation through local management. This paper examines management transfer in the seven irrigation systems which have been transferred [to the present].

CONTEXT OF IRRIGATED AGRICULTURE

Colombia is located in the northwest corner of South America at latitude 5^0 North. Colombia is a mountainous country with an area of 1.1 million sq. km. and a population of 31.9 million people. The country has relatively abundant water resources including more than 1,000 perennial rivers. It has both tropical and temperate climates and an average rainfall of 1,500 mm/year. A marked bi-modal distribution in April/May and October/November makes the need for irrigation primarily a supplemental one.[2]

Of 6.6 million ha of land which has been assessed as having high suitability for irrigated agriculture, only 11.4 percent or 750,473 ha have already been developed, consisting of 525,869 ha under irrigation and 224,604 ha under drainage and/or flood protection facilities (Garcia, 1990).

At present, 155,454 ha of land are irrigated by the public sector, under the supervision of HIMAT[3] and 370,415 ha are completely under private sector or farmer management. Thus, it is clear that the private sector has played a major role in the development of irrigated agriculture in the country, representing 70% of the present total irrigated area (Garces, 1992).

Irrigated agriculture in Colombia includes a wide range of technologies. Under private sector enterprises all types of pressurized irrigation are available: self-propelled devices, sprinklers, micro-jets, buried pipes, etc. Under gravity

---

[1]Findings are based on a study conducted during 1993-94 by IIMI in collaboration with HIMAT, the Colombian Institute for Hydrology, Meteorology, and Land Development. This study has received funding from the GTZ/BMZ of the Government of Germany and the Ford Foundation.

[2]See Annex 1 for additional basic information on Colombia.

[3]In late 1993, HIMAT was restructured to help streamline the agriculture sector. Its new name, INAT (National Institute for Land Development), reflects its emphasis on developing irrigation and drainage systems. It will no longer be involved in hydrology, meteorology, and irrigation management. In Colombia the terminology "land development" and "irrigation development" are synonymous. The concept of land development is defined as:

...the construction of infrastructure facilities in order to provide an area with irrigation, drainage and/or flood protection with the purpose of increasing the productivity of the agricultural and/or animal husbandry sector....

Irrigation districts are areas provided with irrigation, drainage and/or flood protection works.

irrigation, it is common to see siphons, furrows and basin irrigation. Most public irrigation systems are gravity-flow schemes although there are some pressurized pump systems.

IRRIGATION SUBSECTOR POLICY

The Colombian Government is now engaged in an ambitious ten year land development program (1991-2000) for which irrigation expansion is the cornerstone. With a total cost of US$ 1.06 billion it aims to develop 535,500 ha, an area that represents twice as much as that developed so far by the public sector in the country's history. This constitutes 8.1 % of the country's land development potential. The plan covers large, medium and small-scale irrigation projects. All new systems will be turned over to farmer management after construction (Rep. de Colombia, 1991).

A second component of the irrigation subsector policy is the nation-wide program to create "mini districts," which are new, small-scale irrigation systems to be located primarily in hillside areas. The final thrust of the GOC's program concentrates on management transfer of all 23 public irrigation districts to water users associations. In support of this effort the government has modified the legal conditions effecting irrigation management by issuing a new Land Development Law in January 1993.

The new law establishes a Supreme Council for Land Development under the Ministry of Agriculture to coordinate all aspects of the subsector policy. The law also establishes a National Fund for Land Development (FONAT) whose main objective is to finance planning, design, and construction of irrigation, drainage and flood protection facilities. The law also provides farmer-managed irrigation districts with full legal status to obtain water rights, to own property, to enter into contracts, and to manage irrigation districts according to farmer objectives (including freedom to hire and fire district staff at will).[4]

CHARACTERISTICS OF TRANSFERRED SYSTEMS

Figure 1 shows the locations in Colombia of the seven irrigation districts which have been transferred to farmer management to date. Tables 1 and 2 provide basic information on these systems. Except for Samaca District (built in 1945), the transferred systems have all been built since the 1950s. Water users associations were formed after construction, more for lobbying, negotiating and resource mobilization purposes than for management. Water users associations are typically represented by a board of seven farmers, with four having landholdings less than 20 ha and three having landholdings exceeding 20 ha.

Five of the systems are river diversions, one has a reservoir, and one is a pump scheme. Water is measured only at the level of the main canal or head of secondary canals, except for Recio District which measures down to the tertiary offtake level. Most farm turnouts are sliding gates. The systems range from 40 to 101 ha which are served per kilometer of canal. Water delivery efficiencies are relatively high, ranging from 44.1 to 86.1.[5] Only a modest amount of rehabilitation occurred prior to turnover.

Most systems have clay to loamy soils. The main crops are rice and cotton, with some soybeans, sorghum, maize, vegetables, and fruit trees. Rice yields range from 5.5 to 6.8 tons/ha. Cotton yields are about 2.5 tons/ha. Farmers frequently complain that the new open economy policy, which has reduced agricultural subsidies and permitted imports of rice and other food crops, has reduced net farm income in recent years to close to zero. Production costs are high relative to Asia.

Five of the systems exceed 9,000 ha in area. San Alfonso is the smallest with 1,174 ha. The largest is Coello with 25,628 ha. Average farm sizes range from 1.6 ha in Samaca to 37.5 ha in Recio (Table 3). Ten percent of the farms or fewer are above 20 ha in five of the systems. However, in Recio 52% of farms exceed 20 ha. In Coello 24% of farms exceed 20 ha.

TRANSFER PROCESS

Motivations and Negotiations

In Colombia, the process of irrigation management transfer is characterized more by negotiation of terms and conditions of future management policy, financing, staffing and physical improvements. Compared to transfer elsewhere,

[4]Prior to the new law, numerous labor disputes occurred in farmer-managed irrigation districts in transferred systems. Most of these were cases where farmers were prevented from firing staff previously hired by the government before transfer, because of existing labor laws.

[5]Water delivery efficiency is the ratio of water volume delivered to the volume diverted from the source. The high efficiency in Samaca District is due to extensive use of pressurized pipes with valves which are opened and closed on demand. Conveyance losses are very small.

particularly in Asia, relatively little attention has gone into organizing and training farmers. This is primarily because, in Colombia, farmers had already been organized as a political and administrative entity while management was done by a cadre of professional, hired staff. After transfer most of the former staff remained and new staff with appropriate skills, including engineers, were available for hire. The role of farmers before transfer was mainly lobbying and oversight; after transfer it became one of supervision, personnel management and recruitment, as well as oversight.

Farmers in Coello, Saldaña and Recio districts initiated negotiations to take over management with the motivation that they could manage the schemes more cheaply and efficiently than could the government. These districts hired lawyers to negotiate favorable terms for transfer. Although in the other districts the government promoted transfer, farmers generally agreed to the transfer for the same reasons. Farmers expressed the impression that they were subsidizing HIMAT with the water fees and that there were more staff than were needed.

The most common issue to be negotiated prior to transfer was the disposition of existing district staff. Farmers pressured the government for the right to release staff. In some cases however, such as Coello, Saldaña and Samaca, they agreed to retain some staff under some pressure from the government and obstacles of the older labor laws. The Land Development Law of 1993, although not yet operationalized, appears to give full control to the districts over staff disposition.

Another issue was how much the farmers would have to repay to the government rehabilitation. Farmers in Zulia and Recio resisted pressures to repay construction and rehabilitation on the grounds that in Zulia the system was already 25 years old and in Recio the farmers made no repayment commitment prior to rehabilitation. Farmers in San Alfonso agreed to transfer only if the system's infrastructure was handed over in "good condition."

In RUT district, which is a pump scheme, farmers before transfer were not aware of the high cost of energy for pumping, which now constitutes 30% of all expenses. They are now trying to renegotiate the terms of the transfer to obtain an energy subsidy. The government appears sympathetic but as yet has done little to reverse the negotiated terms and conditions of transfer which gave the infrastructure to WUA. Farmers do not want HIMAT to withdraw completely, since they have expressed the need for HIMAT to continue to provide technical and financial support.

Rehabilitation

Only three systems were rehabilitated before transfer: Recio, where US $3.6 million was invested in major repairs; RUT, where the pumping system was rehabilitated (but this was done four years prior to transfer) and Samaca, where some improvements were made in the canal network and reservoir. The government has pressed farmers in Recio to repay the costs but farmers managed to sidestep the issue during transfer negotiations and the matter does not appear in the transfer agreement. In RUT farmers repaid part of the costs of rehabilitation through a special tax. Minor repairs were made in San Alfonso prior to transfer at the insistence of farmers. They were paid by the government. In Zulia farmers and HIMAT agreed that no rehabilitation was needed prior to transfer.

Training and Organizing

No training associated with management transfer was done in five of the systems transferred because most of the former staff were retained by the farmer managed irrigation district after transfer. Over time, training was given primarily on a staff-by-staff basis as a few new staff were hired. Some training was done in San Alfonso and Zulia, sponsored both by farmers and HIMAT, to improve skills of field operations personnel and heavy equipment operators. Since farmers were already organized with a general assembly and a board of representatives prior to transfer, and a separate group of staff were doing the actual management of the systems, farmer groups were not organized by HIMAT or any NGOs in conjunction with management transfer.

MANAGEMENT BEFORE AND AFTER TRANSFER

Management Practices

Before transfer, HIMAT allowed farmers to choose their own actual cropping patterns, but they encouraged farmers to stay within certain limits so as not to overstretch the capacity of the water supply. HIMAT prepared annual and seasonal operational plans and irrigation schedules based on pre-determined allocations for crop water requirements based on a proscribed general cropping pattern. Irrigation schedules were based first on demand requirements modified by supply constraints.

In Coello, Saldaña and Zulia districts the rice crop was (and still is) restricted to certain areas each season and the permitted rice area locations are rotated each season. After transfer the new management of the farmer-governed districts organize crop patterns and irrigation schedules, following basically the same modified demand for water

management systems as before transfer. HIMAT continues to provide technical assistance to help ensure, as it sees it, the equity and efficiency of water distribution. As time goes by the district boards have become more and more independent from HIMAT though and there is some tension between farmers who want HIMAT to remain involved (as guarantors of fairness and technical competence) and others who are trying to break off the "interference." The majority view seems to be that HIMAT should continue to play a supporting role rather than a supervisory one.

Chart 1 shows a typical organizational structure for the districts, after transfer, as represented by Coello district. Before transfer the general manager and other staff were hired by the government. The government supervised all management policy. Farmers and their board acted in an advisory and lobbying role. After transfer HIMAT officially shifts to an advisory and support role and the farmer board takes over supervision of staff and management policy, including hiring and firing staff. In all districts four of the seven board members are elected from landholders with less than 20 ha in the scheme and three are from landholders with more than 20 ha. The General Manager is recruited by the board to supervise the day-to-day management of operations, maintenance, administration and technical matters. Transfer has changed more the governance of the district than the official management structure or procedures.

Staffing

Table 4 and Figures 2 and 3 show a general declining pattern in the number of staff in the districts after transfer. The total number of full-time district staff in the seven districts has dropped from 626 before transfer in the seven districts to 388 by April 1994. This is an overall decline of 38%. Only San Alfonso had an increase in staff after transfer. Commensurate with the decline in staff numbers was an increase in the average area served per staff, from 116.8 ha per staff before transfer to 185.7 ha per staff after transfer. Again, San Alfonso was the only exception.

District Water Fees and Budgets

Table 5 and Figures 4 and 5 show data on trends in annual irrigation water fee levels before and after transfer. Six of the seven districts have both fixed area and volumetric water fees. The fixed area fees are paid by farmers to the districts annually, before irrigation. Volumetric fees are paid after the irrigation season. Revenue is predominantly from the fees, but in a few cases secondary revenue sources are increasing, such as from rental of equipment, transport services and fines.

In Figure 4 we see a consistent overall declining trend in the levels of the area fee emerging generally within a year or two after transfer. Volumetric water fees have also showed a tendency to level off and start to decline after transfer (Figure 5). The exception is RUT district which is the pump scheme which lost some subsidies at transfer and had to raise water fees as a result.

Table 6 and Figures 6 to 9 contain data on revenue and expenditure trends in the districts before and after transfer. As subsidies to the districts decline or disappear at transfer and the districts become fully self-financing, they must begin to balance their budgets. Although the number of years measured is still very few, the data clearly show a pattern in this direction. Figures 6 to 9 show revenue and budget data trends for Coello, Samaca, San Alfonso and RUT districts before and after transfer. Strikingly, all of these districts had deficit balances during the years before transfer and they were all converted to positive balances after transfer, through a combination of declines in levels of expenditure and increases in revenue, in constant Colombian pesos. When surplus revenues are raised they are carried forward and used in the next year. In Coello and Saldaña the districts purchase short-term certificates of deposit with surplus revenues and apply the funds to the following year's budget.

It is too early to ascertain whether or not these are long-term trends, but a consistent pattern of staff reduction and financial viability is emerging between the systems, at least in the short-run. In Coello district, for which some data are available over a longer period of time after transfer, there has been a rise in the cost of water per hectare between the period before transfer and after transfer (in constant 1988 pesos). The dominant crop and the crop which uses the most water in Coello is rice. The cost of water relative to the total cost of rice production has fallen from 4.4% to 2.4% between periods before and after transfer (Table 7).

Perceptions about Transfer

From group and informant interviews with larger and smaller holder farmers, the following information was obtained on farmer perceptions about transfer. In Coello and Saldaña districts, farmers noted four positive results of transfer:

1) it helped keep down the costs of irrigation,
2) it improved the accountability of staff to the farmers,
3) it improved the timeliness and responsiveness of management decisions,

4) it led to a decrease in additional "political appointments" for staff positions.

Some farmers expressed an interest in HIMAT continuing to provide technical support and oversight over district finances and policy to protect against abuses by more powerful farmers and ensure that conflicts do not interfere with equitable and disciplined management performance. They wanted HIMAT to back up the districts and their ability to apply sanctions and maintain discipline.

In Recio district farmers mostly reported that the results of transfer were positive, and that administrative efficiency and responsiveness have improved. They also noted that farmer control over maintenance and water delivery was better. They believed that the costs of irrigation were declining in real terms primarily through the reduction in staff.

In RUT, farmers were less enthusiastic about management after transfer. This was mainly because of the high operating costs of the pumps they wanted HIMAT to continue to subsidize pumping and provide technical support. Several farmers reported that water distribution was often chaotic, with no discipline in ensuring water equity. It had become "every man for himself" with the more powerful gaining the advantage. There were fewer staff but the service has deteriorated.

Farmers interviewed in Samaca said it was still not clear what the advantage of transfer has been. Farmers wanted to release additional staff which they felt were ineffective but were pressured by HIMAT to keep them. They mentioned a loss of discipline in water management and a decline in respect for rules and regulations. Conflicts between district board members and users were becoming more intense and frequent, largely as a result of reported board interference in day-to-day operations. Tension had increased between small holders (who were dominant in the upper part of the system, on hillsides) and large holders (who were dominant in the lower part of the system, in the valley floor). Farmers also mentioned that while some cost-cutting and staff reductions had occurred this was resulting in poorer water management and system maintenance. Farmers did not want HIMAT to withdraw completely but to help provide technical and legal support to settle management problems.

In San Alfonso, farmers interviewed reported that the results of transfer have been mixed. They noted that modest improvement in water distribution had occurred as staff have become somewhat more accountable to users. Road maintenance and administrative efficiency and responsiveness had also improved. There was less paper work and fewer delays after transfer. However, the main problem after transfer has been an increase in conflict between the users and board members. Farmers feel that the water fee is "extremely" high. Because of this and lack of proper measurement structures, farmers want to abolish the volummetric water fee.

In Zulia, farmers reported that the results of management transfer have been, on the balance, positive. They noted improvements in cost efficiency, better responsiveness of administration, a modest improvement in operations and maintenance and a decline in the number of staff. The main problem is labor disputes. Farmers want to further reduce staff but the staff and HIMAT are resisting this. However, farmers expressed an interest in having HIMAT continue to provide technical support and administrative oversight (which farmers felt was needed to ensure respect and legitimacy for the farmer-managed district after transfer).

From interviews with regional staff of HIMAT it is clear that they accept that the transfer of all irrigation systems to farmer management is inevitable. They no longer seem concerned about losing their jobs as it is becoming clear that HIMAT will still be needed both for the ambitious government program to construct new irrigation systems and for providing technical and administrative support to systems after transfer. This is largely because of the government's clear policy to reorient HIMAT toward land development (i.e., construction of new irrigation and drainage systems) and regulation of technical and environmental standards. They also know that most irrigation districts want HIMAT to continue to provide technical and legal support for the districts.

So staff tend to see themselves as providers of technical support and auditing for technical and financial matters. They feel that the WUA are not entirely prepared to tackle more technical problems in many of the systems. They are confident that they will still be needed to advise and assist with such activities as designing new irrigation structures, bridges, etc. HIMAT staff expressed concern that the farmer disposition toward severe cost cutting will result in accelerated deterioration of the systems. They are aware of the social conflicts but seem less inclined to intervene or mediate in these problems than to provide technical support.

In response to the transfer program, farmers have organized the National Federation of Irrigation Districts in Colombia (or Federriego) to provide support services to the districts, as the government at least partially withdraws from the irrigation sub-sector (Federriego, 1992). The Federriego is providing legal, technical, managerial and agricultural support and training to the districts. It is financed by the districts and supervised by farmer board representatives from the various districts (Garcia-Betancourt, forthcoming).

KEY FINDINGS AND IMPLICATIONS

Following management transfer, governance of the irrigation districts goes to the farmers as represented by an elected board. There are indications that this has improved management responsiveness and efficiency. The districts have become self-financing through raising revenue as needed and reducing staff and other costs. However, it is not clear how sustainable this will be, given rising costs of maintenance and declining crop prices, especially for rice.

There are indications that transfer has led to a rise in water distribution problems, primarily due to conflicts between farmers (especially large versus small holders) and to the relative weakness of some of the district organizations. Lack of water measurement devices at secondary or lower levels contributes to lack of accountability and control over water distribution. Because of rising concerns in several transferred districts about equity of water distribution and the lack of measurement devices, farmers in some districts are proposing to abolish the volumetric fee. Sanctions are rarely enforced. Little attention has been given to institutional development prior to transfer.

It is apparent that water users are generally not willing to pay for rehabilitation prior to transfer. They prefer to control management and not be liable for the infrastructure. Hence, no districts are raising long-term capital replacement funds for irrigation infrastructure (although they do have funds for equipment replacement). HIMAT and some district staff report they are concerned that the farmer priority on cost-cutting may accelerate deterioration of the systems. It is also apparent that in most of the districts transferred farmers generally would like HIMAT to remain involved for technical support and to ensure that powerful factions do not take over the general interest.

The most important issue to be negotiated prior to transfer is the disposition of staff, where the farmers generally want to lay off more staff than the agency, HIMAT, is willing to allow. It is expected that the new Land Development Law will give full control to the districts over staffing.

These findings confirm the importance of institutional development, clarity about water rights and accountability prior to transferring governance for irrigation to farmer associations. They also suggest that changes in technology may be needed to lower maintenance costs, to allow measurement of water relative to rights, delivery schedules, and fee payments. Farmer concerns for cost savings should be balanced with an assessment with their implications for system sustainability. This study confirms the notion that where the government pays for construction or rehabilitation the motivation for farmers to later invest in the long-term sustainability of the irrigation system is greatly weakened. There is still an apparent need for the government to continue to play a role of technical support, strengthening farmer associations and perhaps occasionally providing financial support or assistance with system improvements but the terms and conditions for such future support should be made clear and should not interfere with the motivation of farmers to ensure the long-term sustainability of their irrigation systems after transfer.

Table 1. Basic information on systems transferred.

DISTRICT / ITEM	COELLO	SALDANA	RECIO	RUT	SAMACA	SAN ALFONSO	ZULIA
STATE	TOLIMA	TOLIMA	TOLIMA	VALLE	BOYACA	HUILA	N. SANT
PERIOD BUILT	1949-53	1949-53	1949-53	1958-70	1945	1968-71	1964-69
TRANSFERRED	SEP. 1976	SEP. 1976	JAN. 1990	JAN. 1990	OCT. 1992	SEP. 1991	MAY 1992
DESIGN GROSS AREA (ha.)	44,100	16,428	23,600	13,000	3,000	1,300	14,500
IRRIGATED AREA (ha.) (In 1993)	25,628	13,975	10,200	9,700	2,893	1,174	11,200
WUA	USOCOELLO	USOSALDANA	ASORECIO	ASORUT	ASUSA	USOSANAL	ASOZULIA
MAIN SOIL TYPE	Sandy-loam	Clay, Loam	Clay, Loam	Clay, Loam	Clay, Loam	Clay	Clay. Loam
MAIN CROP(S)	Rice, Soybean, Cotton	Rice	Rice, Sorghum, Cotton	Cotton, Grapes, Fruit Trees	Onion, Potato, Peas	Rice, Cotton	Rice, PalmTrees

Table 2. Technical characteristics of systems transferred.

DISTRICT / ITEM	COELLO	SALDANA	RECIO	RUT	SAMACA	SAN ALFONSO	ZULIA	REMARKS
WATER SOURCE	River Coello	River Saldana	Rio Recio	Rio Cauca	River Gachaneca	River Cabrera	River Zulia	Watersheds
SYSTEM TYPE	Run-of River	Run-of river	Run-of River	Pump	Reservoir	Run-of River	Run-of River	
INTAKE STRUCTURE	Radial Gates	Radial Gates	Sliding Gates	Pumping Plant	Vertical Gates	Vertical Gates	Radial Gates	
WATER MEASUREME LEVEL	Secondary Cana	Secondary Can	Tertiary Canal	Main Canal	Offtake Only	Offtake Only	Main Canal	Regular Activity
IRRIGATED AREA (ha.)	25,600	14,000	10,100	9,700	2,980	1,170	11,200	(In 1993)
LENGTH MAIN CANA (km)	100.50	62.0	38.7	87.7	58.0	8.4	57.0	
TOTAL LENGTH CANAL NETWORK (km)	252.0	191.9	135.8	170.7	58.0	29.2	165.0	Main, Secondary and Tertiary
Ha. SERVED PER Km. OF CANAL	101	73	74	57	51	40	68	
TURNOUT TYPE	Sliding Gates	Sliding Gates	Sliding Gates	By Pumps	By Pumps Sliding Gates	Sliding Gates	Sliding Gates	
IRRIGATION STRUCTURES	81	68	234	16	69	98	149	Includes main off-take
WATER DELIVERY EFF. (%)	69.2	69.0	74.1	53.7	86.1	61.1	44.1	Volume Delivered / Volume Diverted
HEAVY EQUIPMENT (Units)	43	35	20	27	2	6	34	

Table 3. Current land tenure of systems transferred.

DISTRICT	COELLO		SALDANA		RECIO		RUT		SAMACA		SAN ALFONSO		ZULIA	
NUMBER OF USERS (IN 1993)	1287		1834		273		1000		1840		175		787	
TENURE CATEGORY	# PLOTS	%	# PLOTS	%	# PLOTS	%	# PLOTS	%	# PLOTS	%	# PLOTS	%	# PLOTS	%
0 - 4.9 ha.	703	39	1256	64	38	14	1395	75	1696	95	109	63	36	3
5 - 9.9 ha.	386	21	285	14	28	11	203	11	52	3	42	24	663	64
10 - 19.9 ha.	300	16	231	12	64	23	129	7	24	1	16	9	274	28
20 - 49.9 ha.	322	18	180	9	64	23	121	6	9	1	5	3	46	4
50 - 99.9 ha.	100	5	18	1	78	29	22	1	2	0	2	1	9	1
> 100 ha.	15	1	1	0	0	0	1	0	1	0	0	0	1	0
TOTALS	1826	100	1971	100	272	100	1871	100	1784	100	174	100	1029	100
ARRANGED BY "MINOR" AND "MAJOR" FARMS														
< 20 ha. "minor"	1389	76	1772	90	130	48	1727	92	1772	99	167	96	973	95
> 20 ha. "major"	437	24	199	10	142	52	144	8	12	1	7	4	56	5

Percentages are rounded off to nearest whole figure

Table 4. District staff levels before and after transfer.

DISTRICT	NUMBER OF STAFF			AREA SERVED/STAFF (HA/STAFF)		
	BEFORE	AFTER	% CHANGE	BEFORE	AFTER	% CHANGE
COELLO*	300 (combined)	97	-37 (combined)	62.3 (combined)	157.7	+137 (combined)
SALDANA*		92			135.9	
RECIO	114	34	-70	88.6	297.1	+235
RUT	92	76	-18	105.4	127.6	+21.1
SAMACA	13	9	-31	229.3	331.2	+44.4
SAN ALFONSO	12	15	+25	97.6	78.1	-20.0
ZULIA	95	65	-32	117.9	172.3	+46.1

**Before transfer, Coelic and Saldana operated as a single District*

Table 5. District water fees before and after transfer.

TRANSFERRED YEAR	RECIO	RUT	SAMACA	SAN ALFONSO	ZULIA
			AREA FEE (Col. Pesos/ha./year)		
- 4	n.a.	n.a.	2,000	3,993	2,975
- 3	n.a.	9,568	2,096	3,540	2,976
- 2	4,741	10,000	4,020	3,400	3,206
- 1	5,440	10,000	4,522	3,400	3,484
TRANSFER	6,206	9,216	9,768	3,718	3,587
+ 1	6,500	10,192	7,326	4,104	3,497
+ 2	5,200	12,098	6,349	3,807	2,584
+ 3	5,325	11,775	n.a.	2,665	n.a.
+ 4	4,435	10,077	n.a.	n.a.	n.a.
			VOLUMETRIC FEE (Col. Pesos/m3)		
- 4	n.a.	n.a.	n.a.	0.93	0.37
- 3	n.a.	2.18	0.75	0.83	0.37
- 2	0.34	1.68	0.75	0.80	0.34
- 1	0.32	1.68	0.80	0.78	0.45
TRANSFER	0.30	1.53	0.60	0.88	0.51
+ 1	0.28	1.63	0	1.05	0.50
+ 2	0.28	1.68	0	0.99	0.46
+ 3	0.27	1.65	0	0.70	n.a.
+ 4	0.18	1.76	0	n.a.	n.a.

(Constant 1988 Colombian Pesos)
In 1988, 333 Colombian Pesos = 1.00 U.S. Dollar

** n.a. - not available*

Table 6. District revenue and expenditure before and after transfer.

TRANSFERRED YEAR	RECIO	RUT	SAMACA	SAN ALFONSO	ZULIA
			EXPENSES		
- 4	n.a.	n.a.	24.30	41.47	145.00
- 3	108.40	188.37	23.76	48.00	145.84
- 2	109.60	196.30	16.90	46.60	n.a.
- 1	91.44	200.32	22.80	n.a.	121.17
TRANSFER	n.a.	n.a.	19.59	n.a.	111.57
+ 1	130.50	n.a.	18.03	27.78	120.75
+ 2	129.24	186.68	21.30	29.82	134.27
+ 3	130.50	194.40	n.a	26.82	n.a.
+ 4	112.20	205.42	n.a.	n.a.	n.a.
			REVENUE		
- 4	n.a.	n.a.	6.74	21.09	64.76
- 3	112.59	131.30	11.00	21.47	65.72
- 2	119.48	127.39	11.00	16.29	n.a.
- 1	146.19	139.56	20.65	n.a.	121.17
TRANSFER	n.a.	n.a.	19.36	n.a.	101.37
+ 1	n.a.	n.a.	22.41	27.78	122.84
+ 2	116.47	150.56	22.00	34.37	134.27
+ 3	115.53	220.69	n.a.	30.27	n.a.
+ 4	112.20	216.44	n.a.	n.a.	n.a.

(Constant 1988 Colombian Pesos)
In 1988, 333 Colombian Pesos = 1.00 U.S. Dollar

** n.a. - not available*

Table 7. Cost water relative to rice production before and after transfer, Coello District.

PERIOD	COST OF WATER/HA.	COST OF PRODUCTION/HA.	COST OF WATER/COST OF PRODUCTION (%)
1953-58	Ps. 8,620	Ps. 194,812	4.4%
1984-87	Ps. 6,698	Ps. 334,400	2.0%
1989-92	Ps. 10,080	Ps. 421,200	2.4%

(Constant 1988 Colombian Pesos)
In 1988, 333 Colombian Pesos = 1.00 U.S. Dollar

Figure 1. Republic of Colombia. location of transferred irrigation districts.

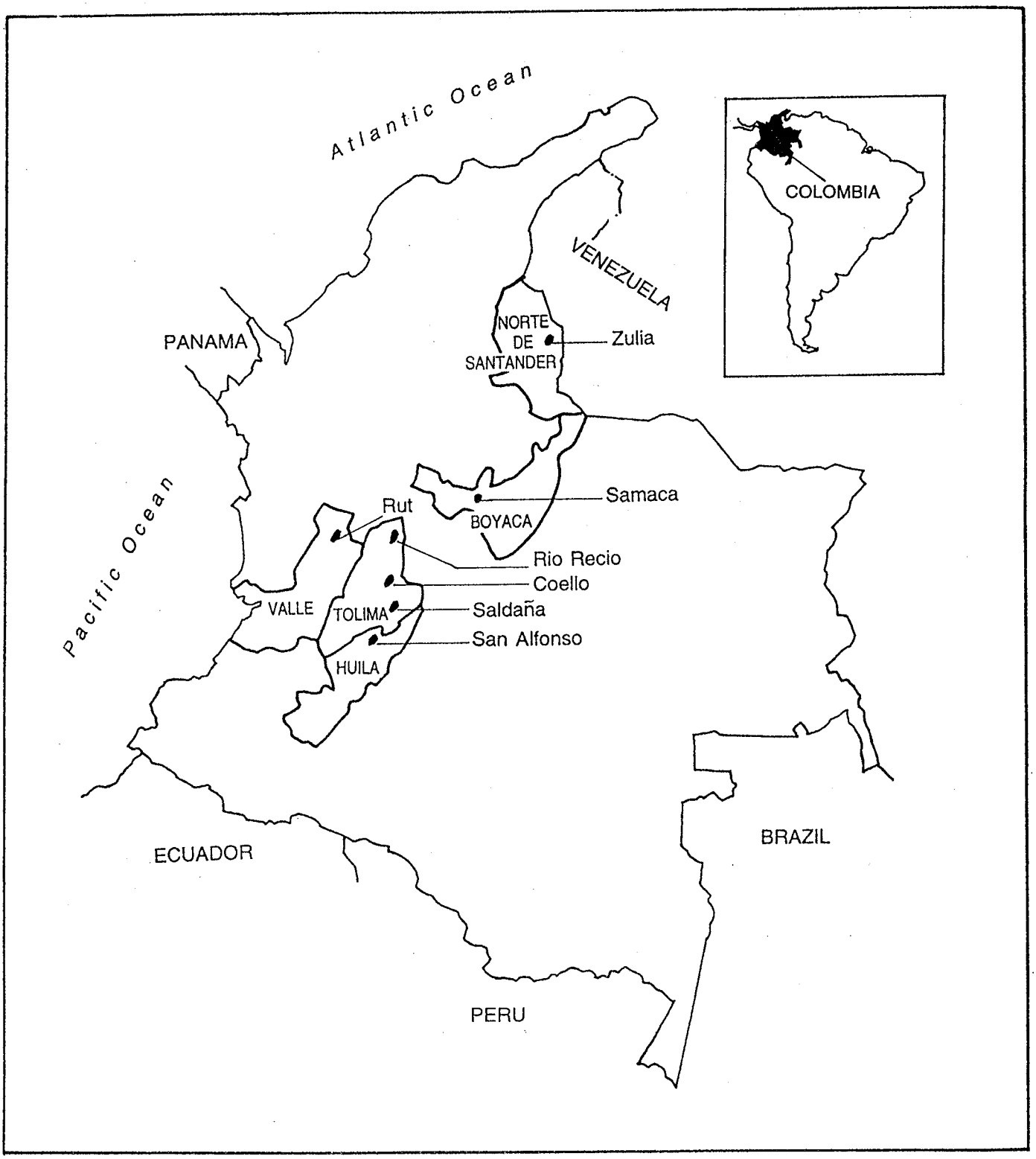
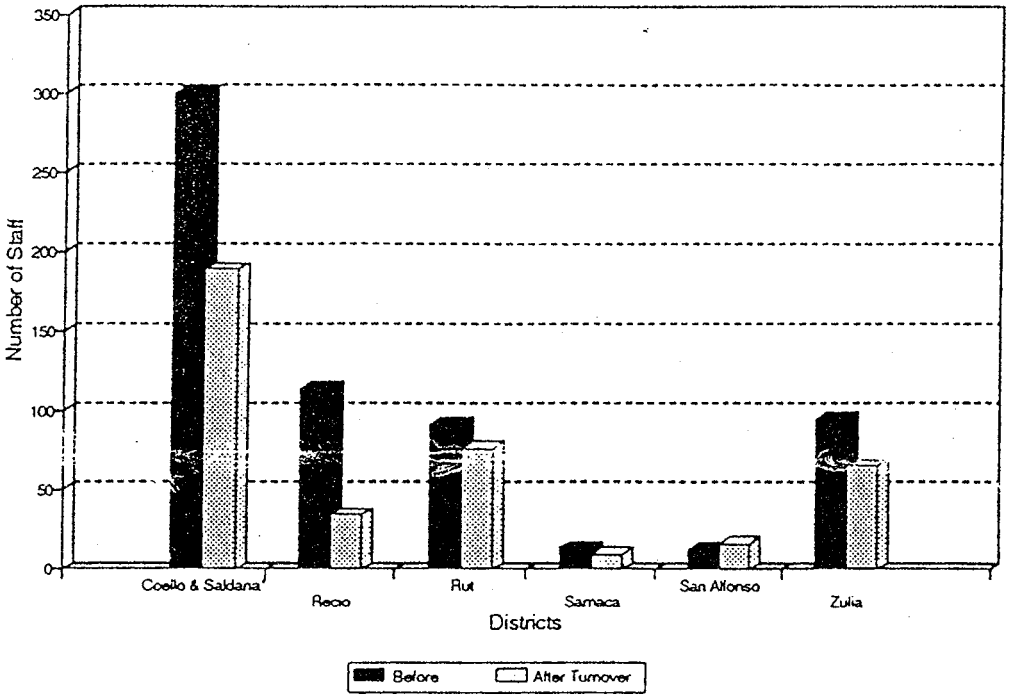
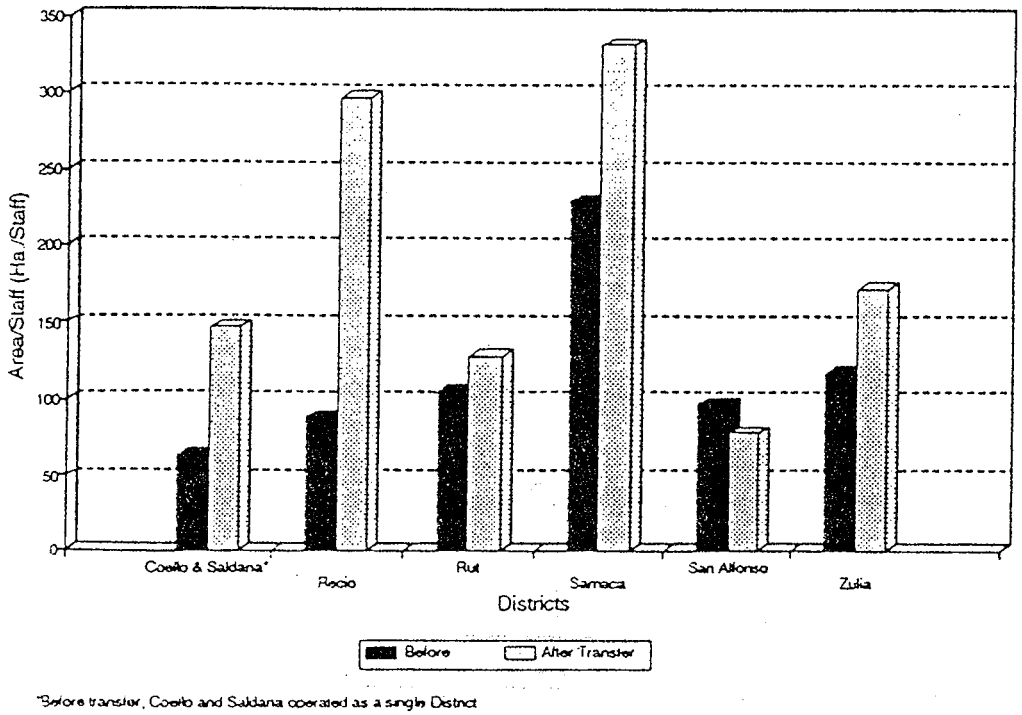


Figure 2. District staff levels before and after transfer.



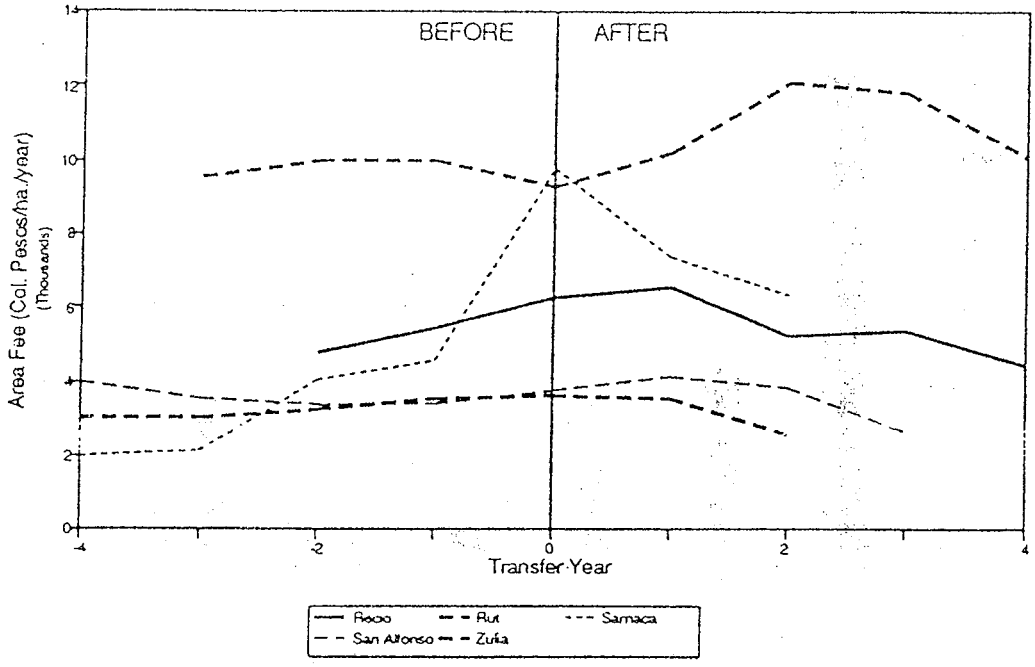
*Before transfer, Coello and Saldana operated as a single District

Figure 3. Irrigated area served per district staff before and after transfer.



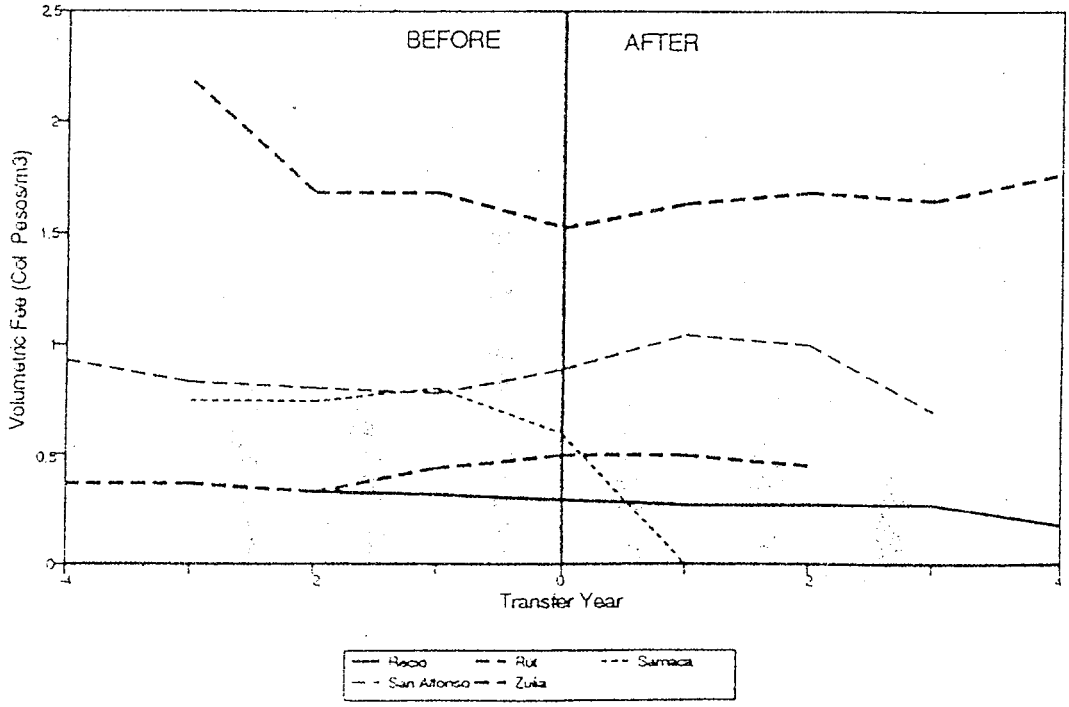
*Before transfer, Coello and Saldana operated as a single District

Figure 4. Area water fees before and after transfer.



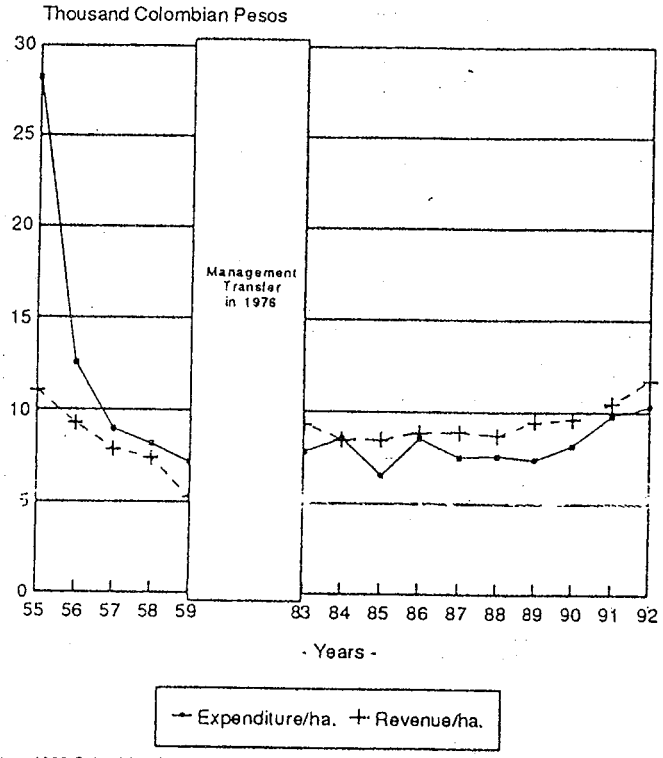
(Constant 1988 Colombian Pesos)

Figure 5. Volumetric water fees before and after transfer.



(Constant 1988 Colombian Pesos)

Figure 6. Total expenditure and revenue per hectare, Coello District, 1955-93.



*In constant 1988 Colombian Pesos; 1988 exchange rate was 333 Colombian Pesos per US dollar. In April 1994, exchange rate was 820 Colombian Pesos per US Dollar.

Figure 7. Samaca district revenue and expenditure before and after transfer.

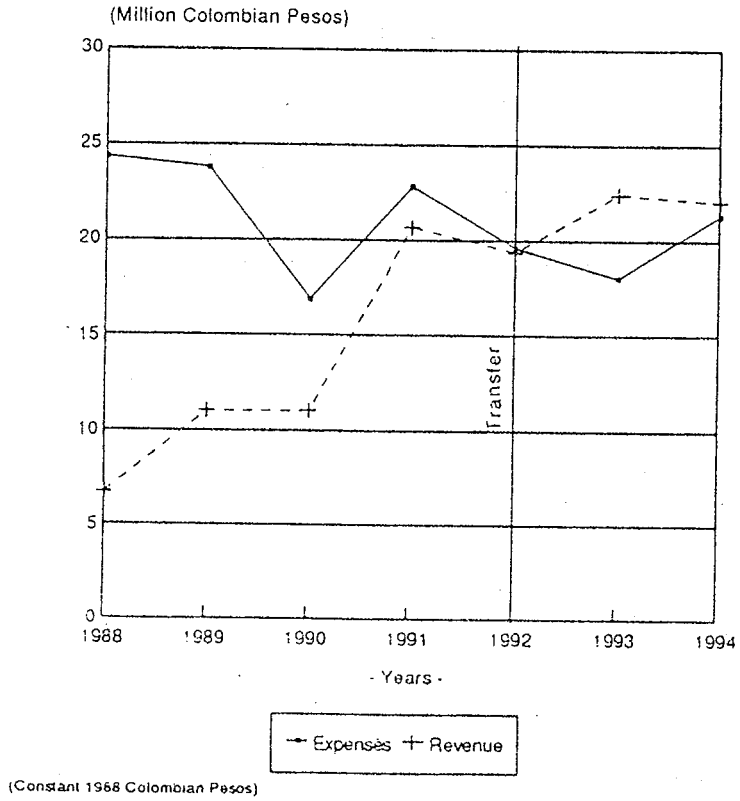
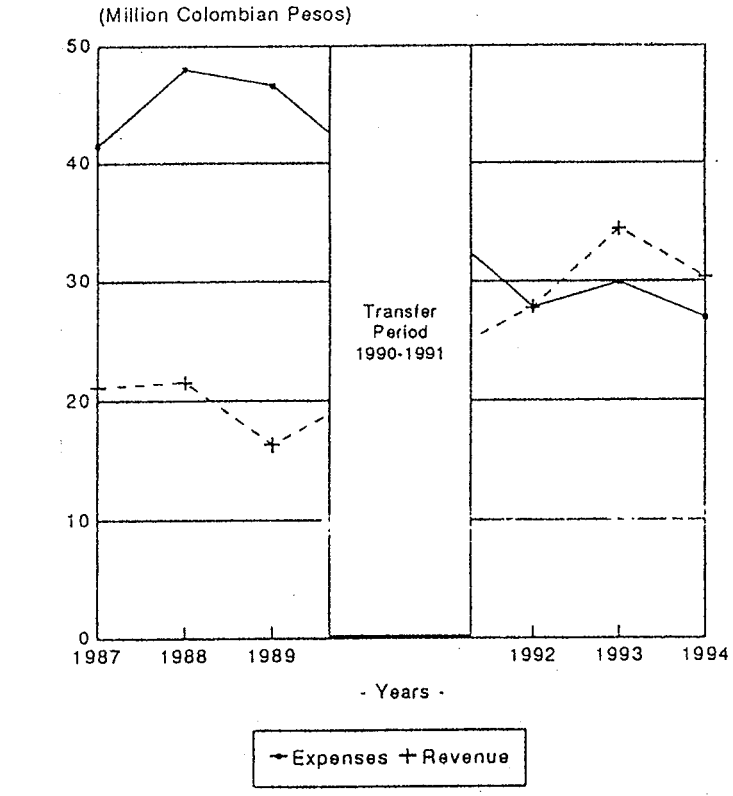
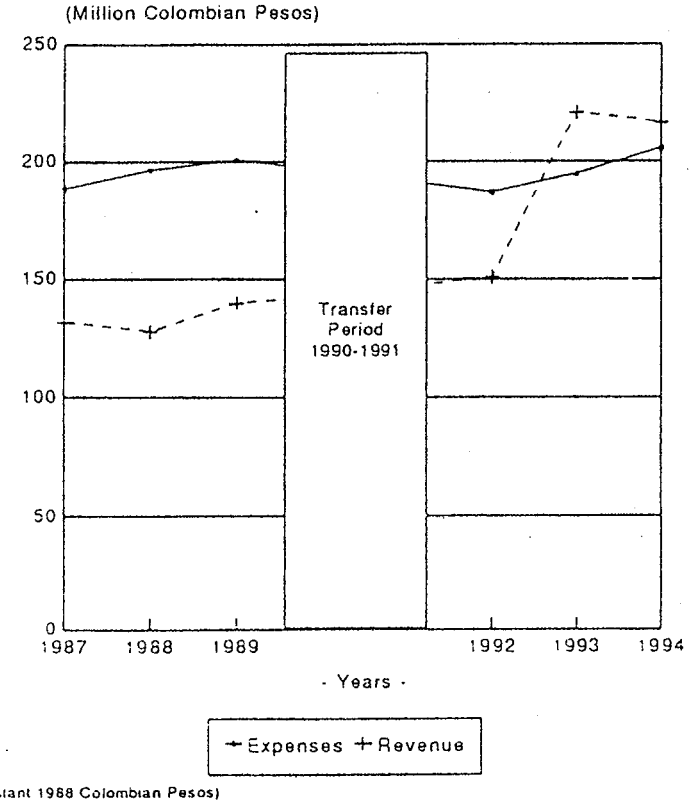


Figure 8. San Alfonso district revenue and expenditure before and after transfer.



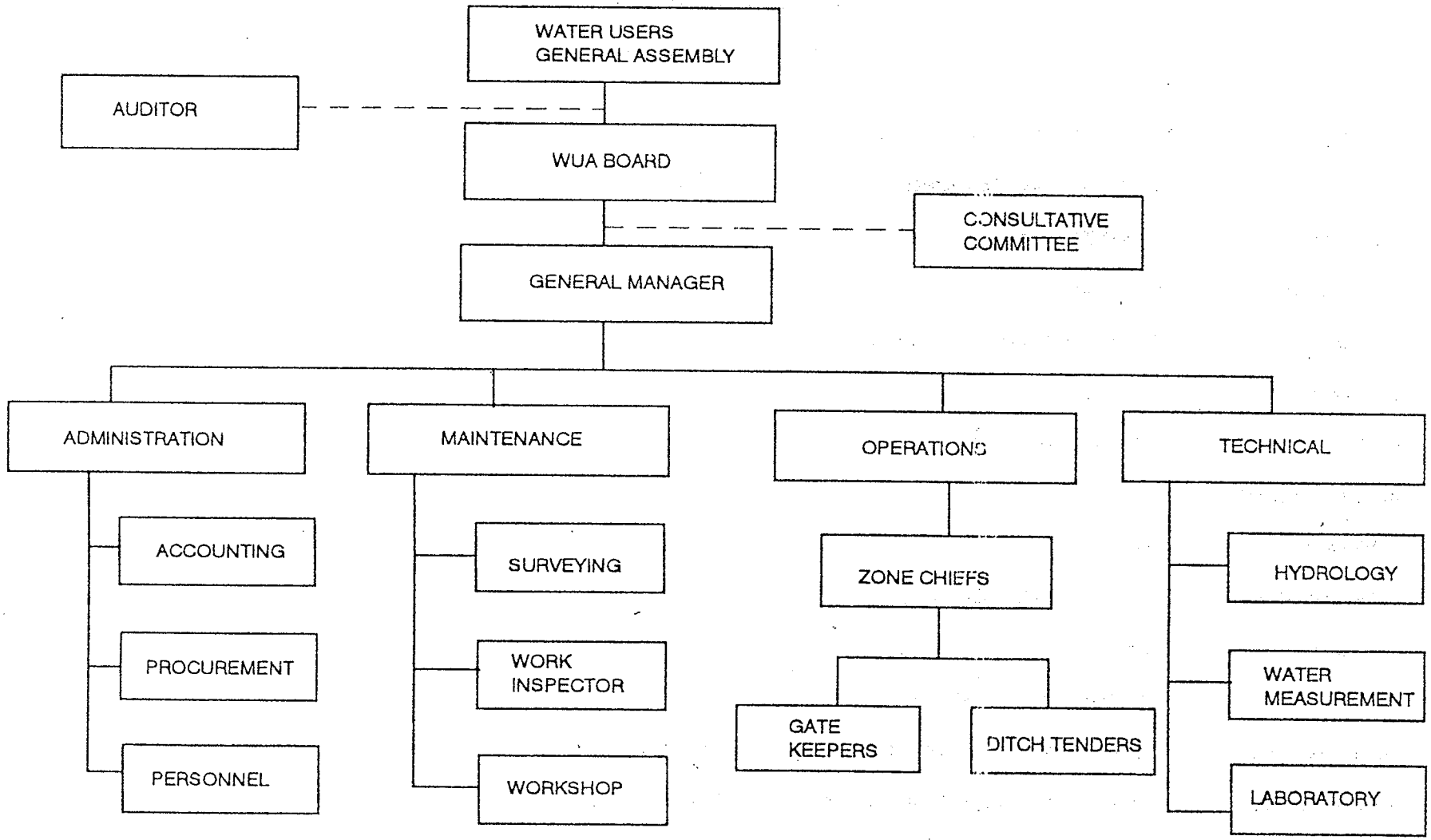
(Constant 1988 Colombian Pesos)

Figure 9. Rut District revenue and expenditure before and after transfer.



(Constant 1988 Colombian Pesos)

Chart 1. Coello District Organizational Structure.



* *This structure is typical of other districts transferred. However, technical units are sometimes included in operations units.*

REPUBLIC OF COLOMBIA

BASIC INFORMATION

Location:	Northwest corner of South America
Area:	1138,355 km^2 (439,735 sq.miles)
Population:	31.9M (1992 census)
Population growth:	2% per annum
Population density:	28 inhabitants/km^2(73 inhabitants/sq.mile)
Life Expectancy:	65 years
GNP:	41,337 M dollars (1990)
Annual GNP growth:	5.4% (1992)
GNP per capita:	US$ 1230
GNP distribution:	Agriculture (21%); Industry (30%); Services (49%).
Language:	Spanish
Currency:	Colombian Pesos {(1US$ = 850 Col. Ps) 1994 June}
Natural Resources:	Petroleum, Natural Gas, Coal, Iron Ore, Gold, Emeralds, Copper, Silver.
Agricultural Resources:	Coffee, Banana, Flowers, Sugarcane, Cotton, Rice, Plantain, Cattle, Sheep.

References

Federriego en Revista USOCOELLO--15 AÑOS. 1992. Editores El Poira. Ibague. Colombia. Pp. 30-31.

Garces, C. 1992. Turnover: The Colombian Experience. IIMI Review Vol.6 No. 2. International Irrigation Management Institute. Colombo, Sri Lanka. Pp 17-18 November.

Garcia, Enrique Sandoval. 1990. Irrigation Management in Colombia. In Irrigation Management in Latin America: Present Situation, Problem Areas and Areas of Potential Improvement. Colombo: International Irrigation Management Institute.

Garcia-Betancourt, Gilberto. Forthcoming. Federriego: The Emergence of the National Federation of Irrigation Districts in Colombia. IIMI Short Report Series.

Plusquellec, Herve. 1989. Two Irrigation Systems in Colombia: Their Performance and Transfer of Management to Users' Associations. Policy, Planning and Research Working Paper Series No. 264. Washington, DC: The World Bank.

Republica de Colombia. 1991. Departamento de Planeacion Nacional. Programa de Adecuacion de Tierras 1991-2000. Documento DNP-2538-UDA Minagricultura. Bogota. Junio 27.

Vermillion, Douglas L. 1992. Irrigation Management Turnover: Structural Adjustment or Strategic Evolution? IIMI Review Vol. 6 No. 2. November.

Vermillion Douglas L. and Garces-Restrepo, C. 1994. Irrigation Management Transfer in Colombia: A Pilot Experiment and Its Consequences. Colombo, Sri Lanka: International Irrigation Management Institute. Short Report Series on Locally Managed Irrigation, No. 5.