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FINANCING IRRIGATION PROGRAMS IN THE PHILIPPINES

by

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ABSTRACT

An evaluation of existing irrigation water pricing policies of the National Irrigation Administration (NIA) of the Philippines is made focusing on the recent policy of the Philippine government of requiring NIA to recover the full costs of irrigation construction and operation. In this paper, we argue that such an approach to water charges is rational on the basis of increasing the pool of financial resources for new irrigation and rehabilitation of existing systems, spreading the benefits derived from public investments in irrigation, and providing incentives for more efficient use of water through greater water use accountability. However, this policy raises the question of whether there is, in fact, a case for subsidizing irrigation programs.

The declining priority for irrigation is reflected in the distribution of irrigation investments relative to the total national budget. This decreased from 5.4 percent in 1979 to 3.3 percent in 1983. In addition, fees collected from water users have remained low compared to the total costs of NIA operations. As a percentage of O&M costs, for example, irrigation fees fell short by as much as P35 per hectare in 1983.

The NIA charges a uniform irrigation fee of 100 kg/hectare in the wet season and 150 kg/hectare in the dry season. These rates, however, vary by system; for example, the Upper Pampanga River Project charges a higher rate of 125 kg/hectare and 175 kg/hectare in the wet and dry seasons, respectively, due to the larger cost of construction and O&M.

Since 1979 irrigation fees contributed about 20 to 30 percent of the yearly income of NIA. Collection rates have also improved from 68 percent in 1979 to over 70 percent in 1983. Several approaches are currently used by NIA to further improve collection rates, such as creation of monetary incentives to NIA personnel and farmers groups and enforcement of the "lateral turnover scheme".

We argue, however, that the problem is not low fee collection but whether such fees are justified. Part III suggests that since positive externalities arise from irrigation investments society must share in the recovery of cost.

We also propose that a distinction must be made between O&M costs which are long-term, and thereby capital-maintaining, and O&M costs which enter the current production cycle.

A practical alternative system of irrigation charges is proposed. The primary consideration should be the capacity-to-pay of water users since many irrigated farm households had incomes which were below the poverty threshold in 1984. The secondary consideration is sustaining current levels of irrigation operations by ensuring that enough funds are available for operating and maintaining existing irrigation systems. Water users should be charged the short-run O&M costs, and by making them pay for these costs, the additional advantage of making water users' associations accountable for maintaining the system facilities is achieved.

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I. Introduction

The need to sustain higher production levels, which have been promoted in part by the increased use of high yielding varieties (HYVs) and modern techniques of production, will create greater pressure for the Philippine government to expand the subsidy for irrigation development and improvement. However, current trends in the pattern and distribution of irrigation investments in the Philippines, and the drastic cutbacks in operating budgets, will have a substantial impact on the expansion of irrigation development activities in the future. These trends include: (1) the new requirement by the Finance Ministry to collect costs of construction and operation and maintenance (O&M) from water users; (2) the declining rate of expansion of target areas for new irrigation; (3) the substantial reduction in the share of irrigation in the national government budget; and (4) the increased emphasis on rehabilitation projects relative to new construction and on small-scale, communal projects compared to large-scale, national systems.

Two issues emerge from these trends. The first issue is related to increasing current collection rates through the improvement of water delivery. Since the present level of fee collection only covers less than 80 percent of actual O&M costs even improved collections will not suffice. Unless subsidies from the national government are forthcoming, NIA will need to reduce its total budget for O&M, but this will have trade-offs in terms of quality of service. New approaches will have to be devised and better institutional arrangements will be needed in improving collection efficiency.1/

The second issue directly concerns the role of government in expanding food production through subsidies for irrigation development. The recent policy of charging higher fees to be collec-

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ted from farmer participants in government irrigation projects has raised questions regarding both its practicability and justification.

The purpose of this paper is to evaluate current policies related to the financing of irrigation investments through irrigation water charges. A description of irrigation development in the Philippines in terms of types of irrigation systems, levels of investments and subsidies, and procedures for fee collection are discussed in Part II. In Part III an evaluation of the existing policies for water charges is made focusing on specific goals behind water pricing and redefining these goals in the context of national development objectives. Practical alternatives to the current water pricing policy and assessments of farmers' capacity-to-pay are then discussed in Part IV.

II. Investments in Irrigation and Policies for Water Charges

Current Status of Irrigation Development in the Philippines

Around 10 million hectares, or one-third of total land area in the Philippines, are considered to be suitable for cultivation. Around 70 percent of this area is currently used for the production of cereals, the major ones being rice and corn. The NIA estimates that 3.1 million hectares of the total cultivated area in the country are potentially irrigable, and at present, about 44 percent or 1.4 million hectares are already under irrigation (Siy, 1984).

There are two major types of irrigation systems in the Philippines: (1) national systems that are built, operated, and maintained by the NIA and (2) communal systems, which may have been built with NIA assistance but are operated and maintained entirely by water users groups. Pump irrigation, which draws water from rivers, main canals, or shallow wells, is sometimes used within national system projects or are classified as communal systems. The national systems are usually over 1,000 hectares in size while communal systems are generally 50 to 500 hectares.

Of the estimated 1.4 million hectares presently irrigated, 45 percent or 610,492 hectares are classified as national projects, 41 percent or 568,308 hectares are communal irrigation systems, and 14 percent or 191,394 hectares are using pump irrigation (NIA, 1982). As of 1984 the NIA managed the operation and maintenance of 128 national irrigation systems with a total service area of 559,000 hectares. An average of 18,000 hectares per year were irrigated in the period 1965 to 1971. The largest investments in new construction occurred during 1972 to 1980 when total irrigated area was expanded by 583,000 hectares, or an annual increase in irrigated area of 65,000 hectares. However, in 1981 NIA's contribution to new irrigated hectarage was reduced

to 47,800 hectares.

The trend of declining priority for irrigation is reflected in the distribution of irrigation investments as a proportion in the national budget from 1979 to 1983 (see Table 1). As can be gleaned from the table, the percentage share of irrigation investments declined from 5.4 percent in 1979 to 3.3 percent in 1983. As a consequence of declining funds for irrigation development, both donor agencies and the NIA have agreed that irrigation investments would be more cost effective if rehabilitation is emphasized over new construction. In recent years, NIA has in fact adopted this direction in response to budget cuts. In 1984, for example, the generation of new areas for irrigation accounted for only 34 percent and 53 percent of the new area targetted under national systems and communal systems, respectively. Much of NIA's efforts shifted towards rehabilitation of existing projects. Table 2 contains the accomplishment targets for the agency for all types of projects for the period 1982-1983 and 1989-1990.2/

Funding for Irrigation Development and Operations

External Funds. The various activities of NIA are financed from several different sources: equity contributions from the national government, loans and grants from international agencies, collection of irrigation service fees, amortization payments from construction loans, and payments from the sale or rental of equipment.3/

The equity contribution from the national government is P10 billion per year but only 7.6 percent of this annual capitalization was released in 1983. A substantial drop in equity of P205 million (or 2 percent) occurred in the following year, or a decline of 76 percent.4/ In 1984 the operating income of NIA reached P431.3 million, about 23 percent or P98.9 million of which came from the payment of irrigation fees.

Foreign loans are the largest source of funds for irrigation projects both in the conduct of feasibility and technical appraisal and in the construction of main headworks and conveyance structures. The total income of the agency from foreign sources amounted to P1.08 billion in 1984 or 66 percent of the total NIA budget for that year (see Table 3).

NIA-Generated Revenues. Since 1979 revenues generated from NIA activities have contributed about 20 to 30 percent of the yearly budget of NIA. Total revenues in 1984 reached P431 million or 26 percent of the P1.6 billion budget of NIA (refer to Table 3).

The income collected from water charges accounted for 23 percent of revenues in 1984. The amount of fees collected is low when compared to the total NIA investment. For example, the total cost of construction, rehabilitation, and improvement of

Table 1. - Share of Irrigation in the National Budget, 1979-1983 (in billion pesos)

Year	Total National Budget 1/	Total Investment in Irrigation	Percentage Share of Irrigation in National Budget (%)
1979	34.3	1.86	5.4
1980	39.8	1.71	4.3
1981	54.9	1.78	3.2
1982	59.7	2.04	3.4
1983	61.8	2.08 2/	3.3

Source:
1/ National Economic and Development Authority, Philippine Statistical Yearbook
2/ National Irrigation Administration, Annual Report 1983.

Table 2. Actual and Projected Irrigation Development for Different Types of Systems, 1982-83 and 1989-90 (in thousand hectares)

	NATIONAL SYSTEMS		COMMUNAL AND PUMP SYSTEMS	TOTAL
	Diversion	Reservoir		
ACTUAL (1982-83)				
Service Area	343.4	162.6	813.6	1,319.6
Irrigated Area:				
Total	423.2	279.1	1,047.0	1,749.3
Wet Season	241.7	146.3	595.3	983.3
Dry Season	181.5	132.8	451.7	766.0
Percent Area Coverage	62	86	64	
PROPOSED (1989-90)				
Service Area	605.8	202.7	937.5	1,746.0
Irrigated Area:				
Total	739.1	324.4	1,198.1	2,261.6
Wet Season	430.1	162.2	683.2	1,275.5
Dry Season	309.0	162.2	514.9	986.1
Percent Area Coverage	61	80	64	65

Source: National Irrigation Administration, Corporate Plan, 1983-1998.

Table 3. National Irrigation Administration (NIA) Budget (CY 1984)

A. Total Funds Allocated From:	Amount in (in thousand pesos)	Percent
1. General Appropriations		
Corporate Equity	205,000	12.5
Communal Irrigation Program	88,200	5.4
2. NIA Operating Income	255,000	15.5
3. Foreign Loans	1,088,981	66.6
	1,644,019	100.0
B. Total Expenditures		
1. Current Operating Expenses		
Personal Services	192,000	11.7
Operating expenses	62,000	3.8
2. Capital Expenses		
Foreign Loan/Assisted Projects	1,263,031	76.8
Locally Funded Projects	126,988	7.7
	1,644.019	100.0

Source: National Irrigation Administration Annual Report 1984.

irrigation systems in 1984 was P1.18 billion, but total fees collected were only P98.9 million, or a capital cost recovery rate of only 8.4 percent (NIA, 1984a).

Collection rates with respect to fund releases for O&M, however, have improved, accounting for 68 percent of total funds allocated for irrigation in 1979 to 72 percent in 1983 inspite of the drop in collection rates in 1981 and 1982 (see Table 4). The low collection rate in 1982 resulted in a deficit of P42/hectare for O&M expenditures. In 1983 the shortfall in O&M costs was about P35/hectare (NIA, 1985).

Irrigation Water Charges

Prior to the creation of NIA as a semi-autonomous government corporation in 1963, irrigation water fees were collected by the Irrigation Division of the Bureau of Public Works (BPW) for all types of irrigation systems. In 1952, fee collection in small, communal systems and pump projects was undertaken by the newly organized Irrigation Service Unit (ISU) of the Department of Agriculture and Natural Resources. The responsibility for fee collection was later transferred to NIA in 1966.5/

Irrigation Service Fees. A uniform rate of P12/hectare/year was collected from all water users from 1947 to 1964. The fee was increased in some newly opened national systems but the general increase in fees occurred in 1966 at a rate of P25/hectare in the wet season and P35/hectare in the dry season. Non-rice and corn lands paid P20/hectare.

The cash payments were converted to payments in kind starting in 1975 -- 100 kg/hectare in the wet season and 150 kg/hectare in the dry season for all types of systems. A higher rate of 175 kg/hectare was collected in irrigation systems located in Central and Northern Luzon and Mindoro to offset regional disparities in irrigation service (Siy, 1984).

For the non-rice and corn lands, comprising a small 4 percent of total irrigated area (20,557 hectares) in 1982, a lower fixed rate equivalent to three-fourths cavan or 37.5 kg/hectare was collected. Pump irrigation systems had an average fee of 250 kg/hectare (Cabanilla, 1984). Table 5 provides information on the actual amount of irrigation water charges for selected pump and gravity national systems by type of crop.

Cost Recovery. In general, the policies of NIA regarding water charges have been directed towards: (1) the recovery of full costs of O&M and (2) the return of the entire costs for construction of irrigation facilities. The Philippine government subsidizes interest payments on the loan and other incidental expenses associated with pre-construction activities (e.g., design and appraisal).

The fixed costs are discounted over a period of 50 years at interest rates of 8 and 12 percent per year. Table 6 contains an

Table 4 Operation and Maintenance Costs in National Irrigation Systems, 1979-1984

Year	Service Area (in thousand ha.)	Total O and M Fund Releases At the System Level (in-million pesos)			O and M Fund Releases Per Hectare	
		Personnel	Others	Total	Current Pesos	1984 Pesos 1/
1979	477.2	58.95	7.20	66.15	139	320
1980	472.0	76.70	9.05	85.75	182	364
1981	492.3	93.06	10.39	103.45	210	380
1982	508.6	93.76	14.38	108.14	213	355
1983	549.9	86.61	14.38	100.91	184	275
1984	559.4	103.57	28.78	132.35	237	237

1/ Current pesos converted to 1984 using Implicit GDP Deflator (ADB, 1985)

Source: National Irrigation Administration, (1985); as cited in Small, et al. (1986), Table A1.28, p.26

Table 5 Current Irrigation Water Charges For Selected Pump and National Systems for Rice and Annual Crops (in kgs./hectare)

System	Rice Crop			Annual Crops
	Wet Season	Dry Season	Third Crop	
Pump Systems:				
Bonga Pumps 1-3	400	600	600	-
Solana-Tuguegarao	400	600	600	-
Angat-Maasim	150	250	250	300
Libuanan-Cabusao	300	300	300	-
Central Luzon Groundwater	375	475	475	-
Cagayan	375	475	475	-
National Systems:				
Upper Pampanga	125	175	175	300
All Other Systems	100	150	150	250

Source: National Irrigation Administration (1985).

Table 6 Water Charges Covering Initial Construction Costs Amortized over 50 years (December, 1985).

Region/System	Annual Cost/Hectare Interest Rate:		Seasonal Cost in Cavans/Hectare (50 kg.=1 cav.)			
			Wet Season Interest Rate		Dry Season Interest Rate	
	8 %	12 %	8 %	12 %	8 %	12 %
I. Ilocos						
Laoag-Vintar	84.49	124.47	0.34	0.51	0.79	1.16
Pasuquin	11.95	17.60	0.05	0.07	0.12	0.17
Dingras	11.51	16.96	0.05	0.07	0.10	0.14
Sta. Maria-Burgos	-	-	-	-	-	-
Sta. Lucia-Candon	67.64	99.65	0.26	0.38	1.78	2.62
Tagudin	25.14	37.04	0.10	0.14	0.23	0.34
Amburayan	26.32	38.77	0.10	0.15	0.20	0.30
Masalip	243.28	358.38	1.01	1.49	1.32	1.95
II. Cagayan						
Abulog-Apayao	115.26	169.79	0.65	0.95	1.10	1.63
Banurbur	63.31	96.20	0.26	0.39	0.48	0.71
IV. Southern Tagalog						
Palico	154.47	227.55	0.62	0.92	0.80	1.18
Agos	90.74	133.67	0.36	0.53	0.57	0.84
Dumacaa	41.71	61.44	0.26	0.38	0.27	0.39
Hanagdong	24.77	36.49	0.11	0.16	0.17	0.25
V. Bicol						
Daet-Talisay	117.70	173.38	0.57	0.83	0.78	1.15
Mahaba-Nasisi	102.18	150.52	0.29	0.43	0.63	0.92
Ogsong	121.[illegible]4	179.19	0.08	0.12	0.75	0.16
Hibiga	32.98	48.46	0.03	0.04	0.20	0.30
Cagaygay	61.00	89.86	0.27	0.40	0.40	0.59
San Francisco	99.[illegible]2	147.20	0.46	0.67	0.72	1.06
VI. Western Visayas						
Pangiplan	66.82	98.43	0.61	0.89	0.81	1.19
Bago	101.05	148.86	0.59	0.86	0.79	1.16
Sibalom-San Jose	19.99	29.45	0.10	0.14	0.20	0.30
Aklan RIS	110.36	162.57	0.42	0.62	0.53	0.77

example of annual and seasonal costs for selected national systems throughout the country.

The average annual cost of construction (fixed cost) is P81.30/hectare and P119.76/hectare at 8 and 12 percent interest rates, respectively. This is equivalent to 0.39 cavans/hectare and 0.58 cavans/hectare in the wet season, respectively, for interest rates of 8 and 12 percent.

The average rehabilitation cost is P8,037/hectare at a yearly cost of P656.97/hectare at 8 percent interest rate and P967.80/hectare at 12 percent interest rate. These costs, when converted to cavans of rice, amount to 3.21 cavans/hectare (at 8% interest) and 4.74 cavans/hectare (at 12% interest) in the wet season and 4.94 cavans/hectare (at 8% interest) and 7.28 cavans/hectare (at 12% interest) in the dry season (see Table 7).

The O&M costs can be broken down into three major categories: (1) personnel expenditures, (2) energy costs associated with the operation of existing irrigation facilities, and (3) transaction or extension field costs (includes office maintenance, field visits, and supplies). In a survey of 32 national systems throughout the country conducted by NIA, the average O&M costs amounted to P261.70/hectare in 1984 or about 1.28 cavans/hectare in the wet season and 1.97 cavans/hectare in the dry season. The average cost for O&M in communal systems was only P67/hectare in the same year (Cruz, et al., 1986). On the other hand, O&M costs for pump systems are about 3 to 5 times higher than national and communal systems.

Table 8 provides actual O&M costs per hectare for the wet and dry season in the sample national systems surveyed by NIA in 1985. These costs are generally larger than the P150/hectare figure computed by Cabanilla (1984) for national gravity systems.

Fees for Water Rights. Additional fees for water rights have been collected starting in 1976 by the National Water Resources Council (NWRC), which is an autonomous agency in charge of the management of all water resources in the country.6/ The additional fees collected by NWRC correspond to charges for securing a legal right to water use, which is expressed in a specific duty of water as measured in liters per second per hectare (lps/hectare). A P100 application fee is paid in addition to the annual water rights fee of P0.50 for every liter per second withdrawal of water per hectare up to 30 liters. The fees increase as more water is withdrawn from the source -- P0.75/lps/hectare up to 50 lps and P1.00/lps/hectare for water use exceeding 50 lps. Total income of NWRC from water fees in 1982 was P0.31 million, which is significantly lower than the amount collected by NIA in the same year (Cruz, et al., 1986). A summary of irrigation-related water fees is presented in Figure 1.

Table 6 continued
page 2:

Region/System	Annual Cost/Hectare Interest Rate:		Seasonal Cost in Cavans/Hectare (50 kg.=1 cav.) Wet Season Interest Rate		Dry Season Interest Rate	
	8 %	12 %	8 %	12 %	8 %	12 %
VIII. Eastern Visayas						
Hindang Hilongos	96.45	142.08	0.37	0.54	0.47	0.70
Binahaan North	101.54	149.59	0.51	0.75	0.80	1.18
Binahaan South	96.17	141.67	0.48	0.71	0.76	1.12
Tibak Soong	37.47	55.19	0.19	0.28	0.30	0.44
Guinarona	161.63	238.10	0.81	1.19	1.28	1.86
IX. Southern Mindanao						
Salug	50.87	74.94	0.25	0.36	0.31	0.45
XII. Central Mindanao						
Libungan	55.57	81.87	0.25	0.37	0.41	0.60
Kabacan	89.37	131.65	0.47	0.69	0.59	0.88
ALL SYSTEMS	81.30	119.76	0.39	0.50	0.60	0.89

Source: NIA (1985)

Table 7 Water Charges Covering Rehabilitation Costs Amortized Over 50 Years (December, 1985)

Region/System	Annual Cost/Hectare Interest Rate:		Seasonal Cost in Cav/Hectare (1 cav.=50 kg.)			
			Wet Season Interest Rate:		Dry Season Interest Rate:	
	8 %	12 %	8 %	12 %	8 %	12 %
I. Ilocos						
Laoag-Vintar	1523.92	2244.91	6.20	9.13	14.17	20.87
Pasuquin	1385.19	2040.54	5.59	8.23	13.67	20.14
Dingras	595.46	877.18	2.44	3.60	5.07	7.47
Sta.Maria-Burgos	1187.97	1750.01	4.48	6.60	-	-
Sta.Lucia-Candon	587.19	965.00	2.25	3.31	15.43	22.73
Tagudin	539.76	795.14	2.08	3.06	4.95	7.30
Amburayan	657.14	968.05	2.60	3.83	5.11	7.52
Masalip	650.70	958.56	2.71	3.99	3.54	5.21
II. Cagayan						
Abulog-Apayao	512.94	755.61	2.08	4.24	4.92	7.24
Banurbur	397.19	585.11	1.60	2.36	2.94	4.33
IV. Southern Tagalog						
Palico	805.17	1186.11	3.26	4.80	4.19	6.17
Agos	642.34	946.25	2.57	3.78	4.02	5.92
Dumacaa	596.69	839.23	3.51	5.16	3.65	5.38
Hanagdong	413.58	609.25	1.80	2.65	2.81	4.14
V. Bicol						
Daet-Talisay	615.52	906.74	2.96	4.36	4.07	5.99
Mahaba-Nasisi	743.73	1095.60	2.14	3.15	4.56	6.72
Ogsong	1743.46	2568.32	1.17	1.72	10.71	15.78
Hiliga	809.91	1193.10	0.66	0.98	4.98	7.33
Cagaygay	708.73	1044.04	3.19	4.70	4.63	6.81
San Francisco	396.98	584.80	1.81	2.67	2.86	4.21

Table 7 continue
page 2

Region/System	Annual Cost/Hectare Interest Rate:		Seasonal Cost in Cav/Hectares (1 cav.=50 kg.)			
			Wet Season Interest Rate:		Dry Season Interest Rate:	
	8 %	12 %	8 %	12 %	8 %	12 %
VI. Western Visayas						
Pangiplan	302.24	445.24	2.74	4.03	3.64	5.37
Bago	176.77	240.40	1.02	1.51	1.37	2.02
Sibalom-San Jose	596.23	878.32	2.91	4.28	6.07	8.94
Aklan RIS	510.94	752.68	1.95	2.87	2.43	3.58
VIII. Eastern Visayas						
Hindang Hilongos	343.06	505.36	1.31	1.93	1.69	2.49
Binahaan North	721.74	1063.21	3.62	5.33	5.71	8.42
Binahaan South	3811.67	5615.03	19.13	28.18	30.13	44.39
Tibak Soong	872.18	1284.82	4.38	6.45	6.89	10.16
Guinarona	3143.93	4631.37	15.78	23.24	24.85	36.61
IX. Southern Mindanao						
Salug	1133.33	1640.06	5.37	7.91	6.72	9.91
XII. Central Mindanao						
Libungan	788.56	1161.65	3.55	5.23	5.80	8.54
Kabacan	423.36	623.67	2.28	3.25	2.78	4.09
ALL SYSTEMS	656.97	967.80	3.21	4.74	4.94	7.28

Source: NIA (1985)

Table 8 Water Charges Covering Operation and Maintenance Costs (December, 1985)

Sytem Name	Service Area	Actual O and M Cost Per Ha	Seasonal O and M Cost (Cav.Ha.) Wet Season	Dry Season
I. Laoag-Vintar	2377.00	570.00	2.32	5.30
Pasuquin	684.00	570.00	2.30	5.63
Dingras	1018.00	570.00	2.34	4.85
Sta.Maria-Burgos	959.00	293.00	1.11	NA
Sta.Lucia-Candon	1594.00	293.00	1.12	7.70
Tagudin	1409.00	293.00	1.13	2.69
Amburayan	3613.00	239.00	.95	1.86
Masalip	1512.00	345.00	1.44	1.88
II. Abulog-Apayao	10310.00	216.00	1.21	2.07
Banurbur	930.00	266.00	1.07	1.97
IV. Palico	852.00	465.00	1.88	2.42
Agos	1081.00	539.00	2.15	3.37
Dumacaa	2511.00	364.00	2.24	2.33
Hanagdong	264.00	364.00	1.58	2.47
V. Daet-Talisay	2917.00	279.00	1.34	1.84
Mahaba-Nasisi	1440.00	293.00	.84	1.80
Ogsong	336.00	293.00	.20	1.80
Hibiga	410.00	293.00	.24	1.80
Cagaycay	1927.00	232.00	1.04	1.51
San Francisco	586.00	816.00	3.73	5.87
VI. Pangiplan	1884.00	209.00	1.88	2.51
Bago	12700.00	170.00	.99	1.32
Sibalom-San Jose	4400.00	269.00	1.31	2.73
Aklan RIS	3916.00	326.00	1.24	1.55
VIII.Hindang-Hilongos	678.00	65.00	.25	.32
Binahaan North	1610.00	316.00	1.58	2.50
Binahaan South	850.00	316.00	1.59	2.50
Tibak Soong	1200.00	316.00	1.59	2.50
Guinarona	440.00	316.00	1.59	2.50
IX. Salug	5710.00	224.00	1.08	1.35
XII. Libungan	7840.00	203.00	.91	1.49
Kabacan	4951.00	200.00	1.04	1.31
ALL SYSTEMS	82909.00	261.70	1.28	1.97

Source: NIA (1985).

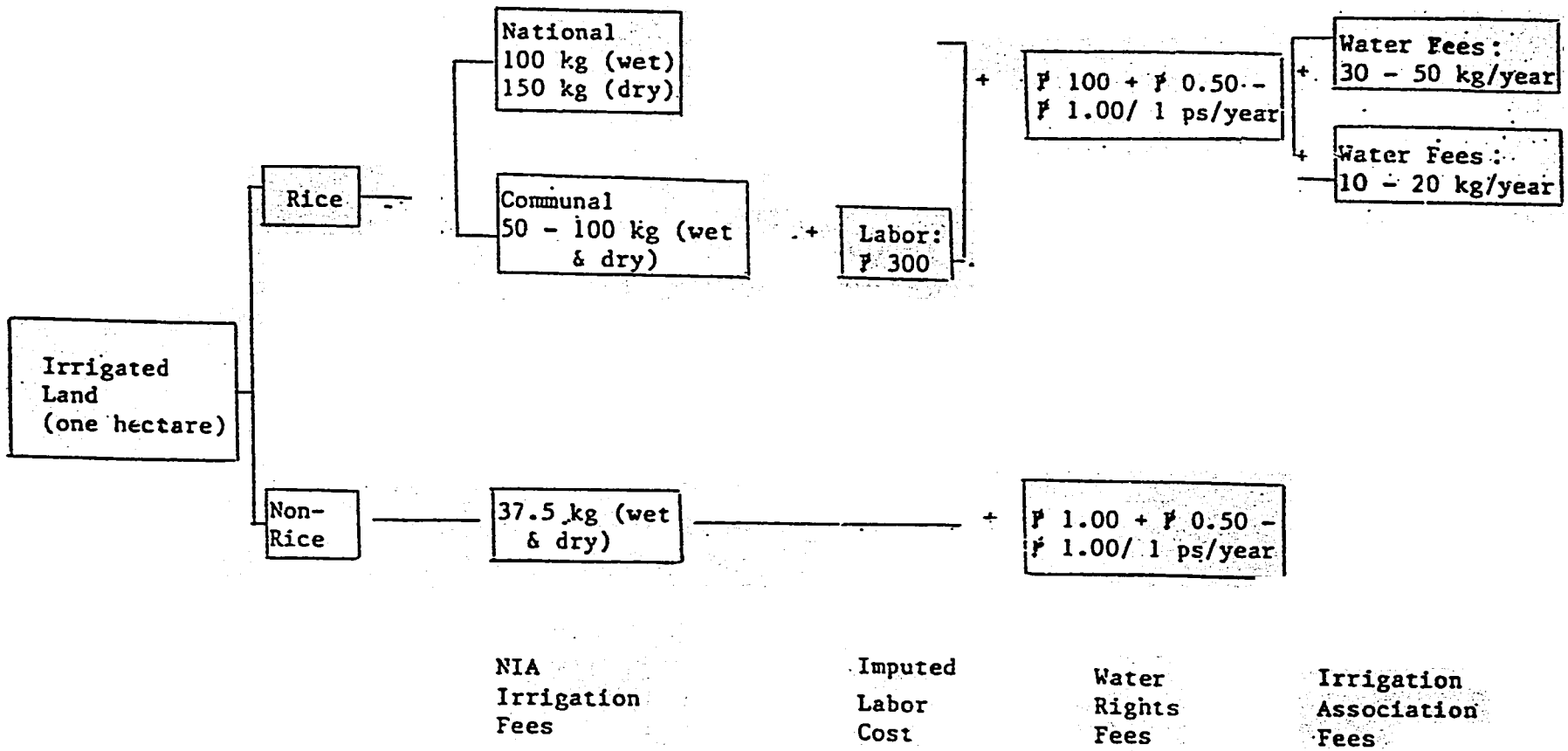

Figure 1. Irrigation Water Fees For One Hectare of Irrigated Land

Collection Rates

NIA's record of irrigation fee collection has improved from 50 percent of total collectibles in 1969 to over 66 percent in 1974. In 1975, however, when the rates were increased, the fee collection rate dropped to only 31 percent, although this has since increased to almost 70 percent of current collectibles in 1983 (NIA, 1984).

Galvez and associates (1979) estimated that about 40 percent collection rate was the minimum needed just for payment of salaries of NIA field personnel. The study attributes the low collection rates and cropping intensities to declining irrigation service efficiency. Based on the sample farms surveyed, deteriorated irrigation system capacity accounted for 41 percent of the variation in fee collection efficiency.

Other factors which explain the poor collection rates are: (1) the low paying capacity of farmers due to any or a combination of the following -- low price of paddy at harvest time, low yields, debts or rentals of land and interest on credit, high production costs, and crop damage; (2) the difficulty of bringing to court delinquent farmers in order to enforce collection; and (3) the attitude that still remains among a significant number of farmers that irrigation service is or should be free since it is being furnished by the government.

Thus, in order to further reduce deficits incurred in operating national systems, NIA has launched a program to convert small and financially marginal national systems into communal systems and, in effect, transfer total responsibility and ownership of these systems to water users' organizations.7/ NIA estimates that between 1983 and 1990, a total of 55 national systems with a total area of 31,360 hectares will be converted into communal systems. In support of this strategy, NIA is now developing and testing different approaches to building farmers capacities to take over the management of these systems.

NIA Collection Schemes. Several collection schemes are being tried out by NIA which have resulted in some degree of improvement in collection rates. One example is the incentive bonus which was devised in 1980 as a reward system for NIA personnel with collection rates exceeding 70 percent of the total collectibles. Under the incentive plan, a 10 percent and 15 percent bonus of the amount in excess of the 70 percent and 80 percent of the principal, respectively, is given to NIA personnel on a cash reward basis. In addition, the entire irrigation district is given a Viability Incentive Grant (VIG), which is a cash reward for units with incomes greater than expenses during a specified operating year.

Monetary incentives are also given to farmers groups that are able to assume responsibilities for the collection of water fees and the maintenance of system facilities. One arrangement, described as the "lateral turnover" scheme, envisions the compen-

sation of farmer groups for canal maintenance at a rate of P6,000/year for every 3.2 kms of canal. The traditional mode of canal maintenance has been for NIA to hire and pay a ditchtender to perform the necessary cleaning. The shift to a lateral turnover agreement reduces NIA costs for system maintenance and permits the irrigation association to raise some funds of its own. In addition, NIA offers the farmers' groups a special commission for reaching particular collection targets.

Another scheme which is being implemented in a small national system in the Bicol region entrusts the association with full responsibility for system maintenance. The association does not receive direct compensation but is entitled to a larger percentage of total collections. For example, the association can receive 35 percent of total collections for amounts within 50 percent of total collectibles. If the association is able to exceed a collection rate of 50 percent, it is entitled to 65 percent of anything it can collect beyond the target of 50 percent of collectibles.

Within pump systems that are managed by the NIA, a joint operation scheme has also been proposed. Under this scheme NIA operates and maintains the pumps while the farmers' association takes full responsibility for canal maintenance and water distribution. Farmers are required to pay the standard NIA rate for pump systems but the incentive for the farmers to improve collection efficiency is that the association will be entitled to 50 percent of the surplus of total collections over the expenses for operating the pumps. In the case of deficits, losses will be carried over in the next year.8/

III. Economic Considerations in Water Pricing

The efforts of the Philippine government in collecting fees for irrigation services are motivated by complex, sometimes conflicting, objectives. The common perception of these objectives for water pricing have been discussed primarily in terms of ensuring efficiency or reducing waste in the allocation of resources for irrigation and in the utilization itself of water supplies (marginal cost pricing). In Part II it was pointed out that the current goal of water pricing in the Philippines is the recovery of the costs incurred by the government for construction and O&M of irrigation systems. These two objectives will be discussed in detail, and it will be shown that, in fact, they both follow from an essentially irrigation-supply vs. benefit or demand perspective.

In addition to these goals which explicitly concern irrigation pricing approaches, the discussion is complicated by the fact that the irrigation development program itself is part of a much larger universe of government concerns which are primarily social benefit- or demand-oriented. These programs, emphasizing growth in food crop agriculture, are aimed at ensuring low food prices for a growing (and increasingly urban) population. Indeed

from this perspective, the fundamental approach for evaluation has to view the development and management of irrigation systems as part of a general program that includes, among others, land resettlement, promotion of new technologies, and subsidies for agricultural credit (see, for example, Hayami and Kikuchi:1978, ILO:1974).

In this section we review the economic bases for the marginal cost and cost recovery approaches to irrigation pricing in addressing the two specific goals above. We then expand the discussion to situate the issue of pricing within the context of agricultural development and the role of irrigation. This will establish the important implications of assessing benefits in a development context and the need for public finance and equity considerations in rationalizing the approach to irrigation charges for the Philippines.

Marginal Cost Pricing as Basis for Water Charges

The marginal cost approach presumes that the primary motivations for water allocations or for the irrigation service itself are based on efficiency considerations. The argument from economic theory is that the supply curve of water is derived from the cost of providing additional increments of water. Therefore given the demand for water, the fee (P2) should equal the marginal cost of providing that amount demanded (Carruthers and Clark, 1982). If the fee is less than this cost (P1), there will be inadequate supply; if the fee is greater than the cost (P3), there will be excess water supply as indicated in Figure 2.

From the short-run perspective (with infrastructure fixed), this approach disregards construction cost and looks at the pricing issue given the existing system capabilities. However, the interesting feature in investments for gravity irrigation is precisely that construction costs are such a disproportionately large component of total cost. It has even been argued that true short-run marginal cost is close to zero (Carruthers and Clark, 1982), the implication being that short-run marginal cost-based fees should then be very low. This means that marginal cost pricing techniques are of limited relevance if we are talking of the short-run, and this irrelevance goes beyond the usual issue of the problem of getting good water measurements. There is really no need to do volumetric measurements since the short-run marginal cost-based price will be very low anyway.

Another way of looking at this is that the economic pricing issue must be more directly concerned with the efficiency not of short-run marginal use of water but with the efficiency of constructing a system. After all, it should be clear that an irrigation system should be operated if so much cost has already gone into its construction. It should also be noted here that, for precision, we need to make a distinction between the water management convention of lumping costs into a construction category

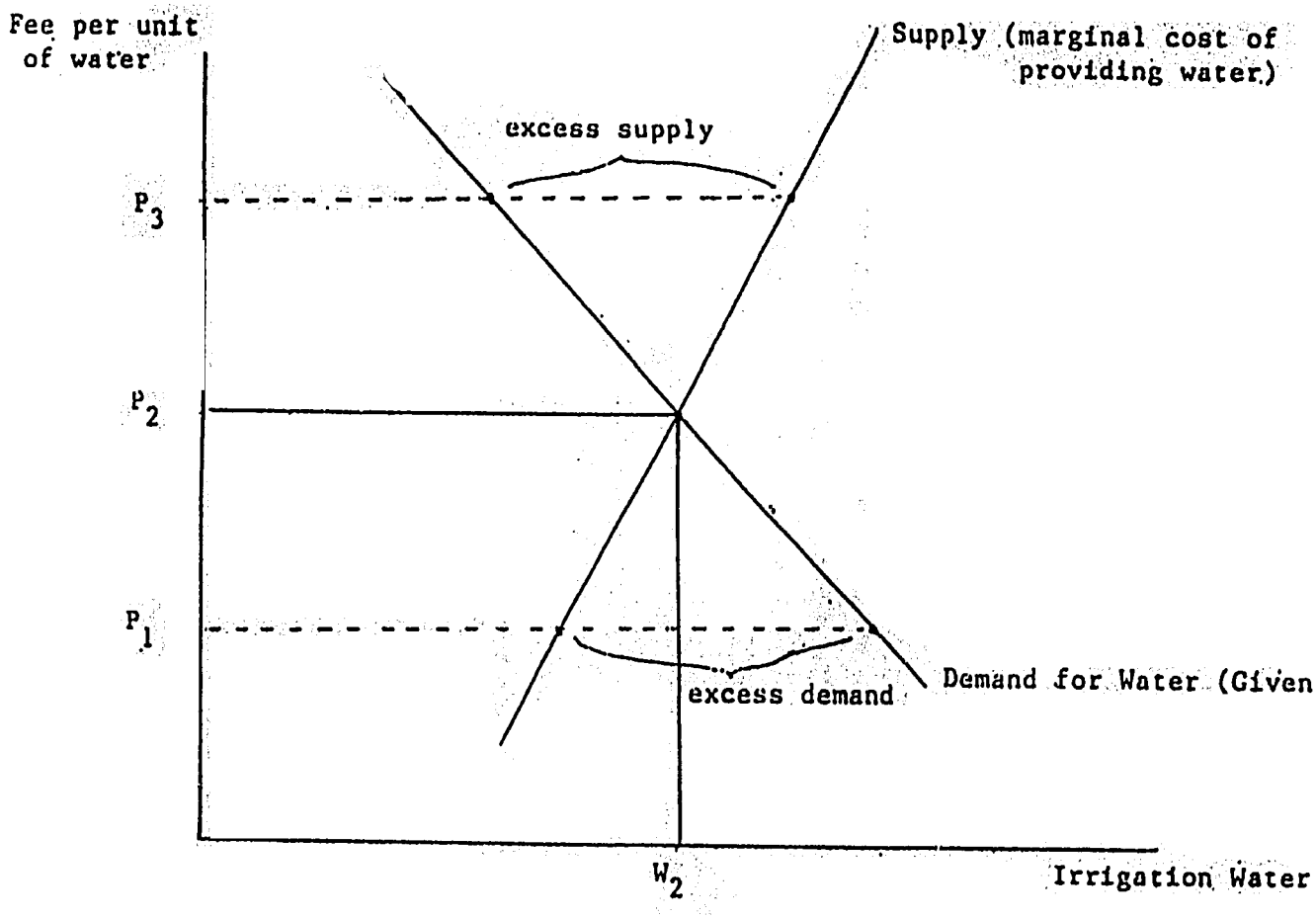

Figure 2. Marginal Cost Pricing of Irrigation water

vs. an O&M category. These categories are not directly comparable with the economic concepts of capital cost and variable (or operating) cost: construction and maintenance costs are part of the capital account and operating costs are limited to those that are incurred for the current production period. If we take this strict view, this further supports the contention that a very low nominal (or even zero) fee should be charged.

Since it is the construction cost component that is important then it is the long-term perspective that is useful in marginal cost pricing. The concern here is on the expansion of the irrigation network. A long-run marginal cost curve may be interpreted as the additional cost (with expenditures made on different years properly discounted) per hectare of irrigation facility. The long-run marginal cost curve may initially decline as economies of scale and learning-by-doing benefits are captured in the irrigation development program (e.g., Carruthers and Clark:1982, Easter, 1985; Taylor, 1979). Eventually, however, the long-run marginal cost will tend to increase as the ideal project sites are exhausted and the standard upward-sloping portion of this curve will be the relevant one on which to base the pricing of irrigation services.

Since the long-run marginal cost curve represents construction cost and since a pricing sytem based on this curve (with limited consideration of demand) has the goal of paying for such costs then we may conclude that the relevant marginal cost pricing approach is really similar to the cost recovery approach. Indeed part of our argument below will show that both approaches are essentially supply-side types of approaches while a more relevant fee system needs to explicitly incorporate demand- or benefit-side considerations.

Before proceeding to the discussion of demand-side issues, we need to clarify why, if long-run marginal cost pricing has really been followed, water charges in the Philippines tend to differ among irrigation systems. (This is not generally true in other countries where charges tend to follow one rate as discussed by Small, et al., 1986). The reason has to do with the financial perspective that the NIA is constrained to take, given the requirement that it recovers the cost of irrigation from its farmer clientele. Even if we can conceptualize a national long-run marginal cost curve, it is more reasonable to view the NIA as a multi-location agency. It determines the hectarage to develop per location based on site-specific long-run marginal cost curves and the demand for irrigation. The scale of operations is then chosen to minimize the average cost per hectare of irrigation development, and this is made the basis of cost recovery charges per location. It is therefore to be expected that the fees among systems will differ if a financial management perspective is required and actually applied. In countries where the fees do not significantly differ among systems, Carruthers and Clark (1982) correctly point out that social or political decisions dominate financial considerations (see also Wade, 1982; Small, et al., 1986).

Demand Side Considerations in Irrigation Pricing

The demand for the construction of irrigation systems may be defined in terms of the demand of farmers for a specific factor input. It may also be based on the demand for irrigation by government as a component of a general food production program. Hayami and Kikuchi (1978) have shown that this latter rôle, as a contributor to the over-all agricultural food production effort, has been dominant in motivating irrigation development policy in the Philippines. Major increases in irrigation investment in the Philippines are correlated with periods of rice shortages and high prices. Mangahas (1985) has argued that this is primarily part of an urban and a consumption bias in policy-making that emphasizes the need for low food prices. The implication here is that the stimulus for irrigation construction is for national or social benefits that go beyond the demand of farmer-irrigators.

The reason why irrigation development has become a key component of the food production program is quite clear. Hayami and Kikuchi (1978) point out that irrigation investments in the Philippines are induced by favorable returns to irrigation development in contrast to the limited potential of continuing agricultural expansion with the increasing scarcity of available land. Large returns to irrigation are made possible by the complementary availability of new rice technology and the increased utlization of fertilizers in rice production (see Table 9).

The government priority for food production should not imply that farmers have no demand or derive no benefit from irrigation development. Indeed to arrive at a practical basis for irrigation charges, we need to explicitly analyze the benefits of irrigation from the view of government or society in general and from the perspective of farmer-irrigators in particular.

The complication here, of course, is how to distinguish between private and social benefits from irrigation. Identifying private (farmer-irrigator) benefits is a straightforward procedure that is normally the subject of financial appraisal. Estimating indirect benefits (those benefits that go beyond what irrigator-beneficiaries capture) is much more difficult. These indirect benefits include gains from the marketing, processing, and consuming sectors, and they are usually referred to as positive externalities of a project. Increased employment in both the farm and non-farm sectors has also been documented in the Philippines as an indirect effect of irrigation development (ESIA-WID:1983). Bell and Hazell (1980), analyzing the indirect benefits from the Muda irrigation project in Malaysia, have concluded that such benefits are of the same range of magnitude as the direct benefits that go to farmer irrigators.

If we therefore expect that irrigation projects will be developed only on the basis of the farmer-irrigators' demand for

Table 9. Estimates of the Rates of Returns to Investments in Irrigation Construction and Land Opening, 1970 Constant Prices

	Irrigation 1/				Land Opening 2/	
	Traditional Varieties		HYV		Rice Case	Corn Case
	5N	15N	20N	60N		
Benefit/Cost Ratio:						
1949-53	2.5	2.6				
1953-57	2.3	2.4				
1958-62	1.8	1.9				
1963-67	1.9	1.9				
1968-72	1.6	1.7	3.1	3.4		
1970-74	1.4	1.5	2.9	3.1	0.9	1.3
Internal Rate of Return (%):						
1940-53	23	24				
1953-57	21	22				
1958-62	19	19				
1963-68	19	19				
1968-72	18	18	32	36		
1970-74	15	15	28	32	9	13

1/ Refers to NIA-system projects completed during the five years shown. 5N, 15N, 20N, and 60N refer to nitrogen inputs in kg. per hectare.

2/ Refers to government land resettlement projects completed in 1973. Rice case assumes one crop of upland rice planted in a newly-settled area. Corn case assumes two crops of corn planted in a newly settled area.

Source: Yujiro Hayami and Masao Kikuchi (1978), Table 1, page 72.

the service (and therefore willingness to pay fees), then less than the socially appropriate level of irrigation development will take place. The reason is that irrigators' demand (based only on their direct benefits for irrigation) will not include additional social demand (based on the positive externalities mentioned above).

Figure 3 illustrates the socially appropriate or optimal level of irrigation that can be provided. As discussed previously the supply curve of irrigated area is upward sloping due to the increasing cost of irrigation development. The demand curve for irrigation is based on the private benefits that irrigators can get from development, and this together with the supply curve, determine a private equilibrium level of irrigation development at H2 hectares with P2 as the development price.

However, because of positive externalities, social demand is much higher than private demand for irrigation. The dotted social demand curve includes the private irrigators' demand plus the demand arising from the benefits of positive externalities from irrigation. The socially optimal level of irrigation therefore is H3 hectares at a price P3. However, private users will only be willing to have irrigation development up to H3 if the price to them were P1. If forced to pay the price P3, they would reduce their demand for irrigation to H1. Thus the government must subsidize the amount (P3-P1)H3.

Obviously, if the government were not to provide this subsidy, users will not be willing to pay the amount charged (P3) for the particular supply of irrigation (H3). However, the problem is that irrigation systems, once constructed, assumes a public goods nature, which makes exclusion of some farmers for non-payment difficult. Hence, in practice, farmers will make use of the irrigation system, but the required price P3 cannot be enforced, giving the economic basis for the problem of low collection rate.

The direct implication of this discussion on setting up a fair and realistic irrigation fee scheme should be clear. The public finance perspective shows that since a project is justified on the basis of the broad assessments of social benefits and costs, and that at least some of those benefits are of the positive externalities type then the manner of actually paying for the project cannot be accomplished by trying to recover full cost only from the farmer-irrigators.

The ideal procedure in getting society to "pay" for having this project is through the taxation system. This means that all beneficiaries of a project are not to be charged for the full amount of specific costs incurred since these costs do not directly reflect social benefits. They are to be taxed for specific net benefits or net productivity improvements that they get with the project. In the case of farmer-irrigators, these benefits to be taxed correspond to increases in land rents that follow from improvements in land productivity due to the project.

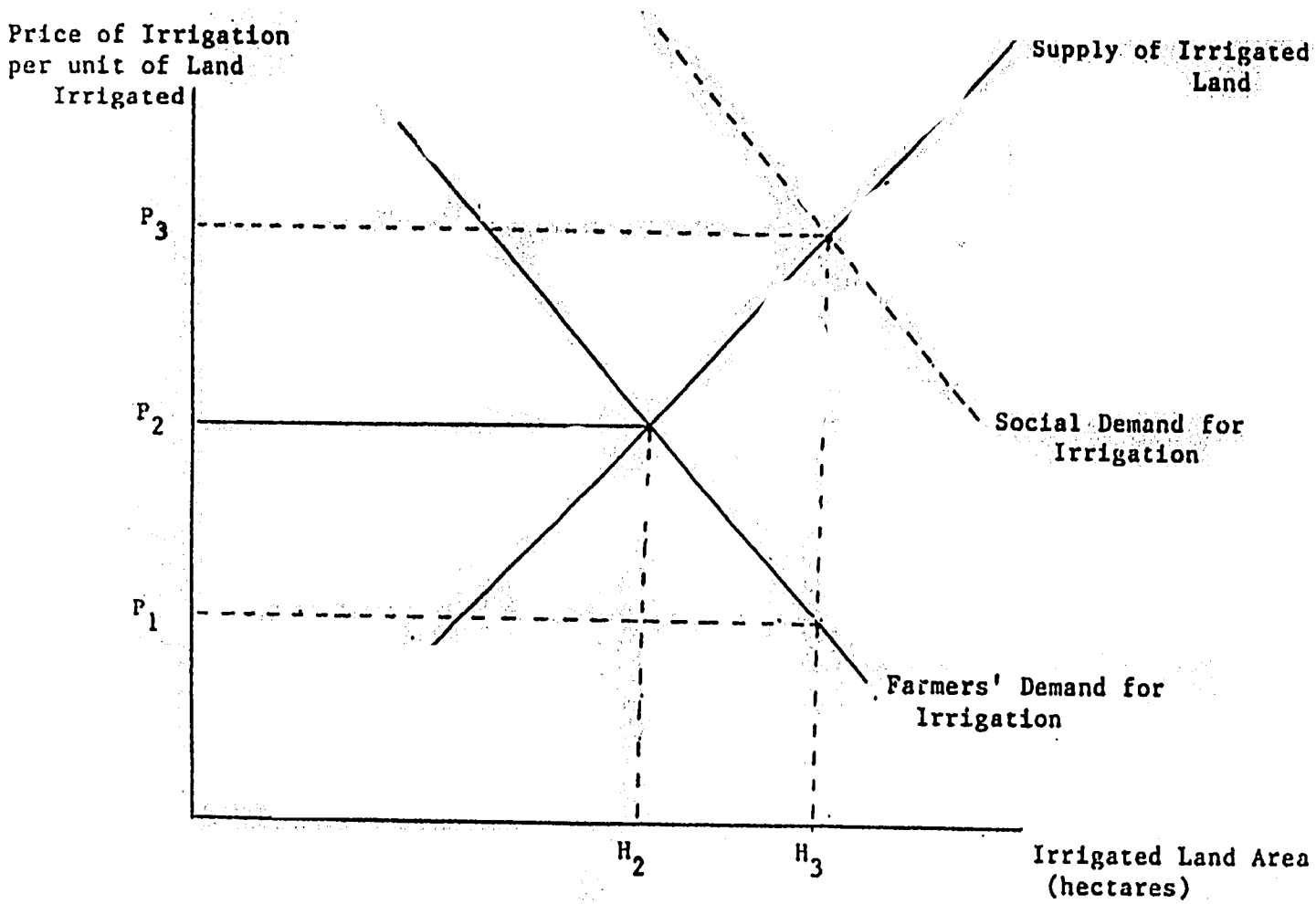

Figure 3. Social vs. Private Levels of Irrigation Development

Note that project beneficiaries in this class of development schemes will not generally be limited to actual irrigation system participants so that the base for taxation is much broader than the base for irrigation charges. This is only proper since, after all, the benefits of irrigation, spilling over into agricultural development, reach a far wider beneficiary group than the group of farmer-irrigators.

Also, since there are many indirect beneficiaries of an irrigation system (e.g., from agro-industrialists who get expanded business opportunities to urban consumers who receive lower prices), it would be unfair to have only the direct users bear the full burden of project costs. Finally, it is quite conceivable that the tax effort will be limited just to capturing enough of the gross benefit to have a viable repayment program for whatever loans were incurred for the project, with some net benefit for particular groups being left substantially untaxed. Of course, in cases where major income distributional goals motivate government programs, taxation of the better-off beneficiary groups may be expanded to the limit with the proceeds earmarked for redistribution (through subsidies) to specific groups.

IV. Practical Implications for Irrigation Charges

Explicitly incorporating demand or benefit-side considerations in the discussion of irrigation development provides a more realistic approach to the practical problem of determining systems and levels of charges. While the recognition that loan repayment forms part of the whole process of irrigation development is important, it does not follow that the direct beneficiaries of projects must be solely responsible for the full recovery of costs. This limited view corresponds with a financial perspective which a private developer takes when underwriting a private irrigation project.

In the Philippines this financial perspective has been applied by the NIA, given the government requirement that it covers all its capital and operating costs. The need for a public finance perspective in contrast to the financial perspective, however, highlights the importance of relaxing this NIA requirement. Indeed, there should be a clear policy that full cost recovery is not the responsibility of NIA, given that its management and supervisory scope does not encompass all the beneficiaries of irrigation development. Its proper scope is project administration or the construction and operation of irrigation projects. The function of public finance which negotiates and pays for the loan is a much broader one, requiring broad taxation as well as subsidy-granting powers, and this is usually taken to be within the purview of the Finance Ministry.

In practice, the NIA fee-collecting role should only be a component of a larger taxation (or subsidy) program associated

with irrigation development. Also, we submit that some of the equity-oriented approaches to other components of the agricultural development effort of the government should also be relevant for determining charges for irrigation.

For example, the research and development costs incurred for new agricultural technologies and for their dissemination are of the same nature as irrigation development costs in that they also contribute to agricultural food production and benefit a fairly wide spectrum of the economy. This is an interesting case of contrast since with the provision of the new food crop technologies the government has always taken a public goods approach: although farmers may be deemed the key beneficiaries, the cost of the program is supported from general government revenues because of the substantial social benefits that also arise from the program. If government should take this particular extreme of completely subsidizing the cost of new technologies, why should it take the other extreme of completely charging farmers for the full cost of irrigation development?

Part of the answer is due to different potentials for the identification and taxation of the beneficiaries of these programs. Beyond this problem, however, an important reason is that the equity aspect of development financing seems to have been disregarded in the case of irrigation. Combining this equity motive with the public finance approach that we have presented can form a sound and practical basis for a system of irrigation pricing.

Capacity-to-Pay as Primary Consideration. In such a system, the first test for the charging of fees should be farmers' capacity to pay. Although it has been presumed that owners of irrigated farms are generally better off than other farmers because of the higher yields that they get, in fact irrigated farms may be much smaller in hectarage. Total output and ability to support minimum household consumption needs may be limited by the small landsizes and inadequate land distribution (tenure) policies so that irrigated farms are not really that much better off (Quisumbing and Cruz, 1986; Mangahas, 1985).

Different calculations of net benefits from irrigation are available for the Philippines. A NIA (1985) survey of 32 national systems indicates an average net return above all costs of P2,369 and P2,589 per hectare for the wet and dry seasons, respectively (see Table 10). A similar figure is provided by Small and associates (1986) using indicative cost and return estimates for family owned resources. Based on their calculations the average net return from irrigation is P4,958/hectare for the entire year. Net returns for the wet and dry seasons are P2,884 and P2,765 per hectare, respectively.

The net returns using assumptions of full cost recovery were also made by Small, et al. (1986) for both low and high investment costs and an average O&M cost of P314/hectare. If water charges are increased so that 100 percent of capital and O&M

Table 10. Net Returns to Irrigated Rice Farming By Region, Wet and Dry Season, 1984

Region/Season	Production Cost (P/ha.)			Irrigation Fee (P/ha.)	Gross Returns (P/ha.)	Net Returns (P /ha.)	
	Cash/ Kind	Non-Cash	Total			Above Cash Cost	Above All Cost
I. Ilocos							
wet season	6336		6336	-	10227	3891	3891
dry season	3881	638	4519	-	6590	2709	2709
II. Cagayan							
wet season	2590	-	2590	210	5271	2681	2681
dry season	3455	-	3455	398	7258	3803	3803
IV. Southern Tagalog							
wet season	4987	-	4987	236	7898	2911	2911
dry season	4181	-	4181	285	6718	2537	2537
V. Bicol							
wet season	4344	-	4344	109	4849	505	505
dry season	4375	-	4375	181	5850	1475	1475
VI. Western Visayas							
wet season	5751	-	5751	75	7946	2195	2195
dry season	4795	-	4795	159	7233	2438	2438
VIII Eastern Visayas							
wet season	2585	-	2585	197	4765	2180	2180
dry season	2589	-	2589	236	5728	3139	3139
IX. Southern Mindanao							
wet season	5520	456	5976	-	9734	4214	3758
dry season	4332	-	4332	315	8917	4585	4585

Table 10. continued.
page 2

Region/Season	Production Cost (P/ha.)			Irrigation Fee (P/ha.)	Gross Returns (P/ha.)	Net Returns (P /ha.)	
	Cash/ Kind	Non- Cash	Total			Above Cash Cost	Above All Cost
XII. Central Mindanao							
wet season	5409	-	5409	-	8830	5421	5421
dry season	4339	-	4339	329	8998	4659	4659
ALL REGIONS							
wet season	4642	456	5098	161	7467	2825	2369
dry season	4285	638	4843	253	7432	3227	2589

Source: NIA (1985), Table 9, p. 22

costs are recovered, the net return from irrigated rice production decreases from P4,958 (using the current charge of 250 kg/hectare/year) to P3,942, assuming a low investment cost of $1,000/hectare. With a high investment cost of $2,500/hectare, the net return to water users is further reduced to P2,262/hectare.

The yearly income of water users of P4,000 to P5,000 is only slightly higher than the national poverty food threshold of P3,120/family and below the total threshold of P5,262/family (Abrera, 1976; Quisumbing and Cruz, 1986). The estimated net benefits for irrigated ricelands, assuming a full cost recovery scheme, will place family incomes within the bottom 30 percent income bracket for rural areas in 1984.

Table 11 compares capacity-to-pay estimates among irrigated rice farms with national poverty thresholds for the rural areas. In general, the poverty incidence rate for irrigated farms is slightly lower for all regions except for Ilocos and Cagayan where the poverty incidence rates for irrigated farms are higher than the average for the entire rural population. The differences in poverty incidence, however, are small so that it would be wrong to conclude that irrigated rice farmers are that much better off than their rural counterparts.

In fact, according to a 1985 NEDA survey, about 21 percent of the poorest (or bottom 30 percent) of families have irrigated farmlands (NEDA, 1985). Of the rice and corn farmers within this bottom group, those with irrigated lands comprise an even greater 32 percent. In terms of capacity to pay, about 92 percent of these low-income families consider their incomes to be inadequate even for basic necessities such as food expenditures (NEDA, 1985).

These figures indicate that policy-makers should not automatically presume that beneficiaries of irrigation projects can afford to pay higher water fees. Even in cases where there are clear additional benefits that these farmers receive from the project, for some of these farmers benefits may not be enough to bring them above the subsistence threshold level where new incomes will not just be consumed by priority requirements for food and other necessities.

As a practical matter then, the government cannot expect that irrigation fees will be paid if farmers get benefits from the system and if these benefits are at least equal to the fees. As long as the farm households are below required subsistence levels, any new income from improved farm productivity will be allocated first toward meeting basic food and other necessities. This means that capacity to pay considerations should take priority over the presence of benefits as the basis for irrigation fees.

In addition, even if we presume that basic subsistence needs have been attained, the level of irrigation fees should not

Table 11. Comparative Evaluation of Capacity-to-Pay As Measured By Net Benefits and Poverty Threshold

Region	Net Returns from Irrigated Rice 1/ Farming (₱ /ha.)		Poverty Line Per Family (in ₱)	Poverty Incidence (%)	
	₱ /ha.	Net Cash Income 2/		Rural Population 3/	Irrigated Rice Farms 1/
I. Ilocos	3380	8265	7464	37.6	42.3
II. Cagayan	3242	8316	7464	44.9	46.9
IV. Southern Tagalog	2724	7911	8448	47.0	33.5
V. Bicol	990	5863	7260	56.1	45.7
VI. Western Visayas	2317	6924	7656	49.4	49.8
VIII Eastern Visayas	2260	7016	7200	56.0	32.5
IX. Southern Mindanao	4172	9325	8124	41.2	38.5
XII. Central Mindanao	5048	10001	7332	28.4	22.3
ALL REGIONS	2479	7523	7716	47.5	48.1

1/ Based on a survey of 32 national irrigation systems.

2/ Net cash income = gross receipts less production costs (cash) for the entire household for one year.

3/ The estimated rural poverty line per family is ₱ 4,529.00

Source: National Irrigation Administration (1985) for columns (1), (2), and (5); World Bank (1985) for columns (3) and (4) as cited in Quisumbing and Cruz (1986).

necessarily attempt to capture all farmer benefits. The presence of substantial positive externalities or benefits that accrue to society in general argues for charges that can actually be significantly less than the construction cost recovery level. Other beneficiary groups can share in the cost. Also, from the income distribution viewpoint, the low variation in poverty incidence among rural occupations and subsectors reflects the complex nature of the Philippine agricultural situation. The predominance of small sized landholdings and the pervasiveness of tenancy will be important considerations if income distribution were to be achieved in the policy for water charges.

Although no direct quantification is available from Philippine data to establish the proportion of cost that should be charged to non-farmer beneficiaries of irrigation development, estimates of economic rates of return that are substantially larger than costs of loans (Hayami and Kikuchi, 1978) and findings from the Muda project in Malaysia (Bell and Hazell,1985) suggest that the current attempts in the Philippines for full cost charges from farmer-irrigators only represent an inequitable policy. This is especially so if we consider that the excessive charges on farmers mean that the much better-off marketing and urban consumer sectors are being subsidized.

To summarize, a practical and equitable financing approach cannot place the full burden for irrigation development on farmer-irrigators. The charges that should be levied on farmers should depend on capacity to pay since, from a pragmatic perspective, fees that cut into the farm households subsistence requirements cannot be collected. From an equity standpoint, even if there is farmer capacity to pay, the full benefits that accrue to him should not be completely taxed away through charges but should only cover short-run operating costs. By charging for the operating costs, farmers retain responsibility for sustaining the system. If this scheme is followed it should not be unreasonable to expect that the charges that NIA will have to levy on farmers will be quite small.

NOTES

1. New approaches to fee collection involving irrigation associations and changes in agency procedures are discussed extensively in Coward and Uphoff (1985).

2. The NIA was able to restore 73,260 hectares (or about 173%) of their 42,360 hectare goal for rehabilitation of national systems in 1981. Likewise, rehabilitation projects in communal systems reached 16,000 hectares or 133 percent of their 12,000 hectare goal for 1981. In 1982, the NIA was able to generate, through national systems projects, 72,426 hectares of new area or 67 percent of its target, but it restored or improved 53,918 hectares, which is 174 percent of its target for rehabilitation projects. Communal systems generated 26,634 hectares of existing systems. While they were able to meet 85 percent of their targets for generated areas under communals, they accomplished 90 oercent of their target for rehabilitation. This indicates a clear pattern of giving priority to rehabilitation projects in the allocation of resources.

3. In 1982, there was a significantly large 12 percent increase in the NIA budget, the increase in funds comprising project allocations for the completion of the massive Magat Multipurpose Project. The next year, the percentage increase in NIA's operating capital declined, signalling the start of the government's retrenchment policy.

4. The peso-US dollar exchange rate is currently about P20 to US $1.00.

5. The NIA is authorized "to charge and collect from beneficiaries of the water from all irrigation systems constructed by or under its administration, such fees or administration charges as may be necessary to cover the cost of operaion, maintenance, and insurance and to recover the cost of construction within a reasonable period of time to the extent consistent with government policy ..." (Republic Act No. 3601).

6. The water permit that is issued is for a specific duty of water and for rice irrigation the measurement is for one liter per second per hectare. Sandy soils are charged a higher fee.

7. The financially marginal systems are systems which would still incur deficits even at 100 percent collection rates. The priority systems for conversion are those with service areas of 1,000 hectares or less. Beginning in 1983, NIA plans to convert an average of 6 to 7 national systems each year into communal systems.

8. This scheme, however, has not been particularly attractive to farmers because pump systems have generally suffered deficits and cost of operating the pumps have been rising steadily.

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