FINANCING IRRIGATION SERVICES IN THE PHILIPPINES

INTRODUCTION

Types of Irrigation

Irrigation in the Philippines is generally categorized into three types of systems: national (gravity) irrigation systems, communal irrigation systems, and pump irrigation systems. In 1984, about half of the total irrigated area of 1.4 million hectares (ha) was in communal irrigation systems, 40 percent in national irrigation systems, and 10 percent in pump irrigation systems (Table 5.1).

Table 5.1. Irrigation development, 1972-1984.

Type of irrigation system	1972		1984		Percent increase
	ha	percent	ha	percent	
National	379205	51.1	559447	39.7	1 X
(illegible)	293819	39.6	696751	49 9	137
Pump	69423	9.3	152128	10.8	I T9
Total	742447	100.0	1408326	100.0	90

Irrigation development between 1972 and 1984 has been rapid, with a 90 percent increase in the total area irrigated. The rate of increase was highest for communal irrigation systems and lowest for national irrigation systems. The area under pump irrigation increased by nearly 120 percent over the same period; however, the area under pump irrigation is relatively small, comprising about 10 percent of the total area irrigated. The increase in the proportion of irrigated land served by communal irrigation systems is a reflection of the emphasis the government has placed on the development and rehabilitation of these systems during the past decade.

Irrigation in the Philippine Development Plan

The updated Philippine Development Plan, 1984-1987, targets for the plan period the generation of an additional irrigated area of about 192,000 ha and the rehabilitation of existing irrigation systems covering 138,000 ha. This represents an increase of about 14 percent in the total irrigated area, and the rehabilitation of about 10 percent of the total irrigated area, or about 19 percent of the area irrigated by national irrigation systems and pump irrigation systems.

Investment requirements **for** water resources (including irrigation, water **supply,** flood control, drainage, and shore protection) amount to **25** percent of the entire infrastructure program of **P75,445** million.[1] Irrigation accounts for about 48 percent of the budget for water resources, or 12 percent of the total infrastructure investment program. The infrastructure program investment requirements for 1983-1987 are given in Table 5.2.

Table **5.2.** Infrastructure program investment requirements, 1983, 1984-1987[a] (in million pesos at **1984** prices).

	Actual	Requirements				1984-1987	
	1983	1984	1985	1986	1987	**Total**	Percent of total
Power and electrification	11938	7962	8193	6121	8114	30390	40
Power	11029	7046	7547	5059	6522	26174	
Electrification	909	916	646	1062	1592	4216	
Transport	5924	5920	4612	4269	4727	19527	26
Highways	3644	3542	2894	3159	3439	12943	
Railways	1737	1192	610	245	284	2330	
Ports	462	961	956	760	X96	3573	
Airports and airways	X1	315	151	105	108	680	
Water resources	3957	3775	4995	4503	5x37	19110	25
Irrigation	1777	1704	2629	2611	2259	9203	
Water supply	1706	1798	2133	1656	3330	8917	
Flood control, drainage, and shore-protection	474	273	233	236	248	916	
Social related infrastructure	1216	1514	1029	1186	1319	5048	7
School buildings	760	1206	715	808	918	3647	
Health facilities	266	180	184	209	225	797	
Urban infrastructure	101	116	125	154	158	553	
National buildings	RY	12	5	15	18	50	
Communications	420	251	203	284	485	1223	2
Telecommunications	386	230	187	259	460	1135	
Postal communications	34	21	16	25	25	86	
Others	16	30	21	49	47	147	< 1
Total	23471	19452	19052	16412	20529	75445	100

[a] 1983 figures are actual, using the average exchange rate of P11.11 = US$1; 1984 figures are based on the average exchange rate of P16 = US$1; 1985-1987 figures are at mid-1984 prices assuming a constant exchange rate of P18 = US$ 1. Includes the requirements of MPWH. MOTC. **MLG, MAR,** MHS. MOH. MECS, NTC. **NPC, NEA.** NIA, FSDC, MWSS, LWUA. RWDC, PNR, LRTA, **PPA. MIAA. State** Colleges, **and** Universities.

Data as of 29 August 1984.

Sources: Subcommittees on Infrastructure **and** Energy on the Plan Updating (1984-1987), the Office of **Budgetary** Management **and** the National Economic **and** Development Authority.

[1] The conversion rate for pesos decreased from US$1 = ₱11.11 in 1983 to US$1 = ₱20.80 in 1987.

The updated irrigation program seeks to increase rice yields to sustain self-sufficiency and reduce regional deficits in this crop, expand irrigation to other crops in order to improve exports, and produce substitutes for imported agro-based products. The program also aims to raise farm incomes quickly, especially in the less developed areas. Increased participation of the farmer beneficiaries and local governments in planning, cost sharing, implementation, and operation and maintenance (O&M) is also a program goal,

Given the increase in the costs of new projects, the plan proposes to achieve the above objectives by placing greater emphasis on the rehabilitation and improvement of existing irrigation systems, and on improved water management and systems operation. Emphasis is also placed on small-scale communal irrigation systems, which, because they are operated and maintained by farmers' associations, have less effects on the operating costs of the National Irrigation Administration. Construction of new pump irrigation systems is minimized in the plan, as expensive oil is needed for operation of such systems.

Irrigation Institutions

National Irrigation Administration (NIA). NIA was established in 1964 under Republic Act No. 3601, with responsibilities for the investigation, construction, improvement, and operation of all national irrigation systems in the country. Additional responsibilities related to flood control, drainage, land reclamation, hydraulic power development, domestic water supply, road or highway construction, reforestation, and projects to maintain ecological balance were given to NIA under Presidential Decree No. 552 of 1974. NIA also assists in the design and construction of communal irrigation systems, under arrangement with farmers' organizations that provide for the repayment of a portion of the capital cost incurred by NIA, and for the O&M of the completed facilities by the farmers' organizations.

NIA is a government corporation governed by a board of directors that includes the Minister of Public Works, the Administrator of NIA, the Minister of Agriculture, the Minister of Economic Planning, and the General Manager of the National Power Corporation. The NIA Administrator is appointed by the President of the Philippines. As a government corporation, it has the authority to collect water charges from the beneficiaries of the irrigation services it provides.

NIA maintains a central office and 12 regional offices. Each regional office is composed of six divisions (Engineering, Operations, Agricultural Coordination, Equipment Management, Administration, and Accounting). The Engineering Division is responsible for system construction activities while the Operations Division is responsible for O&M. At the irrigation project level, an irrigation superintendent is responsible for normal O&M activities, assisted by a staff of water masters, ditchtenders, and gatekeepers.

National Warer Resources Council. The National Water Resources Council is responsible for formulating regulations for the use and management of water resources, and for coordinating water

development activities (irrigation, domestic water use, and industrial water use). Among its activities, it registers and issues water permits for the use of water for various purposes, including irrigation. The Administrator of NIA is a member of this council.

Farm Systems Development Corporation. The Farm Systems Development Corporation was created in 1975 with responsibility for organizing farmers into irrigation associations in communal irrigation systems that had been constructed by NIA, and where irrigation pumps had been sold to groups of farmers on government loans. Beginning in 1976, this corporation collected, for NIA, repayments made by irrigation associations of loans received for the construction of irrigation facilities. In general, the Farm Systems Development Corporation is responsible for small irrigation systems (less than 100 ha), and also for a number of activities that are unrelated to irrigation.

GENERAL POLICIES REGARDING IRRIGATION FINANCING

As a government corporation. NIA is the agency through which funds for irrigation development and operation are channeled These funds come in the form of foreign and international loans and grants: capital stock subscriptions of the government; annual appropriations from the General Appropriation Act for communal irrigation development; and revenues earned by NIA for its services, which include water charges from irrigation beneficiaries, and a charge of five percent from loan funds for administrative and overhead costs associated with the supervision of construction of system (Cruz, Siy, and Cruz 1985).

National policy on the repayment of the costs of irrigation facilities is embodied in the National Economic and Development Authority Resolution No. 20, Series of 1978. The resolution allows NIA to "impose charges to generate revenues sufficient to cover only O&M costs of such facilities and to recover within a period not longer than 50 years, the monies initially invested in such facilities; provided that such charges shall not impair the user's incentive to avail of the benefits from irrigation and provided further, that such charges are within the beneficiaries' capacity to pay." The resolution stipulates further that "the Government shall bear the cost of interest on all indebtedness incurred for the development of irrigation facilities particularly those for areas devoted to the production of rice, corn and feed grains, and vegetables." This policy for cost recovery also applies to communal irrigation systems constructed by NIA.

In recent years, financial pressures at the national level have resulted in reductions in the levels of government financial support for NIA (National Irrigation Administration 1984b). As a result, NIA has sought ways to increase its internally generated revenues and to reduce its operating costs. These efforts are reflected in the development of new procedures to improve irrigation fee collection: the conversion of marginal irrigation systems (those that generate revenues less than O&M costs) into communal irrigation system which will be operated by farmers' associations; the transfer to farmers' associations of entire large irrigation systems (on a modular basis, by sections or laterals); and improvement of water delivery and services to farmers to enhance their willingness to pay for these irrigation services.

CAPITAL COST OF IRRIGATION

There is wide variation in the development cost per hectare among irrigation systems. Table 5.3 gives some indication of this variation with data on six foreign-assisted projects. Projects completed after 1980 have higher costs per hectare. The lower cost of Upper Pampanga River Project, Angat-Magat Irrigation and Development Project, and Aurora-Penaranda Irrigation Project may be attributed to their being implemented earlier and to the lower cost of rehabilitation, compared with new construction.

Table 5.3. Construction cost of completed foreign-assisted projects

Project	Actual implementation schedule	Actual project cost (US$ million)			Service area (ha)			Development cost/ha
		Local	Foreign	Total	New	Rehab.	Total	
Upper Pampanga River Project	1970-1978	92.55	34.00	126.55	35152	47317	82469	1534.52
Angat-Magat Irrigation and Development Project	1973-1978	29.69	7.96	37.65	3810	670788	70888	531.12
Aurora-Penaranda Irrigation Project	1973-1981	38.70	18.94	57.64	8600	16700	25300	2278.26
Davao I Irrigation Project	1974-1980	11.80	4.20	16.00	8590	-	8590	1862.63
Libmanan-Cabusao Irrigation and Development Projects	1975-1981	10.72	0.42	11.14	3873	-	3873	2876.32
Pulangui Irrigation Project	1975-1982	15.94	12.80	28.14	12000		12000	2395.00

Note: Conversion rate for Upper Pampanga River Project is US$1 = P6.645, Angat-Magat Irrigation and Development Project US$1 = P6.75, Aurora-Penaranda Irrigation Project US$1 = P7.87, Davao I US$1 = P7.50, and Pulangui US$1 = P7.66.

Sources National Irrigation Administration, CORPLAN (1984)

Moya (1985) estimated the capital cost of 12 irrigation projects in the Central Luzon region of the Philippines. The estimates, converted to 1984 prices, were about US$590/ha for one 2,700-hectare national irrigation system, US$155-910/ha for communal (village) irrigation systems, US$300-750/ha for surface pump irrigation system, and US$1,660-2,430/ha for deep well pumping systems (Table 5.4).

In another study, Sison and Guino (1984) estimated the total capital cost of irrigation system by type (national, communal, and pump irrigation systems) and size. Their findings, converted to 1984 prices, are summarized in Table 5.5. For national irrigation systems, the average costs per hectare for the system studied were about US$700 for the large systems and about US$1,200 for the small systems. The capital costs of communal irrigation systems were about US$260/ha for the large

Table *5.4.* Summary of costs per hectare of service area for 12 irrigation systems, Central Luzon, 1979-1980 wet and dry seasons.

system	Capital investment cost (US$/ha)		Annual operation and maintenance cost (US$/ha)				Annualized total cost (US$/ha)	
				P/ha		P/ha		
	1980 prim	1984 prices	1980 prices	1980 prices	1984 prices	1984 prim	1980 prices	1984 prices
National system								
1. San Fabian	580	594	28	239	29	478	99	101
Village system								
2. Prenza	885	906	10	85	10	I70	117	I20
3. Salapungan	502	514	6	51	6	102	66	68
4. Caingin	151	155	59	504	60	1008	77	79
5. Sibul	201	206	4	34	4	68	28	29
surface pumps								
6. Buenavista	704	721	111	948	114	1897	197	202
7. Safari	297	304	54	461	55	922	94	96
8. Halina	508	520	175	1494	179	2989	248	254
9. Small pump	729	746	56	478	57	956	197	202
Deep well pumps								
10. GP-3	2377	2433	146	1247	149	2495	425	435
11. GP-4	1625	I663	144	1230	147	2461	329	337
12. GP-19	2028	2076	176	1503	I80	3007	421	431

Notes: Cost data are based on I2 percent interest rate and lifetimes of 60. 30, and I5 years for dams, canals, and pumps and engines. respectively. 1980 prices. Currency conversion rate is P 8.54 = US$1. 1980 prices converted to I984 using Implicit GDP Deflator (Asian Development Bank 1985).

Source: Moya (1985).

systems, and US$590 for the small ones. Deep tube wells were estimated *to cost* about US$1,510/ha, and shallow wells about US$770/ha. These figures are roughly consistent with the estimates from the Moya study presented in Table *5.4.*

OPERATION AND MAINTENANCE COST

Budgetary Procedures for *the* Provision of O&M Funds

Each February or March, the National Irrigation Administration's annual budget proposal for the following calendar year is prepared by the Management Services Department of its Programming Division. The proposed budget is submitted to the Office of Budget and Management before the end of March, in accordance with a time schedule established in a memorandum circular from this office.

Table 5.5. Average capital investment costs per hectare for different types and sizes of pirrigation systems in selected areas.

Size of system	Type of system								
	National			Communal			Pump		
	Number of systems[a]	Average service area(ha)	Average cost[b] (US$/ha)	Number of systems[a]	Average service area(ha)	Average cost[b] (US$/ha)	Number of systems[a]	Average service area(ha)	Average cost[b] (US$/ha)
Large	9	7416	708	I5	275	264			
Medium	6	2228	1088	Y	x9	521	9[c]	58	1512
Small	5	515	1216	7	34	591	18[d]	3	766

[a]Number of systems included in the study.

[b]1984 prices. 1982 prices in pesos convened to 1984 prices using Implicit CDP Deflator and converted at P16.69 = US$1.

[c]Deep tube well systems

[d]Shallow pump systems.

Source: Sison and Guino (1984).

The office evaluates the proposal, and by June or July calk for a budget consultation, attended by all the heads or representatives of the government corporations and presided over by the Prime Minister. At this budget consultation, the office gives each corporation its budget ceiling, based on the projected income of the national government. These ceilings are usually very much lower than the original budget proposal.

NIA's Programming Division then coordinates and consults with project managers and with NIAS Construction Management for the necessary revision of the budget. The revised budget is submitted to the Appropriations Committee of the *Batasang Pambansa* (National Assembly) in July, with a copy to the Office of Budget and Management. Discussions and debate on the budget are held in the National Assembly some time in August. The Assembly usually approves the budget late in August.

Expenditures for O&M

National irrigation systems. Aggregate data on O&M costs for national irrigation systems for 1979-1984 are presented in Table 5.6. Nominal O&M releases per hectare have been increasing except in 1983. when there was a 14 percent reduction from the previous year. In real terms, however. the funds available for O&M per hectare of service area have declined from I981. In I984 prices. O&M fundingaveraged about P355/ha for the years 1979-1981, which is about 40 percent higher than the releases in 1983 and 1984.

Average O&M expenditures per hectare of service area in I982 for national irrigation system for each of the I2 regions of the country are presented in the ninth column of Table 5.7. In general, the range of the figures is about P150-230/ha. Similar data on each of the I2 systems of Region 3

Table 5.6. Operation and maintenance costs of national irrigation systems, 1979-1984.

Year	Service area (ha)	Total O&M fund releases (million current Pesos)			O&M fund releases/ha of service area		Personnel as percent of total
		Personnel	Ochers	Total	Current Pesos	1984 Pesos[a]	
1979	477239	58.95	7.20	66.15	139	320	89.1
1980	472008	76.70	9.05	85.75	182	364	89.4
1981	492336	93.06	10.39	103.45	210	380	90.0
1982	508578	93.76	14.38	108.14	213	355	86.7
1983	549926	86.61	14.38	100.99	184	275	85.8
1984	559447	103.57	28.78	132.35	237	237	78.3

[a]Current Pesos convened to 1984 using Implicit GDP Deflator (Asian Development Bank 1985).
Source: National Irrigation Administration (1985a).

are presented in the penultimate column of Table 5.8. The average expenditure for this region was P232/ha, with a range of about P130-430/ha. Expenditure in the Upper Pampanga River Integrated Irrigation System (UPRIIS), by far the largest irrigation system in the country, was P250/ha.

Table 5.7. Irrigation service fee collections and O&M expenses for national irrigation systems, by region, 1982.

Region	Number of national irrigation systems	Total service area ('000 ha)	Collectibles		Collection[a]		O&M expenses		Collections as percent of O&M expenses
			Total ('000 pesos)	Per ha pesos	Amount ('000 pesos)	Efficiency (percent)	Total ('000 pesos)	Per ha (pesos)	
1	20b	47.0	9960	212	5404	54	9887	210	55
2	13	101.5	21585	213	13483	62	12864	127	105
3	12[b]	172.0	51071	297	27702	54	39998	232	69
4	23	49.9	9376	188	6227	66	9008	180	69
5	14	16.4	4036	246	2027	50	4960	303	41
6	14	53.1	12972	244	9263	71	8545	161	108
7	2	0.5	47	94	36	77	103	226	35
8	11	14.9	2916	196	1624	56	3323	223	49
9	4	11.3	2650	235	2069	78	1549	137	134
10	3	9.7	1413	146	923	65	562	58	164
11	10[b]	30.4	4621	152	3634	79	4335	142	84
12	7	25.0	5389	216	4363	81	4071	163	107
Total	133	531.9[c]	126037	237	76757[d]	61	99206	187	77

[a]Data are from the systems reports to the Systems Management Department, NIA.

[b]Each of the subsystem in Regions 1. 3 and 11 having the same designation is counted as one unit system.

[c]Total irrigation service area varies from season to season and year to year according to the availability of irrigation water.

[d]This total figure is much higher than the audited figure of 58.430 (see Table 5.29).
Source: Japan International Cooperation Agency (1984).

Table 5.8. Irrigation service fee collections and O&M expenses for national irrigation systems in region 3 (1982).

System	Total service area (ha)	Collectibles		Collection		O&M Expenses		Collection as percent of O&M expenditure
		Total ('000 pesos)	Per ha (pesos)	Amount ('000 pesos)	Efficiency (percent)	('000 pesos)	per ha (pesos)	
Angat-Maasin	31371	9309	296	6647	71	8671	276	77
Porac-Gumain	5015	1437	287	662	46	841	168	79
Colo	467	142	283	129	91	174	373	74
Tama	77	26	343	15	56	42	551	35
Caulaman	562	162	289	90	56	241	428	38
San Juan	68	15	223	10	66	68	1005	15
Sto. Tomas	3448	831	245	579	70	753	219	77
Nayom	1158	343	238	221	64	384	332	58
Tarlac	9763	1114	114	805	72	1281	131	63
Smoris	8645	1201	140	487	41	761	88	64
Camiling	8885	1546	174	724	47	1171	132	62
UPRIIS	102588[a]	34945	331	17334	50	25609[b]	250	68
Total	172047	51071	297	27702	54	39998	232	69

[a] In the O&M expenses in this table, expenses for the UPRIIS support divisions in the main office are not included.

Note: In this report, 92,000 ha is used as standard irrigation service area.

Source: Japan International Cooperation Agency (1984).

The service area of irrigation systems represents the area commanded by the irrigation facilities, but the actual irrigated area is often considerably less. Aggregate data on irrigated areas, by season, are compared with the service area figures in Table 5.9 for the years 1975-1984. In recent years, the area served in the wet season has amounted to only about 75 percent of the service area. It is reasonable to assume that the area irrigated in the dry season is a portion of that which is irrigated in the wet season, and that the remainder of the service area is not actually irrigated in either season. Based on the data on O&M fund releases for 1984 (Table 5.6) and the wet season area irrigated for 1984 shown in Table 5.9, the average expenditure for O&M in 1984 was P314/ha actually irrigated.

O&M of national irrigation systems has always suffered from shortages of funds. As *can* be noted from Table 5.6, most of the O&M expenditures are for personnel costs, leaving a very small amount for the actual maintenance. A World Bank paper (1982) reports on the near absence of any efficient mechanical equipment to maintain the systems properly, and the lack of physical facilities and discipline to ensure adequate and timely distribution of water to farmers. This has led to the agency losing credibility with its clients and the subsequent low rates of collection of water charges. This has been described as a vicious circle where inability to collect water charges leads to decreased funds, less maintenance, greater farmer frustration, and lower payments of water charges.

Table 5.9. Service and irrigated areas in national irrigation systems.

Year	Service area ('000 ha)	Irrigated area				
		wet season		Dry season		Dry season area as percent of wet season
		'000 ha	Percent of service area	'000 ha	Percent of service area	
1975	399.7	348.8	87.3	178.2	44.6	51.1
1976	448.8	378.2	84.3	238.0	53.0	62.9
1977	459.3	384.0	83.6	204.8	44.6	53.3
1978	466.1	368.0	79.0	271.8	58.3	73.9
1979	477.2	373.3	78.2	279.3	58.5	74.8
1980	472.0	374.6	79.4	288.9	61.2	77.1
1981	492.3	371.8	75.5	294.5	59.8	79.2
1982	508.6	390.5	76.8	317.2	62.4	81.2
1983	549.9	362.5	65.9	288.5	52.5	79.6
1984	559.4	421.2	75.3	267.6	47.8	63.5

Note: [a]Includes area of second and third crops.
Source: National Irrigation Administration (1985a).

Table **5.10.** Operation and maintenance cost in UPRIIS, **1978-1982, in '000 Pesos**

	1978		1979		1980		1981		1982	
	Current Pesos	1984 Pesos	Current Pesos	1984 Pesos	Current Pesos	1984 Pesos	Current Pesos	1984 Pesos	Current Pesos	1984 Pesos
1. Personnel expenses	163022	43383.9	19695.4	45303.4	23472.3	46958.3	27029.1	48903.7	27581.5	46000.9
a. Salaries	13854.6		16990.0		13989.0		14318.5		15055.2	
b. Government share	968.7		1061.0		1236.3		1247.1		0062.6	
c. Wages	1478.9		1635.4		12222		0044.9		0096.7	
d. Cost of living allowance					5511.5		6153.0		5845.4	
e. Amelioration allowance					1492.0		1555.8		1619.9	
f. Representation allowance					21.3		44.5		47.2	
g. Incentive allowance							2301.4		1975.3	
h. Pag-ibig fund							63.9		279.2	
2. Other expenses	2558.7	6809.3	2019.5	4645.3	3189.1	6380.1	3210.8	5809.3	5759.0	9607.7
a. Travelling expenses	282.2		135.3		3224		262.3		266.4	
b. Sundries and other expenses	1010.6		499.1		465.1		533.4		720.2	
c. Supplies and materials, spare parts	1265.9		1385.1		1101.7		5224		1228.0	
d. Water, illumination and power services					183.0		174.4		290.6	
e. Gasoline and oils					1116.9		1718.3		3095.5	
f. Collection expenses	-								135.5	
g. Purchase of equipment									228.8	
Total (It2)	18860.9	50193.2	21714.9	49948.6	26661.4	53338.4	30239.9	54713.0	33340.5	55621.6
Ratio of personnel expenses/ total O&M cost (percent)	86.4		90.7		88.0		89.4		82.7	

Source: Japan International Cooperation Agency (1984).

The national expenses for personnel services (including salaries, government share, wages, allowances, and *pag-ibig* fund) have averaged 87 percent of the total O&M fund releases in the past 6 years (Table 5.6). Personnel expenses averaged 87.4 percent of the total O&M cost of **UPRIIS,** (Table 5.10) during 1978-1982, but have dropped from a high of 90.7 percent in 1979, to 82.7 percent in 1982. Other O&M expenses of this system include travel expenses, sundries, supplies and materials, spare parts, water, illumination and power services, and gasoline and oil. The total nominal amount of these expenses has more than doubled from P2,558,700 in 1978, to P5,759,000 in 1982, but in real terms the increase has only been 16 percent.

NIA is undertaking measures to improve the O&M situation in the national irrigation systems. These measures are the reduction of personnel and expenses for O&M, and the sharing of expenses with the systems concerned. **A** resolution approved by the **NIA** Board calls for the retention of only 1,276 out of 1.654 positions for UPRIIS. Most of the positions affected are those of field staff such **as** water management technicians, assistant technicians, water masters, and ditchtenders. Ditchtenders are now being discharged **as** their age or service period requirements for retirement **are** satisfied. **NIA** has also liberalized its guidelines for the payment of separation benefits.

Pump irrigation systems. Estimates of O&M costs for some pump irrigation systems developed by Moya (1985) are presented in Table 5.4. Data for additional systems are presented in Table 5.11. For the Solana-Tuguegarao and the Angat-Maasim River Irrigation Systems, the *cost* data **are** limited to the cost of power consumption for pumping. The cost of electric power is variable, depending on the **source** (which may be a private franchise holder, the Manila Electric Company, or a rural electric cooperative). To operate pump irrigation systems, entails from two to over seven times the cost of national irrigation systems.

Table 5.11. Operation and maintenance costs in selected pump irrigation systems.

System	Service area	O&M cost (P)	Cast/ha (P)	Remark
Bonga Pumps	1174	920468	784	
Solana-Tuguegarao	1320	2301826	1744	**Power consumption only**
Tibmanan-Cabusao	3427	2411475	704	
Angat-Maasim River Irrigation Systems				
Tibagan	1237	1438 10X	1163	**Power** consumption only
Bustos-Pandi	351	181076	516	do
Bustos-Pandi **Fxt.**	730	373483	512	do

Source: National Irrigation System (1985a).

Desirable O&M Costs for National Irrigation Systems

A World Bank funded Operation and Maintenance Study (Phase III) conducted for **NIA** by PRC Engineering Consultants Incorpordted of Colorado, **USA** and Sycip, Gorres, Valayo and Company of Manila. estimated a "desirable" O&M cost of P386.50/ha of service area, which would

represent a more than 60 percent increase over the average O&M expenditures for national irrigation systems in 1984. about one-third (P130/ha) of this "desirable" cost is for operation costs, and nearly two-thuds (P249/ha) is for maintenance. In addition, P7.50/ha was suggested for training.

FARMERS' ABILITY TO PAY FOR IRRIGATION SERVICES

Price Policies

A comprehensive study on the impact of economic policies on agricultural development (the Philippine Institute for Development Studies and the Philippine Council for Agriculture and Resources Research and Development 1982) and a World Bank report on pricing policy (1984b), conclude that price intervention policies in the Philippines have created an incentive structure that is significantly biased against agriculture. The findings show that the increasing regulations on the agriculture sector in the 1970s led to an undervaluation of exportable products through export quotas, export taxes, special levies, and government monopoly of marketing. The sector was, likewise, penalized by the overvaluation of the Philippine peso, and by low agricultural prices which had been artificially depressed to raise the profitability of the industrial sector.

Output price policies. Because almost all irrigated lands are rice fields, the output for which pricing policy has a significant bearing on irrigation is that of rice. Until mid-1985, government regulations set floor and ceiling prices for rice. The National Food Authority has had a monopoly on international rice trade operations.

The policy of the National Food Authority is to attempt to purchase a sufficient quantity of the rice crop to defend the floor price, and to create a stockpile for release into the domestic market during times of shortages. Financing for the activities of the Authority comes from a) subsidized lines of credit from government-owned hanks; b) the government (public) budget; and c) internally generated funds from the Authority's importation of wheat, soybean meal, and yellow corn, and from licensing fees. Although the Authority thus has access to "cheap" sources of funds, it still experiences cash flow problems, so that its share of the market has remained small (about 10 percent of the total).

Price policies for inputs other than water. The effect of government interventions on the price paid by farmers for fertilizer has been quantified in terms of the estimated implicit tariffs on the major grades of finished fertilizer from 1973-1981 (David and Balisacan 1982). The weighted average implicit tariffs (i.e., the percentages hy which the prices farmers paid differed from border prices) ranged from a negative 5 percent in 1973 to a positive 56 percent in 1976 (Table 5.12). Between 1975 and 1979, the implicit tariff range was 19-41 percent. From 1973-1975, when a two-tier pricing system was in effect, the food crop sector received substantial price subsidies. Fertilizer for food crop production was sold at prices 50-70 percent less than fertilizer for export crops. In 1975, however, the food and export crop sectors enjoyed a price subsidy of about 46 and 14 percent, respectively. This occurred because the Fertilizer Industry Authority lowered the price of urea, ammonium sulfate, and mixed

fertilizer to the export crop sector to draw down the large inventory which resulted from the government's decision to double fertilizer imports in 1974. The decision to double imports in 1974 and the very high prices paid for these imports resulted in huge losses to the fertilizer industry. Problems in enforcing a two-tier price system and the decline in the world price of fertilizer encouraged the adoption of a single price system starting 1976.

Table 5.12. Estimated implicit tariffs on four grades of finished fertilizer. 1973-1981 (percent of border prices).

		Fertilizer grade				
		Urea	Ammonium sulfate	Mixed	Muriate of potash	Weighted average
1973	I Food crops	-25	-9	-49		-5[a]
	II Export crops	31	39	-2	119	
1974	I Food crops	-11	-23	-33		7
	II Export crops	50	44	17		81
1975	I Food crops	-39	-43	-56	30	
	II Export crops	-5	-5	-31	86	
1976		65	86	30	85	56
1977		55	59	13	105	41
1978		28	37	-5	96	19
1979		34	52	15	89	32
1980		7	-43	-14	68	5
1981		8	45	-11	80	7
Weighted average		16	27	-4	86	10

[a]From 1973-1975, figures refer to weighted average of Priority I and II prices. Fertilizer for the food crop sector was sold at prices 50-70 percent less than the prices for export crops.

Implicit tariff = $[P_d - 1] \times 100$ where P_b denotes border price, P_d is domestic wholesale price, ex-Manila.
$[P_d \quad]$

These two prices are assumed to be at a comparable point in the marketing chain, so that the differences between domestic and border prices may be attributed to government interventions like import quotas and price controls.

Source: David and Balisacan (1982).

In 1976, implicit tariffs increased to a level of 56 percent above world prices. supposedly to allow the fertilizer industry to recoup losses incurred during the 1973-1975 period. The levels of the implicit tariffs have since declined, and in recent years have been estimated to average five to seven percent.

Thegovernment has applied different pricing policies to thedifferent types of fertilizer. Although the mixed fertilizer grade has received a modest price subsidy, David and Balisacan (1982) found that for the period of 1973-1982, prices paid by farmers for urea and ammonium sulfate respectively averaged. 16 and 21 percent higher than border prices. The price of muriate of potash, the fertilizer widely used for sugarcane production. has averaged 86 percent above border prices.

The fertilizer price policy is probably the most important input price policy affecting farmers' ability to pay for irrigation services. In addition, government policies lead to implicit tariffs on machinery, farm chemicals other than fertilizer, and fuel. Some credit is available at subsidized interest rats; however, the volume of agricultural credit receiving these subsidies is small.

Considering the overall situation with input and output pricing policies, a World Bank report (1984b) concluded that the discrimination against rice fanning implied by the input and output price polices noted above was approximately balanced by the government subsidy of irrigation costs (investment costs plus some of the O&M costs). Thus, the implicit taxation of rice production through output and nonirrigation input price policies, significantly reduces the ability of farmers to pay directly for the cost of the irrigation services.

Changes in government policies in 1985. The revitalization of the agricultural sector is considered crucial for a quick and strong recovery of the Philippine economy. Policy changes in agricultural pricing are embodied in a memorandum on the Revitalization of the Agricultural Sector. The provisions include:

1. Complete deregulation of rice prices, in order to improve incentives to farmers for more rice production; support prices are to be adjusted upwards in proportion to increased production costs, to ensure price and supply stability; the buffer stock operations of the National FoodfAuthority are to be strengthened.

2. Full implementation of the policy to allow all sectors to import and distribute fertilizer.

3. Gradual removal of subsidies on agricultural credit and on irrigation. This policy, to be implemented over a period of not less than one year, is expected to reduce government costs further, improve the profitability of industries providing such inputs, and stabilize prices over the medium-term.

Earlier policy changes included the lifting of all price controls except on rice, and the removal of the National Food Authority's monopoly on the import of feed grains.

Tax Policies

The primary tax which may affect the fanners' ability to pay for irrigation services is the real property tax. This is an *ad valorem* tax based on the assessed value of the property. For agricultural property, the assessed value is limited to 40 percent of the market value. The tax that would apply to agricultural lands would generally be levied by the provincial governments, which are required to tax real property at rates between *0.25* and 0.50 percent of the assessed values. Thus, agricultural lands may be taxed at 0.1-0.2 percent of their market value. To the extent that assessments fail to reflect changes in market conditions fully, it is likely that the effective rates of payment would be less than these figures.

Table 5.13. Average costs and returns in rice production, all National Irrigation System Improvement Program I and II systems, 1983-1984.

	Dry season 1983	Wet season 1983	Dry sawn 1984
I. GROSS RETURN			
A. Yield (Mt./ha)	34	3.9	4.3
B. Total value (P/ha)	5039	5x77	8999
II. PRODUCTION COST (P/ha)			
A. Cash/in-kind cost			
1. Material cost			
a seeds	188	193	206
b. Fertilizer	187	306	172
c. Pesticides	396		
Weedicides	35	42	387
Insecticides	225	241	
Rodenticides	2	5	
SUB TOTAL	845	788	765
2. Labor inputs			
a. Land preparation	359	311	305
b. Transplanting/Direct seeding	217	233	373
c. Weeding/Crop management	93	151	53
d. Harvesting/Threshing/Drying	706	707	1255
SUB TOTAL	1375	1402	1986
3. Others			
a Land charges	616	680	1087
b. Irrigation service fee	212	190	329
c. Interest on loans	71	139	233
d. Other expenditure (land tar, etc.)		0.23	
SUB TOTAL	898	1009	1649
TOTAL. FOR A	3118	3198	4400
B. Noncash cost (imputed family labor)			
1. Land preparation	204	296	465
2. Transplanting/Direct seeding	18	41	18
3. Weeding/Crop management	123	105	161
4. Fertilizer/Spraying	16	22	
5. Harvesting/Threshing/Drying	60	69	35
6. Other expenses	162	254	568
TOTAL FOR B	582	786	1247
TOTAL FOR A & B	3701	3984	5647
III. NET RETURN (P/ha)			
A. Above cash/in-kind cost	1921	2678	4599
B. Above total cost	1339	1892	3352

Source: National Irrigation Administration (1984a)

The importance of the real estate tax on the farmers' ability to pay for irrigation water is indicated by data used for the establishment of the market value of irrigated rice land for taxation purposes. Data for 1980 (the most recent year for which separate data on irrigated land are available) from selected municipalities in the provinces of Bulacan, Laguna, North Cotabato and Iloilo show market values of irrigated rice field area to vary from as low as P2,870/ha to as high as P18,000/ha. Applying the maximum rate of tax to these figures implies a tax range of P636/ha. Taxes of this magnitude would have little effect on the ability of farmers to pay for irrigation services.

Another indication of the lack of importance of the real estate tax on farmers' ability to pay for irrigation services comes from data collected as part of NIA's input-output monitoring study in selected irrigation systems. Data from three seasons indicate that the average land tax paid was less than one peso per hectare (Table 5.13). If the amounts actually paid are as low as these data indicate, then either assessments are much below market values. or there is considerable nonpayment of taxes.

Irrigation Benefits and the Farmers' Ability lo Pay for Irrigation Services

Data on the average production benefits of irrigation for the nation are not available. It is therefore necessary to rely on the results of individual studies of specific projects to gain some idea of the probable magnitude of these benefit?.

The Input-Output Monitoring Program of the National Irrigation System Improvement Program has obtained data on the average costs and return to rice production in the National Irrigation System Improvement Program systems for the 1983 wet and dry seasons and for the 1984 dry season (Table 5.13). Converting the costs of production to unmilled rice at the 1983 farmgate price of P1.46 per kilogram (kg), and assuming that all land is owned by the farm family, these data indicate a return to family resources (land. labor. capital, and management), before payment of the irrigation fees, of 1,831 kg unmilled rice/ha in the 1983 dry season; 2,305 kg/ha in the 1983 wet season; and 2,256 kg/ha in the 1984 dry season.

If one assumes that there are no wet season benefits from irrigation (an obvious underestimate of the true situation). and that a farmer is able to grow an irrigated dry season crop on about three-fourths of his area (which represents about the average proportion. in recent years, of the area irrigated in the dry season to that of the wet season -- see Table 5.9), then the average annual benefit of irrigation (measured in terms of the average increase in net returns to family resources) would be about 1,533 kg/ha (three-fourths of the average net returns for the two dry seasons).

The above estimates were made on the unrealistic assumption of no wet season benefits. Data from a study conducted by the Bureau of Agricultural Economics of the Ministry of Agriculture (Tepora et al. 1984) provide a basis for comparing average costs and returns for wet season irrigated and rain-fed rice for 1983 (Tables 5.14 and 5.15). The net income figures are calculated in terms of the return to family-owned resources (land. labor. capital, and management), under the assumption that the family owns all the land farmed. The difference between the irrigated and rain-fed figures is 469 kg rice/ha. Adding to this the 100 kg/ha spent for irrigation service fees in the irrigated areas gives an increase in

net income prior to paying for water charges of 569 kg rice/ha for the wet season. Combining this with the above estimate of 1,533 kg/ha as the average increase in income during the dry season gives an estimate of about 2,100 kg rice/ha as the total increase in net income.

Table 5.14. Approximate average costs and returns to irrigated wet season rice production, 1983.

Item	Amount in P/ha	Kg rice/ha[a]	Percent value of total production
1. Gross receipts	4938	3382	100.0
2. Water charges			
a. for O&M	142	80	2.4
b. for capital repayment	36	20	0.6
3. Other purchased current inputs, excluding labor	733	502	14.8
4. Hired labor	1175	805	23.8
5. Returns to family resources (if family owns all land farmed)	2852	1975	58.4

[a]Conversion of P/ha to kg rice/ha.
Item 2 is computed at P 1.78/kg, the support price. Items 1, 3, 4 and 5 are computed at P 1.46/kg, the actual price received by farmers.
Sources: computed from Tepora et al. (1984).

Table 5.15. Approximate average costs and returns to rain-fed rice production, 1983.

Item	Amount in P/ha	Kg rice/ha[a]	Percent value of total production
1. Gross receipts	3497	2445	100.0
2. Water charges	0	0	0
3. Other purchased current inputs excluding labor	42	299	12.2
4. Hired labor	915	640	26.2
5. Returns to family resources (if family owns all land farmed)	2154	1506	61.6

[a]Price received by farmers was P 1.43/kg and this was used in computing for the kg rice/ha.
Source: computed from Tepora et al. (1984).

In 1984 the average O&M cost per hectare irrigated was P314. At the 1984 support price of P2.23/kg, this implies that O&M costs are equivalent to approximately 141 kg/ha. Thus about seven percent of the net benefits of irrigation would be needed to pay for the average O&M costs. The current irrigation service fee in most irrigation projects is 100 kg of rice/ha in the wet season and 150 kg of rice/ha in the dry season (see section Direct Methods, under Methods of Financing Irrigation Services). Considering that the dry season fee would be paid on only 75 percent of the area

irrigated in the wet season, the average annual payment would come to 213 kg/ha, which is equivalent to about 10 percent of the net incremental benefits of irrigation.

Moya (1985) studied the costs and benefits of 12 irrigation systems. The range of the estimated net benefits for these systems was about P1,100-2,500/ha, in 1980 prices. The average O&M cost of P314/ha irrigated in 1984 would thus comprise 1329 percent of the net benefits. Payment of irrigation service fees would require 19-43 percent of the net benefits.

In research conducted in the Libmanan-Cabusao Pump Irrigation System (LCPIS), Moya (1984) estimated the income earned by farmers in two types of irrigated area (flood-free and flood-prone) and in rain-fed areas (Table 5.16). The estimated income levels were low — with the rain-fed farmers earning less than the assumed opportunity cost of their family labor. Irrigation resulted in significant increases in the net income, with the increase being about P3,400/farm for flood-free areas, and about P1,220/farm for the flood-prone areas. The range of farm sizes was 1.3-1.5 ha. Using a representative figure of 1.4 ha/farm, these figures imply increases in net income of P2,430/ha in the flood-free areas and P870/ha in the flood-prone areas.

Table 5.16. Comparative net surplus per farm per annum, irrigated and rain-fed farms, LCPIS, Camarines Sur, at constant 1984 prices.

	Irrigated		Rain-fed	Difference	
	Flood-free	Flood-prone		Rain-fed versus flood-free	Rain-fed versus flood-prone
Value of output	12874	8547	3809	9065	4738
Costs of production					
a) Material inputs	2210	1664	869	1401	795
b) Labor	3711	2820	1695	2016	1125
Hired	2092	2032	1032	1870	1000
Family	809	788	663	146	125
c) Miscellaneous costs	2168	1568	921	1241	641
d) Land rent	1601	1564	608	993	956
Total costs	9759	7616	4099	5651	3517
Net surplus	3124	931	(290)	3414	1221

Source: Moya (1984).

Implications of Alternative Policies

Based on some of the data discussed above, indicative estimates of the costs and returns to irrigated rice production in the Philippines are presented in Table 5.17. To facilitate comparison with the other study countries, the data are expressed in terms of kilograms of unmilled rice. The annual figures are based on the assumption that an irrigated farmer is able to grow an irrigated wet season crop on his entire area each year, and an irrigated dry season crop on three-fourths of his area. The returns to family-owned resources (assuming all land is owned by the family) are shown in the last line of the table.

Table 5.17. Indicative costs and returns to irrigated rice production (kg unmilled rice/ha).

Item	Wet season[a]	Dry season[b]	Per year[c]
Gross receipts	3382	3850	6270
Water charges[d]	100	150	200
a. for O&W			176
b. for capital repayment			37
Other purchased current inputs, excluding labor	502	655	993
Hired labor	805	1151	1668
Returns to family-owned resources (if family owns all land farmed)	1975	1894	3396

[a] From Table 5.14.

[b] *Computed from* Table 5.13 averaging the 2 dry seasons. Peso cost converted at P 1.46/kg.

[c] From columns 1 and 2 assuming dry season crop planted on 75 percent of *area*

[d] 100 kg of unmilled rice per hectare irrigated in wet season and 150 kg in dry season

The data in Table 5.17 are based on the present policy of cost recovery, namely, that farmers pay in rice, the current irrigation service fee of 100 and 150 kg/ha irrigated in the wet season and the dry season, respectively. Assuming a dry season crop on 75 percent of the area, the average total irrigation fee per hectare is 213 kg of rice/year. Because at the official price in 1983 of P1.78/kg, the O&M costs per hectare irrigated (P314/ha) are equivalent to only 176 kg, and the residual amount of 37 kg is considered to be a payment to capital costs?

Costs and returns to farmers under this policy are compared in Table 5.18 with hypothetical costs and returns calculated under the assumption that policy is changed to require full cost recovery of all O&M plus capital costs. The analysis is presented for two alternative assumptions of the level of capital investment — a low cost assumption of US$1,000/ha, and a high cost assumption of US$2,500/ha. O&M costs are based on the current average O&M cost of P314/ha irrigated.

As can be seen from Table 5.18, even at the low investment cost of US$1,000/ha, the irrigation service fee needed for full cost recovery would increase from the current level of 213 kg/year (which is about 3.4 percent of total production) to 944 kg, or about 15 percent of total production. For the high investment cost situation, the increase would be to 2,095 kg, representing about 33 percent of total production. In either case, the effect is to create a substantial reduction in the returns that would be earned by the farm family. Returns to family-owned resources would decline by about 22 percent in the low investment cost situation, and by 55 percent in the high investment cost situation.

[2] This analysis is thus a farm-level analysis, and assumes that the entire fee is paid. As is discussed more comprehensively in the section on Collection Efficiencies, low rates of fee collection are a serious problem for the National Irrigation Administration, so that even at fee rates which are above the average O&W cost per hectare, the Administration's total collections remain below its O&M expenditures.

Table 5.18. Hypothetical costs and returns to irrigated rice production, 1983, assuming changes in policies regarding water charges (kg unmilled rice/ha/year)[a].

Item	Present policy	Water charges revised for 100 percent cost recovery (O&M plus capital cost) assuming	
		Low[b] investment cost	High[c] investment cost
Gross receipts	6270	6270	6270
Charges related to water			
a. O&M	176	176[d]	176[d]
b. Capital cost	37	768	1919
Other purchased current inputs excluding labor	993	993	993
Hired labor	1668	1668	1668
Returns to family-owned resources (if family owns all land farmed)	3396	2665	1514

[a]Using figurer from Table 5.17.

[b]US$1,000/ha. Amortized assuming interest rate of 10 percent and 50 year life.

[c]US$2,500/ha. Amortized as above.

[d]Assuming an average O&M cost of P314/ha irrigated wnvened at the support price of P1.78/kg.

In order to place these returns in a perspective which will facilitate comparisons among the other study countries, we have related them to two reference levels of income. Data underlying these reference income levels for the Philippines are presented in Table 5.19. The first reference level is what we have termed "parity household income" expressed on a per hectare basis (item 5 of Table 5.19). "Parity" income represents a level of per capita income from crop production which would give a farm household an income comparable to the average per capita income for the Philippines. assuming that crop production is the household's only source of income. In reality, *other* sources of income frequently exist, so these income levels overstate the level of crop income which many households would need to achieve "parity." They are, however, indicative of conditions on farms with no other sources of income. The second reference income level is an estimated absolute poverty level of income, based on data compiled by the World Bank (1984a). As in the case of the "parity" income, it has been adjusted to a per hectare basis, again on the assumption that crop income is the only source of income for the farm household,

Table 5.19. Calculation of income reference levels, 1983.

Average per capita income (P)[a]	7404
Average farm household size (persons)[b]	5.7
Parity farm household income (P) (1 x 2)	42203
Average farm size (ha)[c]	1.2
"Parity" houschold income per hectare (P) (3 4)	35169
Estimated per capita absolute poverty income level (P)[d]	1866
Estimated farm household "poverty" income (Pi (2x6)	10636
Estimated poverty level of income per hectare (P) (7/4)	8863

[a]NAS, National Economic Development Authority.

[b]NAS, National Economic Development Authority, Study on Low Income Groups (1985).

[c]Tepora et al. (1984).

[d]1981 Estimate of US$195 taken from World Bank (1984a) Social Indicator Data Sheets, and converted to P1,540 at 1981 exchange rate of P7.9 per dollar. Using the Implicit GDP Deflator. this was calculated to be P1.866 at 1983 prices.

As is shown in Table 5.20, under current policy, the returns to family resources are only 14 percent of the "parity" income level, and 56 percent of the "poverty" level. These low returns are consistent, at least

Table 5.20. Estimated effects of changes in policy regarding water charges 1983

	Present policy	Assumed policy on water charges	
		Water charges revised to cover O&M plus 100 percent of capital cost assuming initial capital cost level is	
		low	high
Farm returns (kg unmilled rice ha)[a]			
Returns to family resources (if all land is owned by family)	3396	2665	1514
Farm returns relative to "parity" (percent) Returns to family resources (if all land is owned by family)	14	11	6
Farm Returns relative to "poverty" (percent) Returns to family resources if all land is owned hg family)	56	44	25

[a]From Table 5.1X.

[b]"Parity" crop production income per hectare of P35,169 (from Table 5.19) or 24.088 kg unmilled rice.

[c]"Poverty" crop production income per hectare of P8,863 (from Table 5.19) or 6,071 kg unmilled rice.

qualitatively, with the results of several studies that have examined farm incomes. In a study conducted by Tagarino and Torres (1976) examining the farmer's capacity to pay for irrigation services, in the Upper Pampanga River Project, farm income (net value of production plus the imputed value of unpaid operator and family labor) was found to be generally below what was considered to be a minimal level of family living expenses. In a subsequent survey (Japan International Cooperation Agency 1984) in the same area in 1982-1983, 28 percent of the farm households still have incomes below the minimal level. Living conditions for amortizing farmer-owner operators with less than one hectare and lessees with less than two hectares remain at the subsistence level.

Another study (Economic Development Foundation 1981) compared estimates of family incomes with the poverty threshold income level (Table 5.21). At actual farmgate or government support prices in 1979, the average amounts of family incomes in excess of the poverty income level are significantly on the negative side in all but three regions in the country.

Table 5.21. Estimated family income versus poverty threshold level[a] (1979).

Region	Family income (P)	Poverty threshold income (food and other needs) (P)	Surplus (Deficit) Income	
			(P)	Equivalent cavans of palay
1	1940.34	14495	(12554.66)	(223.47)
2	6429.49	13783	(7353.51)	(140.44)
3	22143.36	15805	6338.36	97.66
4	7666.63	13922	(6255.37)	(119.93)
5	10732.23	13140	(2407.77)	(49.09)
6	21973.00	11630	10343.00	219.60
7	16927.71	12067	4830.71	95.28
8	3726.36	11757	(8030.64)	(171.59)
9	2143.39	13090	(10346.61)	(217.36)
10	3707.56	15793	(12085.44)	(236.74)
11	6158.30	13590	(7431.70)	(154.83)
12	12128.58	14095	(196642)	(41.10)
Average all regions	11685.15	14151	(2465.85)	(45.221

[a]Estimates used actual Farmgate Price of unmilled rice.

Source: Economic Development Foundation (1981). The study used 1978 estimates of the Population, Resources, Environment, and the Philippine Future project of the Development Academy of the Philippines -- adjusted to 1979 levels by using the Consumer Price Index of the National Economic and Development Authority.

The Input-Output Monitoring Program — National Irrigation Systems Improvement Program of NIA obtained similar results. Although farm families in the Ilocos, Cagayan and Leyte provinces had some family savings, the average actual family living expenses in all the selected regions have been well below the poverty threshold income level (Table 5.22).

Table 5.22. Income, living expenses, and poverty threshold expenses in selected regions (1979)[a].

	01 Ilocos	02 Cagayan	04-05 South Luzon	06 West Visayas	08 Leyte	09-12 Mindanao
I. Family income						
(a) Farm						
1. Rice	457	4846	2056	1563	797	4735
2. Other crops/ livestock	1241	125	273	1509	1657	370
SUB TOTAL	1698	5571	2329	3072	2454	5105
(b) Non-farm	3032	3006	3279	4003	2596	3071
II. Total disposable income	4730	x577	5608	7075	5050	8176
III. Family living expenses	3710	7589	9160	10136	4522	9860
IV. Family savings	1020	988	(3552)	(3061)	528	(1684)
V. Poverty threshold expenses (1979)	14495	13783	13922-13140	11630	11757	13090-14095
Average farm size	0.78	2.57	1.25	1.61	1.38	1.87
Average household size	5.5	5.8	5.80	6.0	5.3	6.9

[a] *Source*: Poverty Threshold Expenses taken from Economic Development Foundation (1981), as based on a study done by the Development Academy of the Philippines. All other data are obtained from results of surveys done by the National Irrigation Administration's Input-Output Monitoring Program under National Irrigation Systems Improvement Program I and II.

Given the low returns earned by farmers under current policy, any policy attempting full cost recovery of O&M plus capital costs would have severe implications for the welfare of farmers. Under the assumption of low investment costs, such a policy would lower the returns to family resources to 11 and 44 percent of the "parity" and "poverty" reference incomes, respectively (Table 5.20). Full cost recovery with the assumption of a high investment cost results in returns to family resources that are only 25 percent of the "poverty" reference level. To the extent that National Irrigation Administration is unable to collect the fees from 100 percent of the farmers, the fee levels necessary for full cost recovery would have to rise even further. It is apparent that a full cost recovery policy would not be feasible without imposing substantial hardships on the farmers.

METHODS OF FINANCING IRRIGATION SERVICES

Direct Methods

General policies. The main financing mechanism for obtaining resources from the beneficiaries of irrigation has been irrigation service fees levied on the bask of a flat rate per hectare for each season (wet and dry). Such fees have been officially levied from at least 1946. Since 1966, the rate of levy for the dry season crop has been higher than for the wet season crop. Since 1975, higher rates have been charged for pump irrigation systems than for national irrigation systems.

Table 5.23 shows the irrigation fee rates for the period 1946-1984. The real values of these rates, deflated by the price index for services, are given in Table 5.24 expressed in 1984 pesos. Since 1975, the irrigation fees paid by farmers have been denominated in terms of rice. This has provided a degree of indexation against inflation and has freed NIA from the difficult task of frequent recourse to the President of the Philippines in order to raise the level of water rates (World Bank, 1982). The farmers may either pay in-kind or the equivalent amount in cash, based on the government support price of rice. Thus, the cash equivalent of the fee increases with any increase in the support price. In spite of this, the irrigation service fee rates have declined by about 35 percent in real terms since 1975.

Table 5.23. Irrigation service fee rates in national irrigation systems, by type of system and by season, 1946-1984 (P/ha).

Year	Pump system		Gravity system	
	wet season	Dry season	wet season	Dry season
1946-1966	12	12	12	12
19661975	25	35	25	35
1975[a]	150	250	100	150
1976	165	275	110	165
1977	165	275	110	165
1978	165	275	110	165
1979	195	325	130	195
1980	210	350	140	210
1981	221	37x	151	226
1982	248	413	165	248
1983	267	445	178	267
1984	335	558	223	335

[a]Starting in 1975. irrigation fee rates have been set at two cavans per hectare during the wet season and three cavans per hectare during the dry season for gravity systems, and three cavans per heaare during the wet season and live cavans per hectare during the dry season for pump irrigation systems. The cash equivalent is based on the government's support price for palay. (1 cavan = 50 kg).

Source: National Irrigation Administration.

Table 5.24. Real value of irrigation service fee rates in national irrigation systems by type of system and season, 1975-1984 (1984 P/ha).

Year	Pump system		Gravity system	
	wet season	Dry season	Wet season	Dry season
1975	514	856	343	514
1976	516	860	344	516
1977	471	7X6	314	471
1978	439	732	293	439
1979	449	748	299	449
1980	420	700	280	420
1981	411	684	273	411
1982	414	689	275	414
1983	399	664	266	399
1984	335	558	123	335

Note: Nominal values were deflated by the implicit GDP Deflator (Asian Development Bank 1985).

Although the fees shown in Table 5.23 apply to most irrigation systems, there are some exceptions. Details on the current rates of irrigation fees in various systems are presented in Table 5.25.

Table 5.25. Irrigation service fee rates (cavans[a]/ha), 1985.

Type of system	Rice[b]			Annual crops[c]
	Wet season	Dry season	Third crops	
Pumps				
Bonga Pump 1 to 3	3	5	5	8
Solana - Tuguegarao	8	12	12	
Angat - Maasim (Angat Maasim River Irrigation System)	3	5	5	6
Libmanan - Cabusao	6	6		
Gravity				
UPRIIS	2.5	3.5	3.5	6
Other national irrigation systems	2	3	3	3
Communal				1.5[d]

[a]One cavan of unmilled rice weighs 50 kilograms at 14 percent moisture content.

[b]Irrigation fee rates for crops other than rice and annual crops are 60 percent of those for rice.

[c]Annual crops include bananas and sugarcane.

[d]Average annual amortization rate per hectare for all communal irrigation systems constructed by NIA or its predecessor agencies.

Notes:

1. Irrigation fees for pump irrigation systems differ due to costs of power which vary according to the source (i.e., National Power Corporation, electric cooperatives, private franchise holders, etc.).
2. The area (in hectares) planted to other crops in the National Irrigation Administration is a very small proportion of the total irrigated area. In 1982, out of 513,926 ha irrigated by the national irrigation systems, only 2,819 ha was planted to other crops. The current government programs on crop diversification can be expected to increase the area planted to other crops in the future.
3. World Bank-assisted systems are authorized to charge 7.9 cavans per double-cropped hectare within five years of system completion.

Source: National Irrigation Administration 1985a.

Assessment, billing, and collection procedures. NIA's standard operating procedures on billing and collection of irrigation fees are based on its Memorandum Circular (National Irrigation Administration 1970), and subsequent modifications to it. The key personnel involved in the assessment, billing, and collection process are the water master, the billing clerk, the irrigation superintendent, and the field cashier or collection officer.

Every week during the crop season, the NIA water master prepares a list of irrigated and planted areas. This list is prepared in triplicate, with the original going to the billing clerk and a copy each to

the irrigation superintendent and the regional irrigation director. This weekly list has the acknowledgements of water delivery by the water users, or, if this acknowledgement has not been obtained. the certification of delivery by the water master.

The billing clerk prepares the bills for each lot, based on this list. The bills are not distributed or posted in the irrigation fee register, however, until receipt of the list of lots withtotal crop failuredue to water shortage. Total crop failure is defined to mean a condition where the standing crop has been damaged to such an extent that practically no harvest is expected. The water master, in coordination with the local farm management technician of the Bureau of Agriculture or the Bureau of Plant Industry determines which lots havetotal crop failuredueto water shortage, and preparesthelistof such lots for submission to the irrigation superintendent three weeks before the estimated harvest date. Based on this list, thesuperintendent advises the billing clerk ofcancellations and adjustmentsin fees, who in turn. adjusts or cancels the bills which he had previously prepared on the hasisofthelist of irrigated and planted areas.

The collection officer checks and verifies the bills against these two kinds of lists before forwarding them to the irrigation superintendent for his approval and signature. *The* bills are grouped by division for speedy distribution to the irrigation water users by the team leader for the division. The team leader must serve all bills before or during the threshing period. and obtain acknowledgements to the effect that all water users received their bills.

The hill collector or assistant collector has custody and accountability for official receipt booklets. He also receives payments that are due to **NIA,** and issues official receipts for all payments received. He turns over all collections to the field cashier, once a week, or whenever collections reach P500. *The* field cashier or collecting officer deposits the money with the Philippine National Bank branch in the locality. which remits the amount to the **NIA** central account with the bank's head office in Manila.

Enforcement. There is general agreement in the literature reviewed that the enforcement of punishment to nonpaying farmers has been problematic. For example, the nondelivery of water to delinquent farmers has not been enforced due to lack of water control devices in the field, Nondelivery of water to a section of a system, which would penalize a group of farmers who do not meet a certain collection level, may be easier to implement than preventing a particular fanner from having access to the irrigation water. In the case of pump irrigation systems, **NIA** may decide not to operate a pump if the fee collections amount to less than 90 percent of what is collectible. However, in the few instances where **NIA** decided to terminate the operation of a pump, local and provincial officials intervened on behalf of the farmers.

Given the difficulty of enforcing the payment of irrigation service fees through penalties, **NIA** has concentrated on providing positive incentives to encourage payment. Several approaches have been tried in various irrigation systems. on an experimental basis. These approaches generally combine delegation of certain **O&M** responsibilitiesto farmers' organizations, with incentives for them to take an active role in fee collection. For example. under one type of arrangement known as the "lateral turnover'' arrangement. the farmers' association contracts with **NIA** for canal maintenance at a

specified rate per kilometer of canal. To the extent that the work can be done at a lower cash cost (by encouraging farmers to contribute unpaid labor) the association is able to earn a cash income. Furthermore, theassociation is allowed to retain 2.5 percent ofthe fees it collects from its members if it achieves a target rate of 70 percent collection. If the collection rate rises to 100 percent, the association can retain 3 percent of the collections (Cruz and Siy 1985). Under another arrangement. the farmers' association is given full responsibility for system maintenance without any cash payment. However, the association is allowed to retain a significant portion ofthe irrigation service fees it collects from its members. For collections below 50 percent of the aggregate amount due, the association is allowed to retain 35 percent ofthe funds collected. For all collections above 50 percent, the association is allowed to retain 65 percent of the amounts collected (Cruz and Siy 1985). NIA also provides an incentive for prompt payment by giving a 10 percent discount to farmers who pay 100 percent of their current account collectibles on time (Cablayan and Palomares 1986, Cruz 1979).

Collection Efficiencies

National irrigation systems. The irrigation fee collectibles and actual collections in all national irrigation systems from 1971 through 1984 are given in Table 5.26. Collections from current accounts averaged only about 37 percent, while those from back accounts averaged 5 percent. Data are unavailable on the age of both the uncollected and collected back accounts. It seems likely, however. that most collections on back accounts are for relatively recent billings. Assuming that all collections on back accounts are from the previous year's billings, the data from Table 5.26 have been used to estimate the total collections from each year's billing (Table 5.27).

Table 5.26. Irrigation fee collectibles and actual collections in all national irrigation systems

Year	Collectibles ('000 pesos)			Collections					
				From current account		From back account		Total collections	
	Current charges	Rack account	Total	'000 pesos	Percent	'000 pesos	Percent	'000 pesos	% of current account
1971-1972	10749	46383	57132	4281	39.8	2114	4.h	6395	59.6
1972-1973	12114	50137	62911	5052	41.5	2807	5.5	7859	64.6
1973-1974	16387	55052	11439	6025	36.8	3266	5.9	9291	56.7
1974-1975	17538	62156	19694	7162	40.8	3152	5.1	10314	58.8
1975-1976	49716	69382	119098	13434	27.0	2199	3.2	15633	31.4
1977	85396	130318	215714	21133	32.5	10278	7.9	38011	44.5
1978	85015	175208	260223	30316	35.7	11693	6.7	42009	49.4
1979	112754	227407	340161	35553	31.5	11229	4.9	46782	41.5
1980	97039	293537	390576	37154	38.3	14522	5.0	51676	53.3
1981	130483	314345	444828	46451	35.6	12124	3.9	58575	44.9
1982	120201	385660	505861	43101	35.9	15329	4.0	58427	48.6
1983	118425	432433	550858	56775	47.9	15788	3 7	72563	61.3
1984	158675	487269	645944	77648	48.9	23152	4.8	100800	63.5

Source: National Irrigation Administration Collection Efficiency Report (1985).

Table 5.27. Estimated collection efficiencies from current irrigation service fee charges.

Year of hilling	Current charges	Amount of current charges collected		Percent of current charges collected			Percent of total collections received in year of billing
		In year of hilling	In following year	In year of billing	In following year	Total	
1971-1972	10749	4281	2807	39.8	26.1	65.9	60.4
1972-1973	12174	5052	3266	41.5	2b.U	68.3	60.8
1973-1974	16307	6025	3152	36.9	19.3	56.3	65.6
1974-1975	17538	7162	2199	40.8	12.5	53.4	76.4
1975-1976	49716	13434	10278	27.0	20.7	47.7	56.6
1977	85396	27733	11693	32.5	13.7	46.2	70.3
1978	85015	30316	11229	35.7	13.2	48.9	73.0
1979	112754	35553	14522	31.5	12.9	44.4	70.9
1980	97039	37154	12124	38.3	12.5	50.8	75.4
1981	130483	4045 I	15329	35.6	11.7	47.3	75.2
1982	120207	43101	15788	35.9	13.1	49.0	73.3
1983	118425	56775	23152	47.9	19.5	67.5	71.70

Source: Calculated from Table 5 26, assuming all beck account collections are from the previous year's billings.

The data in Table 5.27 indicate a gradual decline in the total collections as a percentage of the amounts hilled from the early 197Q until about 1979, followed by a gradual increase. Of the total amounts collected lrom each year's billings. generally from 65-75 percent has been collected in the year of the hilling, with the remaining 25-35 percent collected in the following year. The major exception tothisoccurred in 1975-1976, when NIA introduced anapproximatelyfour-fold increase in the rates charged . the lint increase in a decade (see Table 5.23). Collections during that year dropped to a record low of 27 percent of the billings. This has sometimes been cited as evidence that many farmers refused to pay these higher fees. But the apparent amount of these charges collected in the subsequent year was very high, comprising another 2 I percent of the amounts billed. This suggests that the impact of the increase in the fees was more an initial delay in payments than a sharp decrease in the total level of payments. Total payments on that year's billings are thus estimated to be about 4X percent, which wassomewhat lower than in the previous year. but quite consistent with the downward trend that had been taking place over several years.

At present, NIA is in the process ofreviewingthe back accounts to consider the possibility of deleting them from its booka. But in order not to set a precedent on bad debts, a method of writing-off back accounts in proponion to improvements in total collections of current accounts is beingformulated. Writing-off all, or a portion of farmers' back accounts could strengthen their willingnessto pay their current accounts. A NIA study on 18 selected irrigation systems reported that on the average, farmers are willing to pay up to 7 I percent of their back accounts on an installment basis (National Irrigation Administration 1984c). NIA's course of action on these accounts must take into consideration the related rules and regulations being implemented by the Bureau of Internal Revenue.

NIA's program of involving fanners' irrigation associations in the collection of irrigation fees may increase its collection efficiency. A case study on the Angat-Maasim River Irrigation System showed a 15 percent increase in the collection of irrigation fees after the formation of the fanners' association (National Irrigation Administration 1983).

A feasibility study conducted by Japan International Cooperation Agency (1984) on the improvement of O&M of the UPRIIS reported an average irrigation service fee collection efficiency rate of about 50 percent from 1979 through 1982 for the system (Table 5.28). The efficiency rate in the UPRIIS is lower than the average collection efficiency in all national irrigation systems, which stands at about 60 percent. The low collection efficiency is attributed to: a) insufficient supply and improper distribution of irrigation water, b) inadequate records and complicated billing and collection procedures, c) lack of dissemination, d) low capacity of the farmers to pay, e) farmers' negative perception of the quality of irrigation services, and f) absence of effective measures to punish nonpaying farmers.

Table 5.28. Irrigation service fee collections, LIPRIIS, 1979-1982.

District	Collectible ('000 pesos)	Collections[a] ('000 pesos)	Efficiency (percentage)
1979			
1	M52	3294	51.1
2	7800	4997	64.1
3	8964	4086	45.6
4	5512	3543	64.3
Whole UPRIIS	28728	15920	
1980			
1	5760	2967	51.5
2	6759	4407	65.2
3	7427	3559	47.9
4	5330	2534	47.5
Whole UPRIIS	25276	13467	53.3
1981			
1	8394	3842	45.8
2	9350	4254	45.5
3	10571	3509	33.2
4	6129	3814	62.2
Whole UPRIIS	34444	15419	44.8
1982			
1	8263	3932	47.5
2	9389	4944	52.7
3	10166	3769	37,1
4	7127	4689	65.8
Whole UPRIIS	34945	17334	49.6
Average collection and efficiency (1979-1982)		15535	50.4

[a]Including *back* account.

Source: Japan International Cooperation Agency (1984)

The above study recommends: a) that water users' associations collect irrigation service fees and remit the collections to the UPRIIS office, in order to alleviate the burden on the office of collecting directly from individual farmers; b) that the option to pay irrigation fees in-kind be abolished, or the allowance of 6 kg/cavan collected for payments in-kind be increased to 10 kg/cavan to recoup all expenses incurred in collecting the rice; and c) that the present penalty charge of one percent per month for nonpayment of the irrigation fees be increased, considering the current interest rates on loans and penalties on tax payments.

Of critical concern to NIA is the balance between the revenues it receives in the form of irrigation service fees that are collected and the expenditures it incurs for O&M. Average aggregate data on this balance, based on system-level O&M expenditures, are presented in Table 5.29. Irrigation service fee collections were equivalent to nearly 70 percent of the O&M costs in 1979 and 1980, but dropped to only 50 percent in 1981 when O&M expenditures increased sharply, while collections declined somewhat. In 1983 and 1984 collections rose more rapidly than O&M expenditures, so that nearly 75 percent of the O&M expenditures were covered by fee collections.

Table 5.29. Total irrigation service fee collections and O&M fund releases, 1979-1984.

Year	Total collections (in million pesos)		Fund releases (in million pesos)		Collections as a percent of releases
	Current pesos	1984 pesos[a]	Current pesos	1984 pesos[a]	
1979	45.35	104.31	66.15	152.16	68.6
1980	59.24	118.51	85.75	171.55	69.1
1981	52.74	95.42	103.45	187.17	51.0
1982	58.43	97.4x	108.14	180.41	54.0
1983	72.72	108.57	100.99	150.78	72.0
19x4	98.95	98.95	132.35	132.35	74.8

[a]Current pesos converted to 1984 pesos using Implicit GDP Deflator (Asian Development Bank 1985).
Source: National Irrigation Administration (1984b).

Similar data for 1982, broken down according to the 12 NIA regional offices, are presented in Table 5.7. There are sharp differences among regions in the extent to which irrigation service fee collections cover O&M expenditures. Ignoring Region 7, which has less than 500 ha of irrigated area, the range is from 41 percent in Region 5 to 164 percent in Region 10. The variability is only partly accounted for by variation in collection efficiencies, whose range was 50-81 percent. It is clear that the O&M cost per hectare is much more variable than the irrigation service fee per hectare. The correlation coefficient between average O&M expenditures per hectare and the average irrigation fee charged per hectare is only 0.30. Even excluding Region 7, the correlation coefficient is only 0.59. Thus, in some regions farmers are asked to pay considerably more than the total O&M expenditures, while in other regions they are asked to pay an amount approximately equal to or less than O&M expenditures. At the national level, the average irrigation service fee which farmers were asked to pay in 1984 was about 20 percent greater than the O&M expenditures per hectare.

Similar data, again for 1982, for the 12 individual systems comprising Region 3 (which accounts for about one-thud of the total area of national irrigation systems) are presented in Table 5.8. The range of collection efficiencies was 41-91 percent, with an average (dominated by the UPRIIS collection efficiency of 50 percent) of 54 percent. Variability among these systems in the extent to which collections cover O&M expenditures is less than that among the 12 regions of the country. The correlation between the fees charged and the O&M expenditures incurred, both on a per hectare basis, is only 0.31 for the 12 systems, rising to 0.68, if the 2 systems with the smallest area (less than 100 ha in each case) are overlooked in the analysis. Ignoring the 4 systems with less than 600 ha each, the collections range from 62 percent of O&M expenditures to 79 percent. Average charges are about 28 percent greater than average O&M expenditures — a figure comparable to the national average — but with a lower average collection rate (54 percent); the collections for the entire region amount to only 69 percent of expenditures.

Total O&M releases in 1984 were P132.4 million (Table 5.29), and total Current charges for irrigation service fees were P158.7 million (Table 5.26). This implies that an average collection efficiency of 83 percent would have been required for NIA to fully recover O&M costs and it estimates that in general, to recover O&M costs fully, the collection efficiency should be from 80-85 percent of the current amounts billed.[1]

Pump irrigation systems. Pump irrigation systems present a special problem because of their high operating costs. To some extent, this is reflected in the higher irrigation service fees that NIA charges farmers in these systems (Table 5.25). But these differences do not always fully reflect cost differences. For example, the Tibagan portion of the Angat-Maasim River Irrigation System incurs power consumption costs of nearly P1,200/ha (Table 5.11). Given the irrigation service fee rates for this system (Table 5.25). and assuming 80 and 60 percent of the service area to be planted during the wet and dry seasons respectively, with no third cropping, the total fees assessed would amount to only 78 percent of the cost of power consumption. In contrast, NIA could cover its O&M costs with only a 50 percent collection rate for the Libmanan-Cabusao pump irrigation systems, and with an 87 percent rate for the Bonga pumps. Although there is little difference in the O&M cost per hectare for the Libmanan-Cabusao and the Bonga pumps, the latter system has a maximum irrigation service fee of 8 cavans (400 kg) for the wet and dry seasons, as compared to the 12 cavans (600 kg) for the 2 seasons in the case of Libmanan-Cabusao pump irrigation systems. For the Solana-Tuguegarao pump irrigation systems, in spite of an irrigation service fee of 20 cavans (1,000 kg) for the wet and dry seasons, a collection efficiency of 77 percent would be needed just to cover the costs of power.

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[1] Although the *rate* of collection on current billings is important, another potentially significant factor is the extent to which billings are issued to irrigated areas. Data from Table 9 show the 1984 "irrigated area" (as contrasted to the larger service area) to be 421,200 ha in the wet season, and 267,600 ha in the dry season. Using P223/ha as the wet season fee (100 kg rice at the official price of P2.23/kg) and P334.5/ha as the dry season fee, the implied total billings would be P183.4 million. Actual billings, as reported in Table 25, were only P158.7 million, or 87 percent of this amount. Considering that the wet and dry season fee rats in the Upper Pampanga River Integrated Irrigation System, which comprises 19 percent of the total service area of the country, are 25 and 17 percent greater, respectively, than the rates used in the above calculation, it *appears* that either a) data on irrigated areas are considerably overstated, b) billing adjustments for crop damage are high or c) many farmers in irrigated areas are not billed. To the extent that the latter is the *case*, the National Irrigation Administration could improve its financial position by improving its rate of billing coverage.

Improvement of collection efficiency. In 1977, a study was launched by NIA to identify and quantify the variables affecting collection efficiency. The study was formulated based on the concept that collection efficiency is affected by variables associated with NIA organization and with the farmer-clientele. Results of the analysis of the information obtained from 30 sample irrigation systems from Luzon revealed the following factors that directly affect collection efficiency: adequacy of personnel and budget, communication among personnel and with farmers, capacity of the irrigation system to perform adequately, and performance evaluation. The discrepancy between the area programmed for irrigation and those actually served explained about 31 percent of the variations in collection efficiency.

Based on the above study, NIA developed a Management Action Program in 1980 which defines the direction of its efforts in improving collection activities. This program identified the presence of a strong collection base, a credible package of rewards and punishment, and a practical and efficient billing and collection machinery as the three basic requisites for a good collection system. In essence, the program aims to strengthen the collection base by increasing the reliability of NIA service delivery, thus making the clientele capable and willing to pay their obligations. A package of rewards and punishments is designed to provide incentives for farmers to pay, and to prevent nonpaying farmers from continuing their practice. A practical, simple, and efficient billing and collection machinery is also intended to lend itself to easy monitoring and checking for both accomplishments and discrepancies. While the plan to implement initially this program in the Angat-Maasim River Irrigation System on a pilot basis did not materialize, a number of the recommended actions in the program have been adopted by management for implementation.

For pump irrigation systems, NIA launched the Farmer Irrigator Organizing Project in 1982 with the farmers themselves as organizers. The main goals of this Project are to reduce O&M costs and to increase rates of irrigation service fee collection. Reduction in O&M costs was expected to be effected by the Irrigators' Association doing the O&M work of cleaning canals, distributing irrigation water, and collecting irrigation service fees. The NIA management decided to carry out a pilot implementation of the Farmer Irrigator Organizing Project in some selected areas of the Angat-Maasim River Irrigation System and PGRIS. These areas involved pump irrigation systems where the funds collected from irrigation service fees were 33 percent below O&M expenses.

The status report and impact assessment of the Fanner Irrigator Organizing Project after a 20-month implementation period showed that cropping intensities of areas in this Project increased from 157 percent in 1982 to 175 percent in 1984. Collection efficiency increased from 56 percent in 1982 to 71 percent in 1984. Aggregate O&M expenses in the Project areas declined by about 18 percent. These changes resulted in these areas being transformed from a nonviable status (0.61 viability index in 1982), to a viable status (1.32 viability index in 1982)[4].

[4]The viability index combines information on the performance of the system in terms of cropping intensity for the area programmed for irrigation with information on actual physical accomplishments relative to planned accomplishments.

Four Irrigators' Associations in pump irrigation systems have entered into contracts with NIA for the assumption of O&M responsibilities. Three types of contractual arrangements have emerged:

a) The association assumes lull responsibility for the system's O&M, including maintenance. waterdistrihutinn, and fee collection activities, and shoulders the corresponding O&M expenses such as power cost, transmission line maintenance cost, salaries, wages of the pump operator, and othcn. In addition, the association gives NIA a token payment of 25 kg (1/2 cavan) of rice per hectare per year for 25 years.

b) The association participates in all O&M activities. O&M expenses are subtracted from the total fees collected, and any excess is shared equally by NIA and the irrigators' association. If there is a deficit. the fee lor the subsequent cropping seasons is adjusted accordingly.

c) Another joint management contracl formulated quite differently is one where a fixed rate of P92. ha, season is charged by NIA to cover O&M expenses. If the total fee collection exceeds this amount, the excess income is shared equally between NIA and the association. If there is a deficit the association undertakes to reimburse NIA for the deficit.

Collection costs. The total expenses incurred in the collection of irrigation fees from 1982-1985 in national irrigation systems are given in Table 5.30. The expenses incurred on a per hectare basis have increased by 27 percent over the past four years. This collection expense of about P14/ha of service area (or P18/ha irrigated) is roughly 8 percent of the average collections in 1984 (see Table 5.29). and 5 percent of the average assessment (see Table 5.26).

Table 5.30. Total expenses incurred in the collection of irrigation fees in national irrigation systems. 19x2-1985.

Year	Collection expenses ('000 pesos)	Incentives/ bonuses ('000 pesos)	Personnel expenses[a] ('000 pesos)	Total expenses	
				('000 pesos)	(P/ha)
1982	1169	335	3936	5440	11
1983	1944	680	4282	6905	13
1984	2549	793	4358	7700	14
1985[b]	2421	869	4358	7648	14

[a]Personnel expenses are based on a personnel density of one billing clerk per 3,700 ha of service area and one bill collector per 7,400 ha of service area, both with an average gross salary of P1,600 per month, 1982-85.

[b]Based on the estimated budget for 1985 and the same service area as in 1984.

Source: National Irrigation Administration (1985a).

Personnel expenses average about 60 percent of the total collection expenses incurred. Though the salaries of the water management technicians and ditchtenden deputized to collect irrigation fees are not included under personnel expenses, the incentives and bonuses they received are included

Indirect Methods

Secondary income of NIA. Income earned by an irrigation agency from sources other than charges paid by the water users may be termed secondary income. NIA earns secondary income from equipment rental, from interest on construction funds held on deposit, and from management fees which it charges to supervise construction of foreign-funded systems. The total amount of such income greatly exceeds the revenues derived from irrigation service fees (Table 5.31); however, much of this income is derived from, and spent on, new construction, and is therefore not available to finance O&M expenditures. The approximate percentage of O&M expenditures financed by irrigation service fee collections was 54 percent in 1982, 72 percent in 1983 and 75 percent in 1984 (Table 5.29). By implication, the remaining portions were financed from NIA's secondary income.

Table 5.31. Income of the National Irrigation Administration by source, 1983 and 1984.

Source	1983		1984	
	Million pesos	Percent total	Million pesos	Percent total
Irrigation service fees	72.7	22.2	100.8	23.3
Other operating and service income	134.5	41.0	128.6	29.7
Income from investments	98.3	30.0	175.9	40.7
Miscellaneous income	12.6	3.8	11.1	2.6
Sale of assets	9.6	2.9	8.9	2.1
Grants	0.3	0.1	7.1	1.6
Total	328.0	100.0	412.4	100.0

Source: Japan International Cooperation Agency (1984), Annual Audit Report on NIA for 1984.

Real property taxation. Local governments in the provinces. cities, and municipalities receive a significant portion of their fund requirements and operational needs from the real property tax which they are permitted to levy. This tax is imposed on all real property including land, building. machinery, and other improvements attached or affixed to real property. The real property tax is an *ad valorem* tax based on the value of the property. Real property is classified for assessment purposes on the basis of actual use. A percentage assessment level is applied to the market value to determine the taxable or assessed value of the property. The market values used for assessment purposes are supposed to be revised every three years.

In addition to the basic real property tax. there are special levies on real property. The Real Property Tax Code authorizes the imposition and collection of the following:

a) a one percent annual real property tax for the Special Education Fund created under Republic Act No. 5447;

b) an *ad valorem* tax on idle lands at the rate of five percent per year based on the assessed value of the property;

c) a special levy on lands benefited by public improvements financed by local governments, not exceeding 60 percent of the costs of these improvements; and

d) a special levy on lands benefited by public works projects financed by the national government, not exceeding 60 percent of their cost. The national government, through the Minister of Finance may, by Ministry Order issued for the purpose, provide for the imposition and collection of this special levy. In this case, however, the tax shall be collected by the local government treasurers who shall remit their collections to the national treasurer in accordance with the rules and regulations issued by the Minister of Finance for its implementation.

Detailed data to permit an evaluation of the extent to which irrigation has increased revenues derived from property taxes are not available; however. data on the valuation of irrigated and nonirrigated rice land in several municipalities in four provinces suggest that the impact of irrigation on these revenues is very low. The range of the difference in the reported market values between irrigated and nonirrigated land was P500-8,000/ha. Considering that assessed values of agricultural land are only 40 percent of the market values, and that the maximum tax rate is 0.5 percent of the assessed value, the implied maximum increase in regular property tax revenues due to irrigation is only between P1.0 and P16.0/ha per year. The provision for the imposition of an additional tax (effectively a betterment levy) through the "special levy on lands especially benefited by public *works* projects" is a possible alternative method that could he used to recover some of the investment cost of irrigation infrastructure. It is not clear whether this type of tax has ever been imposed on newly irrigated areas.

Taxes on Business

There arc a number of national and local business taxes which may increase due to the increased volume of business activity resulting from the additional production brought about by irrigation; however. it would hc very difficult to quantify the effect of irrigation on these tax revenues. Grain wholesalers, retailen, and millers have to pay a tax based on their gross annual sales during the preceding year. Operators or owners of rice or corn mills are also subjected to an annual graduated fixed tax hased on total capacity per machine. In addition, the National Food Authority requires payment of application, license, and registration fees for the following activities in the grains industry: retailing. wholesaling. threshing, corn shelling. processing and manufacturing, exporting, importing, indenting. warehousing, milling, and grains packaging.

RELATIVE CONTRIBUTION OF FARMERS TO IRRIGATION FINANCING

As has been indicated in previous sections of this report, the aggregate level of contribution of farmers to irrigation financing in national irrigation systems is less than the O&M costs. There is, thus, no aggregate contribution to the capital cost of irrigation. On the other hand, it has also been noted that there is considerable variability among regions of the country, and among individual systems, in the amount which farmers pay relative to the O&M costs. If one were to consider an analysis on a

system-by-system basis, one could conclude that in some systems farmers are paying for a portion of the capital costs. The implication of this, when combined with the fact that at the national level there is no aggregate farmer contribution to capital costs of irrigation, is that farmers in some irrigation systems effectively subsidize the O&M costs of other systems.

For communal irrigation systems, farmers and their organizations have complete physical and financial responsibility for O&M. In addition, they are required to make payments designed to recover, over a 50-year period at no interest, the portion of the capital cost that was provided by NIA for the initial construction of the facilities. This policy thus provides for the farmers of communal irrigation systems to make some contribution towards capital recovery, although the effective subsidy (through the long-term interest-free loan to the farmers) is high.

EVALUATION OF FINANCING POLICIES

Efficiency in Water Use

The methods of irrigation financing used in the Philippines provide virtually no direct incentives for individual farmers to increase their efficiency of water use. A possible exception involves the distinction that is made in the irrigation service fee between land cropped to rice and land producing other ("upland") crops. A farmer growing the latter pays only 60 percent of the fee charged from a farmer producing rice. Although this may have some effect on a farmer's cropping decision, the fact that there is almost no upland crop production within the Philippine irrigation systems suggests that now any efficiency effect that this policy may have is inconsequential.

Efficiency of water use in the Philippines is thus related more to the effectiveness of NIA's control over the distribution of the supply of water within the irrigation system than to the control over the individual farmer's demand for water through any pricing mechanism. In many systems, this control is problematic, and the resulting water use efficiencies are low.

Efficiency in Investment

Until recently, there was little in the financing policies of the Philippines that would enhance the efficiency of investment decisions. Such decisions were made as part of an overall planning process that was not directly concerned with the levels of farmer payments for irrigation services. This has recently changed, as NIA has been asked to assume responsibility for foreign loans for irrigation investments. Considering that NIA is still facing the problem of how to generate enough funds to cover O&M, it is not clear that imposing an additional financial responsibility for capital investments would improve the quality of the investment decisions. It is possible that the result would be to encourage NIA to avoid undertaking new projects which involve foreign loans, regardless of the inherent desirability of the proposed investments. Such a response was considered in the analysis undertaken for the NIA Corporate Planning study (National Irrigation Administration 1984a). That analysis concluded, however, that the gains from such a strategy, in terms of NIA's reduced foreign

loan repayment obligations, would be more than offset by the reduction in its income from the management fees that it charges on capital outlays for new projects. The fact that undertaking new system construction generates a source of income (the management fees) which *can* be used to cover deficits in O&M suggests that current financial policies may influence investment decisions in ways that have little relationship to the economic efficiency of the investment.

Efficiency in Management

Financing policies in the Philippines have put increasing pressure on NIA to reduce the deficit which it encounters in its operation of irrigation systems. From NIA's perspective, this *can* be done either by increasing revenues or by decreasing expenditures. Given that NIA has not followed the undesirable strategy of reducing expenditures by drastically curtailing services and letting irrigation systems deteriorate, most of the options open to NIA involve placing greater responsibility on the farmers. This responsibility may be financial (increasing the rate of fee collection from farmers, or increasing the amount of the fees charged), or it may be physical (increasing the involvement of farmers in the actual O&M activities). NIA has followed both approaches, and in doing so, has found it necessary to provide the farmers with incentives to cooperate. *It* is recognized, for example, that farmers are unwilling to take over the operation of a system that is in such poor condition that satisfactory operation is not possible. It is also recognized that if farmers are expected *to* pay their irrigation fees, M A must provide a service which is satisfactory, not just from the perspective of NIA, hut from that of the farmers. Furthermore, by turning over the operation of portions of the systems to the farmers, it is probable that the real costs of O&M have been decreased, as farmers are likely to be able to undertake these activities at a lower cost than NIA. Although difficult *to* quantify, it appears that these developments have generally led to increased efficiency of irrigation management.

Income Distribution between the Public and Private Sectors

Irrigation clearly involves a net expenditure of public funds in the Philippines, as it does in most countries. In effect, none of the capital costs of irrigation investments are recovered, with the exception of the communal irrigation systems.

There is also a deficit between the amount of funds collected directly from farmers and the amount of recurrent expenditures incurred for O&M. This deficit, however, is modest, and could be decreased significantly with increased collection efficiencies of the irrigation service fees. In addition to the direct contributions of farmers to O&M expenditures, there are other sources of government revenues which have been increased as a result of the economic activity generated by irrigation. These include a land tax and various business taxes and fees. Data are insufficient to quantify the importance which irrigation has had on the revenues generated from these taxes.

Income Distribution within the Private Sector

The general subsidy of the capital costs of irrigation, and some of the O&M costs represents a transfer of income from taxpayers to the farmers in irrigated areas. In general, this implies a redistribution of

income from the urban population to the farmers. This is consistent with the policy of the government to increase farm incomes, especially in the light of the disparity between farm incomes and average non-farm incomes. On the other hand. to the extent that the subsidy to farmers of irrigated land reduces the funds available to the government for other rural development activities, these farmers are benefiting at the expense of farmers in rain-fed areas. Furthermore. to the extent that government price policies for rice and for agricultural inputs other than water, discriminate against fanners. this subsidy offsets what would otherwise be an income distribution bias against farmers and toward the urban sector.

REFERENCES

Asian Development Bank. 1983. Study of food demand and supply and related strategies for DMCs. Staff Position Paper - Regional TA No. 5116. Appendix 1. Manila the Philippines: Asian Development Bank.

Asian Development Bank. 1985. Key indicators of developing member countries of ADB, vol. I6 (April). Economics Office. Manila, the Philippines: Asian Development Bank.

Cablayan, Orlando M.; Palomares, Ramon S. 1986. The Philippines: Country paper on irrigation service fees. Paper presented at the Regional Seminar on Irrigation Service Fees, Asian Development Bank, Manila. the Philippines, July 1986.

Cruz, Ma. Concepcion J.: Siy, Robert Y., Jr. 1985. Issues in irrigation water management in the Philippines. Paper presented at the Center for Policy and Development Studies' Mini Workshop on Rice Policy. University of the Philippines at Los Banos. 3-4 January.

Cruz, Ma. Concepcion J.; Siy, Robert Y.. Jr.; Cruz, Wilfrido D. 1985. Issues in irrigation water management in the Philippines. Paper presented at Center for Policy and Development Studies' Workshop on Agricultural Policy, University of the Philippines at Los Banos, Los Banos, 3-4 May.

Cruz, V.C. 1979. The Philippines. In Asian Productivity Organization, Farm-Level Water Management in Selected Asian Countries: Report of a Multi-Country Study Mission, 12-28 June 1979. Tokyo. Japan: Asian Productivity Organization.

David. C. 1983. Economic policies on agricultural development. Integrative report presented at the Workshop on the studies for the PIDS and PCARRD research project on the Impact of Economic Policies on Agricultural Development. Tagaytay City. the Philippines, 25-26 March.

David. C.; Balisacan, A.M. 1982. An analysis of fertilizer policies in the Philippines. Staff Paper Series No. 82-1. Manila, the Philippines: Philippine Institute for Development Studies.

Economic Development Foundation, the Philippines. 1981. A study on appropriate levels of National Irrigation Administration irrigation fees. Manila. the Philippines.

Japan International Cooperation Agency. 1984. Feasibility study report on the improvement project of the operation and maintenance of national irrigation systems (Upper Pampanga River Integrated Irrigation System). No. 23: Appendices. Report prepared for National Irrigation Administration, Manila, the Philippines.

Moya, Piedad F. 1984. Farm level benefit of irrigation in the Libmanan-Cabusao Irrigation System. Paper presented at the Workshop to Review Selected Research to Increase Rice Production in the Bicol River Basin Area, Camarines Sur, June 1984.

Moya, Piedad F. 1985. A comparative economic analysis of different types of irrigation systems in Central Luzon, the Philippines. Pp 67-86 in T. Wickham (ed.), Irrigation Management: Research from Southeast Asia. Edited papers from the Conference on Investment Decisions to Further Develop and Make Use of Southeast Asia's Irrigation Resources held at Kampangsaen, Thailand, August 1981. New York, NY, USA: Agricultural Development Council.

NAS / National Economic and Development Authority Study On Low Income Groups. 1985

National Irrigation Administration. 1983. A case study report on the economic gains with both the irrigators' organization effort and the O&M turnover to the Irrigators' Associations of AMRIS Pump System. Manila, the Philippines.

National Irrigation Administration. 1970. Memorandum circular no. 46, series of 1970. Manila. the Philippines.

National Irrigation Administration. 1984. CORPLAN. **Manila,** the Philippines: National Irrigation Administration.

National lrrigation Administration. 1984a. The agricultural input loan: Irrigation study. Manila, the Philippines: Corporate Planning Staff.

National Irrigation Administration. 1984b. NIA-audited income-expense statements, 1979-83. In the National Irrigation Administration Annual Report, 1984. Manila, the Philippines.

National Irrigation Administration. 1984c. A Study on Selected **NIA** Operating Policies. Manila, the Philippines Corporate Planning Staff.

National Irrigation Administration. 1985a. Operation and Maintenance Study. Vol. II: Main Report. Study conducted for NIA by PRC Engineering Consultants Inc. of Colorado, USA, and Sycip, Gorres, Valayo and Co., Manila. Manila, the Philippines.

National Irrigation Administration. 1985b. Collection efficiency report

The Philippine Institute for Development Studies and the Philippine Council for Agricultural ar Resources Research and Development. 1982. Research project on the impact of economic polici on agricultural development. Tagaytay City, the Philippines: the Philippine Institute for Develo ment Studies and the Philippine Council for Agricultural and Resources Research and Develo ment. (see also entry under ***C.*** David 1983.)

Real Property Tax Code. 1974. Presidential Decree No. 464. promulgated on **20** May 1974. Manil the Philippines.

Sison, Jerome **F.;** Guino, R.A. 1984. An assessment of cost and performance of various types c irrigation systems in the Philippines. Final report submitted to the ADB for the Project Assessment c Food Demand and Supply Prospects and Related Strategies for Development Member Countries c the ADB. Manila the Philippines, 31 May.

Tagarino, R.N.: Torres, R.D. 1976. The pricing of irrigation water: A case study of the Philippine Upper Pampanga River Project. Los Banos, the Philippines: International Rice Research Institut

Tepora, E.V.; Caddarao. R.A.; Monge, **V.S.** 1984. Costs and returns of producing palay in th Philippines, 1983. Economic Research Report **No.** 8. Bureau of Agricultural Economics, Ministry c Agriculture and Food.

World Bank. 1982. The Philippines: Irrigation program review. Report no. **3545-PH.** Washingtor DC, USA: Country Projects Department, East **Asia** and Pacific Regional Office.

World Rank. 1984a. Social indicators data sheets. Economic Analysis and Projections Departmen Washington, DC, USA.

World Bank. 1984b. Agriculture in the Philippines: Issues in pricing policy. Vol. 1: Effects and **Issue** of Government Intervention. Washington, DC, USA.