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STUDY OF OPERATION AND MAINTENANCE
PROBLEMS IN IRRIGATION: THE
PHILIPPINE CASE

Case Study prepared for USAID by

Liborio S. Cabanilla. 1984

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INTRODUCTION

Throughout the seventies, irrigation development has comprised a significant component of the Philippine government's agricultural expenditure item (Table 1). This is because of the desire to attain self-sufficiency in rice.¹ Opening up new lands for rice cultivation, the traditional source of expanding rice production until the sixties has ceased because land frontiers are no longer available. Increasing land productivity through investments in irrigation has therefore become the main source of increasing rice production, not to mention the need for water to obtain the maximum benefits from the modern rice varieties.

In recent years however, the serious scarcity of financial resources in the economy has resulted in the slow down in the development of new projects. It has also dimmed the prospects

¹The significance of irrigation development can also be gleaned from the Philippine water code of 1976. See Appendix A.

Table 1. Distribution of national government expenditures on agriculture by type of policy instruments, 1955-1980 (₱ million, 1972 prices).

YEAR	PRICING AND MARKETING	IRRI- GATION	RESEARCH AND EXTENSION	SOCIAL DEVELOP- MENT	ENV'L MGT. AND CON- SERV'N
1955	-	43	37	3	39
1956	..	86	43	5	42
1957	-	92	45	20	48
1958	15	50	48	21	48
1959	29	20	60	10	47
1960	24	24	65	15	51
1961	16	27	70	14	55
1962	97	36	80	13	60
1963	155	32	87	19	62
1964	106	18	93	29	60
1965	54	21	98	33	59
1966	34	25	94	50	61
1967	33	40	89	57	77
1968	37	35	94	146	104
1969	28	39	97	156	116
1970	25	120	85	116	93
1971	30	187	90	123	94
1972	68	171	128	114	108
1973	83	411	242	190	96
1974	60	635	157	231	99
1975	46	382	231	233	149
1976	43	381	231	187	172
1977	35	864	247	302	137
1978	35	565	351	222	174
1979	27	417	332	265	197
1980			353	256	189

Source: David, C.
Economic Policies and Philippine Agriculture
PIDS working paper 83-02.

of rehabilitating old irrigation systems which already deteriorate rapidly² due to poor operation and maintenance.

This brings to light the importance of improving operation and maintenance of National Irrigation Systems (NIS).

This paper is an attempt to get a better understanding about the problems of operating and maintaining NIS. The methodology involved gathering information on two levels --- at the national level and at the system level. National level information were taken from secondary sources while system level information were generated through a survey of a few sample systems.

Composed of two main parts, the first deals with information at the national level and the second part presents information on some sample systems located in different regions of the country.

NATIONAL LEVEL INFORMATION

A. Types of Systems in the Philippines. There are two general types of irrigation systems in the Philippines --- the national irrigation systems and the communal irrigation systems (CIS). A third category, private irrigation systems (usually

²In a recent study, NIA appears to rehabilitate its systems every seven years. See NIA O & M phase II Report, PRC & SGV Consultants, January 1983, SGV Library.

pumps serving an area of 20-25 has.) also exists but it comprises a relatively small proportion of the total irrigated area.

Small pump project development has been the main pre-occupation of the Farming Systems Development Corporation (FSDC) until the late seventies. But in the eighties, FSDC's role in irrigation in the country shifted to the strengthening of farmers associations particularly those involving communal irrigation systems. Undertaken jointly with the NIA, this program is in pursuance to FSDC's rural development project through farmer's organization called Integrated Services Association (ISA).

Most of the NIS are concentrated in Luzon. It can be gleaned from figure 1 that around 73% of the total service area of the 127 NIS are located in Luzon. And, although not shown in the figure, the same distribution is true with CIS.

The National Irrigation Administration (NIA) has the sole responsibility of constructing, operating and maintaining the NIS most of which, are gravity type and with service area ranging from less than a thousand to over a hundred thousand hectares. Communal systems, usually less than 1,000 hectares on the other hand, are operated and maintained by farmers groups but in general, are constructed by NIA.

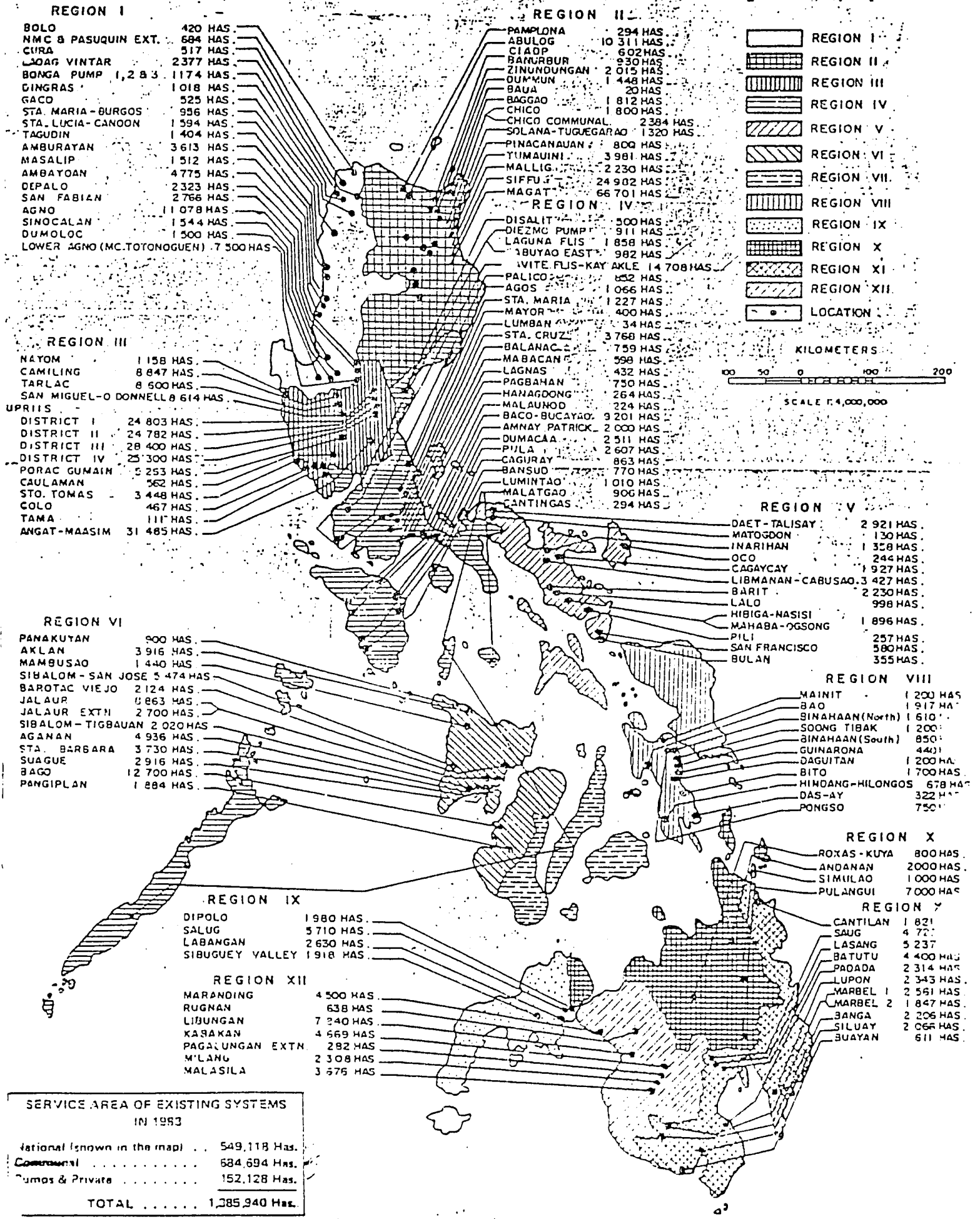
Established in 1964 NIA is the government agency which has the main responsibility to develop and manage water resource in the

country. Being a corporate entity, it is empowered to collect fees for its services, and also to negotiate loans with the foreign lending agencies to be used for irrigation development projects.

From the time NIA was established, the total service area of all types of irrigation systems increased by as much as 156 percent or 7.8 percent per year. In 1983, total service area of all systems was 1,385,940 has. while in 1964, it was 541,000 has. Forty percent of this area in 1983 is covered by NIS, 49 percent by CIS and 11 percent by private systems. The importance of CIS is likely to grow in the future as it has become the policy for NIA to convert all NIS less than 1000 has. into CIS.

B. Operating and Maintaining National Systems. Strictly speaking, the O & M activities of all NIS are undertaken by the respective systems personnel headed by an Irrigation Superintendent. But the planning and coordination of O & M activities at the national level are done by the Systems Management Department (SMD) of NIA. Among its important functions, SMD prepares annual financial requirements for the O & M of irrigation systems (see Appendix B). It also reviews plans and programs of work for operation, maintenance, repairs and improvement of NIS.

Figure 1. NATIONAL IRRIGATION SYSTEMS IN 1983



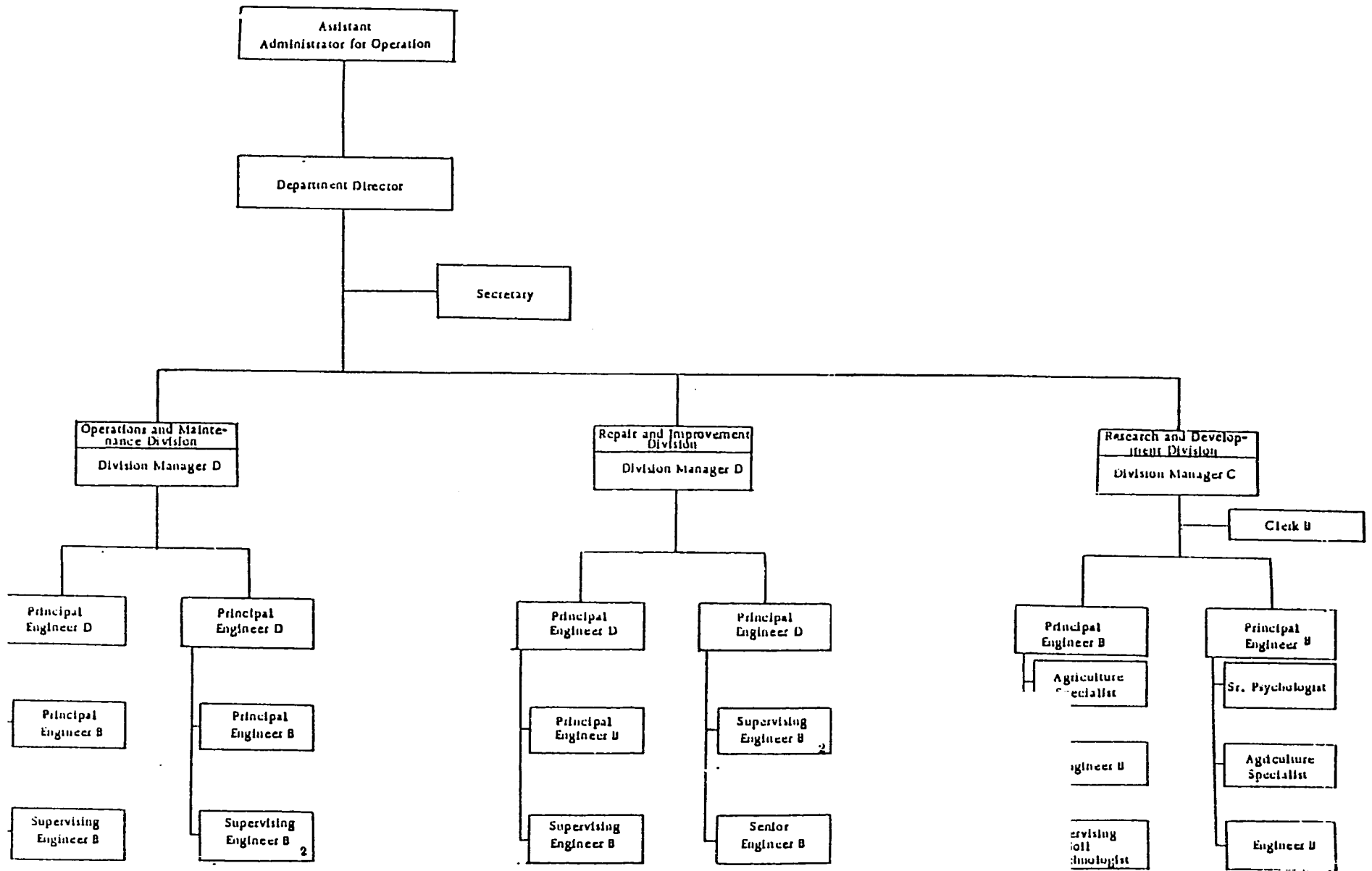
Under the leadership of a Department Director, who in turn is directly responsible to the Assistant Administrator for operations, the SMD is composed of three divisions -- each headed by a division manager. The O & M division is mainly responsible for reviewing plans and programs of work for operation and maintenance (see Chart 1 and Appendix B).

The twelve NIA regional offices provide the link between the central office in Manila and the irrigation systems within the region. Headed by a Regional Irrigation Director (RID), the Regional Irrigation Office is composed of six divisions among which, is the Operations Division (see Chart 2), mainly responsible for monitoring and evaluating the operations and maintenance of NIS within the region (see Appendix C).

Construction functions, the responsibility of the Engineering Division of the Regional Office (see Appendix D), are separate from O & M functions. At the system level, the O & M section (see Chart 3) of the office of the Irrigation Superintendent (IS) is responsible for the equitable and timely distribution of water to farms and also the maintenance of canals, structures and measuring devices. More specifically, it:

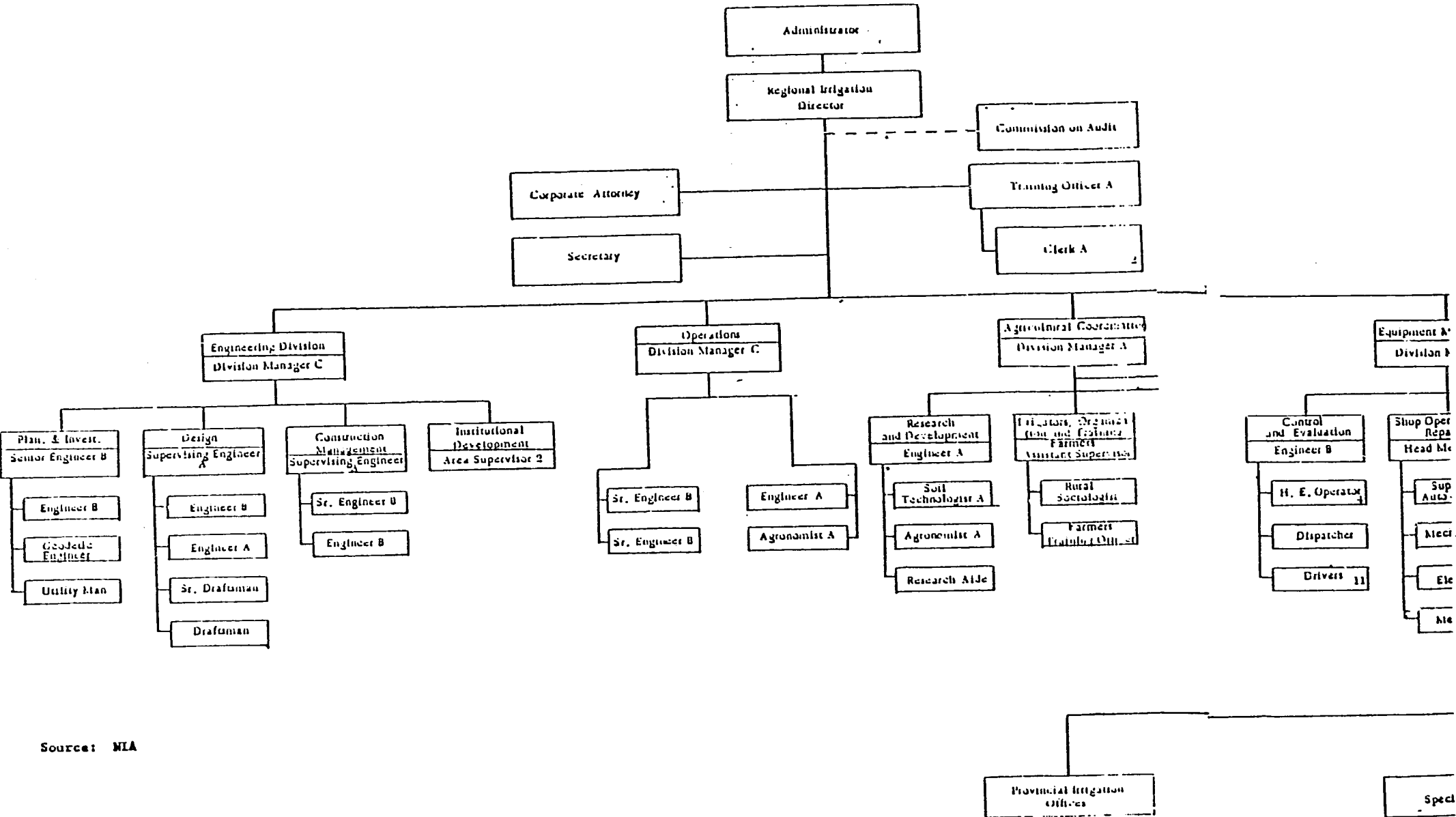
1. Develops cropping schedule and disseminates same to farmers,
2. Delivers water to farm lots and maintains records of water distribution,

CHART I
 EXISTING STAFFING CHART
 SYSTEMS MANAGEMENT DEPARTMENT



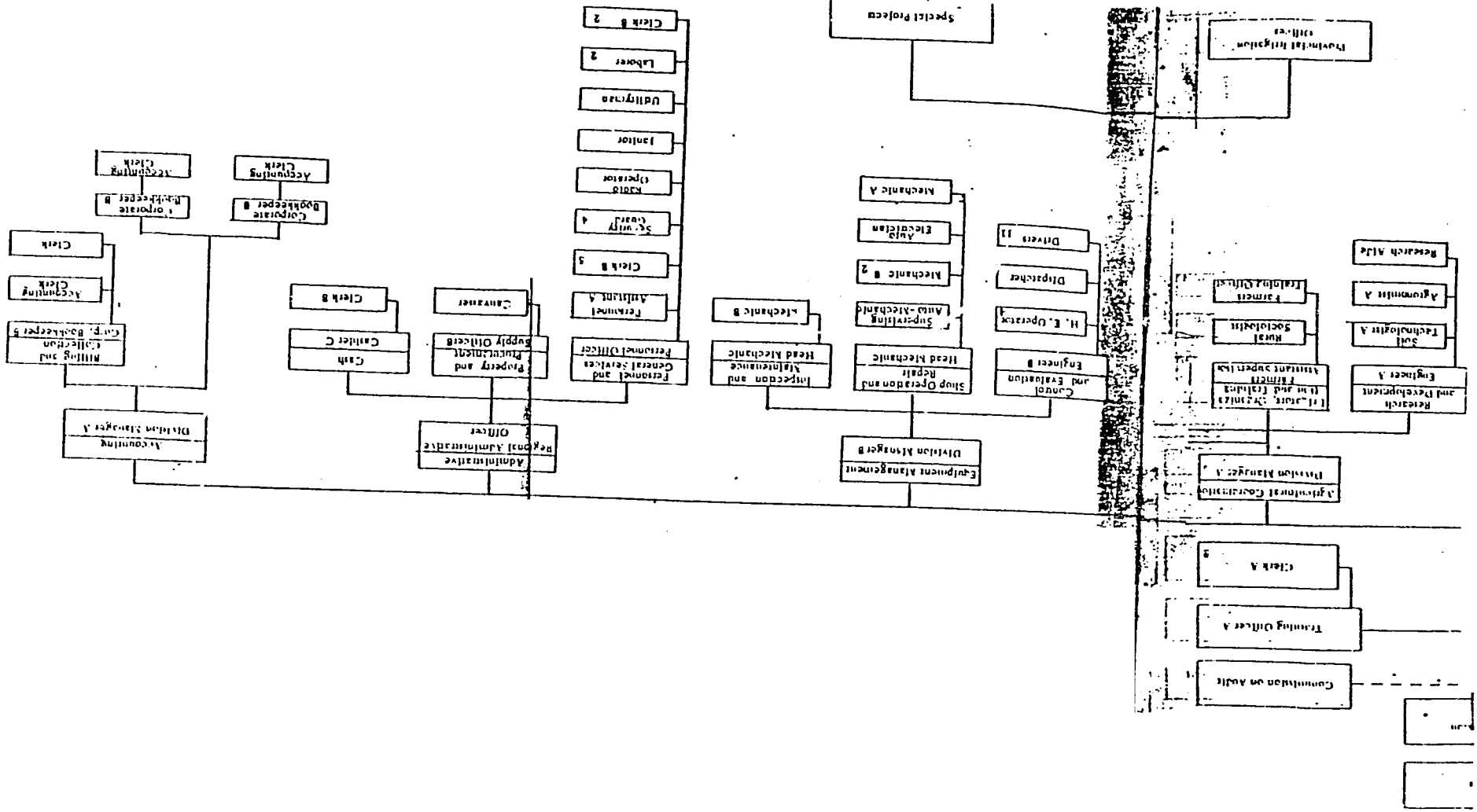
Source: NIA

CHART 2
 EXISTING STAFFING CHART
 REGIONAL IRRIGATION OFFICE



Source: MIA

200



3. Performs minor maintenance and repair of canals, structure and access roads;
4. Distributes irrigation bills to farmers;
5. Determines and reports irrigated/planted areas
6. Supervises/assists in the major repairs of canals, structure and access roads.

The IS also collects irrigation fees during peak collection periods, to back-up the bill collectors.^{3/}

In the few large system, organizational structure is more intricate. In addition to operations and maintenance sections, these large systems have separate collection section, repair and improvement section, and a hydrology unit (see Chart 4).

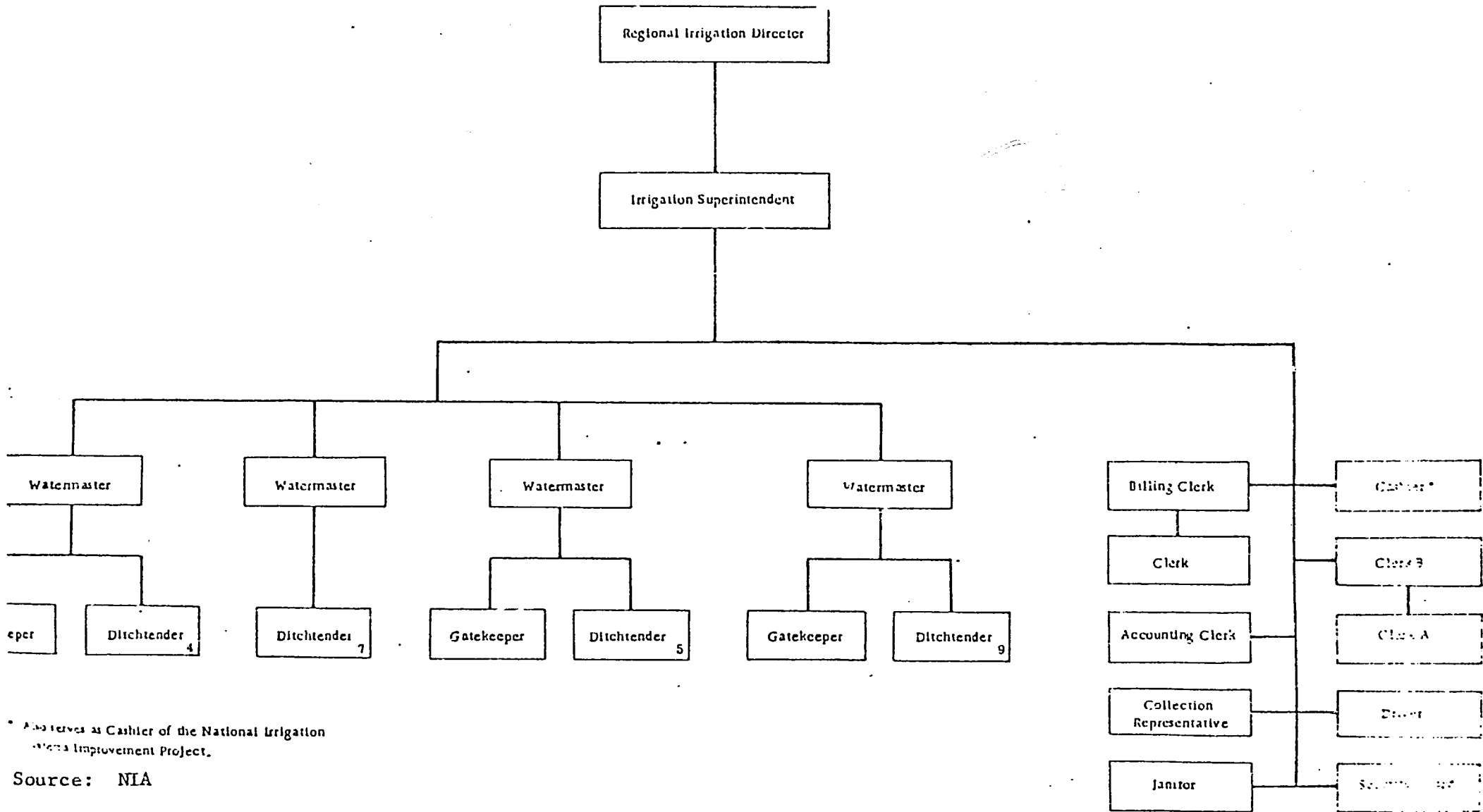
Except for pump systems, cost of O & M among NIS which, in 1982 averaged ₱187 per hectare consists mainly of salaries and wages of employees. This includes salaries of both administrative and field personnel. A recent study by Sison and Guino⁴ showed that around 90 percent of the total O & M

^{3/}This role of the IS can be very important in systems where big landowners are involved. Quite commonly, these landowners ignore the bill collectors.

^{4/}Sison, J. & R. Guino, "An Assessment of Costs and Performance of Various types of Irrigation Systems in the Philippines". Paper prepared for the International Food Policy Research Institute (IFPRI), 1983.

Also see: Moya P, et.al. "Cost of Different Types of Irrigation Systems in Central Luzon", IIRRI Saturday Seminar Paper, June 14, 1980.

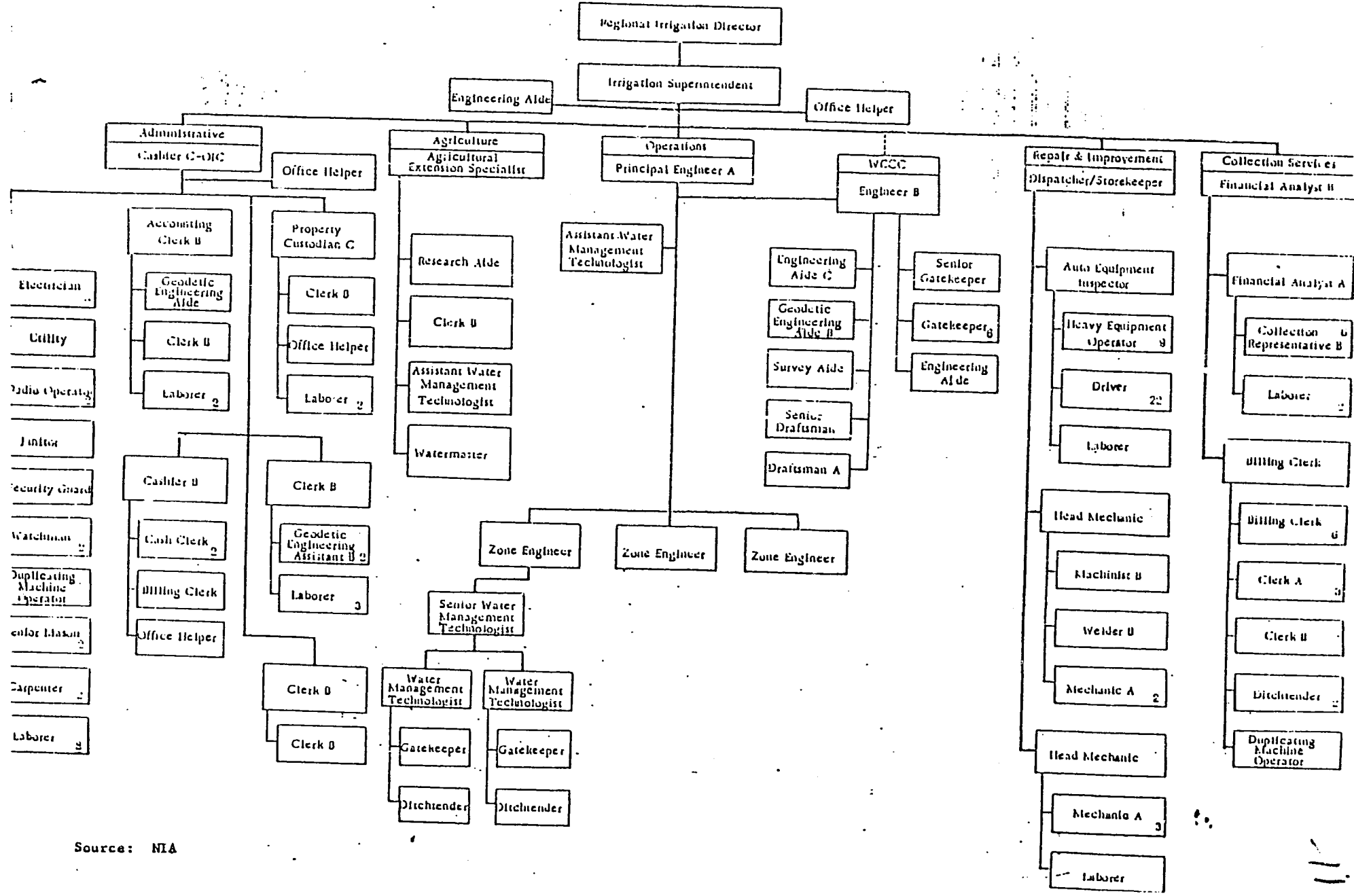
CHART 3
 SAMPLE STAFFING CHART OF A SMALL
 RIVERS IRRIGATION SYSTEM



* Also serves as Cashier of the National Irrigation System Improvement Project.

Source: NIA

1 9 2 1
 SAMPLE STAFFING CHART OF A LARGE
 (34,000 has.) RIVER IRRIGATION
 SYSTEM



Source: NIA

cost is salaries and wages. This indicates that very negligible amount is spent on equipment operation which is essential in maintaining the operating efficiency of canal structures at peak levels.

The heavy wage bill for O & M and, the financial difficulties that NIA has been experiencing primarily due to poor collection of irrigation fees has prompted NIA to adopt a policy of turning over to farmers' associations, the operation and maintenance of marginal systems. NIA has also started turning over to viable Farmers' Irrigation Association (FIA) the O & M (including collection activities) of certain sections of the main canal and lateral which are covered by these associations.

To effect this program, it was necessary for NIA to establish FIAs within the NIS. At the national level, policies and programs regarding the establishment of FIAs are developed by the Irrigators' Assistance Department (IAD)⁵ under the Office of the Asst. Administrator for Systems Operation and Equipment Management. These plans and programs are then implemented and coordinated at the regional level by the Agricultural Coordination Division under the Office of the RID.

^{5/} See Appendix E for the Functional Statements of the IAD.

Generally, NIA's programs related to FIAs involve training farmers to enable them to eventually operate and maintain the system facilities when turned over to the association. There are two economic benefits which NIA derives from FIAs. First, because of the eventual take-over by the association of the O & M activities, NIA saves on the salaries of the displaced ditchtenders. Second, through farmers involvement in collection, NIA expects to attain higher collection performance. In a case study on Angat Maasim River Irrigation System (AMRIS), it was found that collection performance increased by as much as 15 percentage points after the formation of the farmers' association.⁶

The general approach is to organize farmers within hydrologic boundaries starting at the rotational level and upwards as the farmers become confident to operate. Called the farmer-irrigators' group (FIG), the rotational level (covering around 50 has. served by one turnout) organization is formed. They elect a set of officers usually composed of the president, secretary and treasurer. They also elect unit leaders for specific sub-farm-ditch levels. Through the FIG, it is hoped that a more equitable distribution of water within the rotational level will be attained.

^{6/}NIA, A case study Report on the Economic Gains with Both the Irrigator's Organization Effort and the O & M Turnover to the Irrigator's Associations of AMRIS Pum System. Jan. 1983.

Viable FIG's are then organized formally into a bigger group called the Farmer-Irrigators Association (FIA). Consisting of^{at} least two or three FIG's, the FIA is registered with the Securities and Exchange Commission (SEC), making it a formal organization. To perform the roles of management, maintenance, dispute resolution and fee collections, a set of Board of Directors is elected to lead the group. Specialized committees such as the Education and Training, Audit and Inventory, Finance and Development, Irrigation Management, Agricultural supervision and Complaints Committees are also formed.^{7/}

In 1976, NIA started an innovative way of implementing the "participatory approach" to irrigation development by involving the farmers right from the construction or rehabilitating of an irrigation project. This was first done in Laur, Nueva Ecija, and then in the Upper & Lower Lalo Irrigation projects in Bicol. The Bicol experience was documented by Illo, J. and E. Chiong-Javier^{8/} but no further evaluation is available thus far.

^{7/}For more details see: Inos, F. and Carlos Lintag, "NIA's Institutional Development Program", NIA, 1982.

^{8/}See: Illo, J. "Organizing Farmers for Irrigation Management: The Development of a New System, Lower Lalo National Irrigation Project", RSC, Ateneo de Naga, 1981. Also see: Elena Chiong-Javier. "Organizing Farmers for Irrigation Management: The Rehabilitation of an Existing System, the Upper Lalo National Irrigation Project," RSC, Ateneo de Naga, 1982.

As of Dec. 1983, NIA has organized, 1,014 FIAs involving 133,571 farmers and covering an area of 223,704 has. Forty-eight percent of these FIAs involving 76,680 farmers, are now registered with the SEC. With NIA's program of turning over to viable organization the O & M of all marginal systems (systems with less than 1,000 hectares service area) and specific area covered by certain NIS laterals, the number of FIAs is likely to increase in the future.

As a token financial incentive, NIA pays the association a fixed amount payable every end of the month. The association also receives a collection bonus the amount of which depends on their attained collection efficiency.^{9/}

It should be mentioned also that for the first time in NIA's history, it is considering a shift in its programs to emphasize better O & M and de-emphasize construction of new projects. A study is presently being done to determine the economic feasibility of undertaking a program of improved O & M activity in existing NIS. This involves upgrading systems facilities to a certain standard, enabling the systems to operate at desired efficiency levels.

^{9/} See Appendix F.

C. Irrigation Fees. Based on NIA's published as well as internal reports, less than 50 percent of its total income comes from irrigation fees and equipment rental. The bulk comes from interest earnings (Table 2) of foreign negotiated loans which had to be deposited with local banks. Another source of NIA's income is management fee (equivalent to 5% of project cost) that it charges on all construction/rehabilitation projects.^{10/} However, because of the expected decline in construction and greater emphasis on improved O & M, there will be an expected shift in the main source of income towards fees and rentals.

Table 3 shows that from 1946 to 1966, the irrigation fee rate was fixed at ₱12 per ha per year regardless of season, crop, and type of system. Starting in 1966 until June 30, 1975 this was increased to ₱25 per ha. during wet and ₱35 per ha. during dry season for rice and for crops other than rice, the rate was ₱20 per hectare.

The NIA Board of Directors approved a major change in fees that took effect on July 1, 1975. Instead of fees being expressed in pesos, they were now in cavans (50 kgs.) of palay per hectare. Until the present, 2 cavans per hectare is

^{10/}NIA also got government subsidy for O & M until sometime in 1983.

Table 2. Percent distribution of NIA's sources of income,
1978-1983.

Year	Irrigation Fees	Equipment Rental	Interest	Total
1978	28	9	63	100
1979	30	8	62	100
1980	38	15	47	100
1981	33	15	51	100
1982	26	14	60	100
1983	30	12	58	100

Source: NIA

Table 3. Irrigation fee rates (Pesos per hectare) in the Philippines' NIS by type of system and by season, 1946-1984.

YEAR	SYSTEM			
	Pump		Gravity	
	Wet	Dry	Wet	Dry
1946-1966	12.00	12.00	12.00	12.00
1966-1975	25.00	35.00	25.00	35.00
1975*	150.00	250.00	100.00	150.00
1976	165.00	275.00	110.00	165.00
1977	165.00	275.00	110.00	165.00
1978	165.00	275.00	110.00	165.00
1979	195.00	325.00	130.00	195.00
1980	210.00	350.00	140.00	210.00
1981	226.50	377.50	151.00	226.50
1982	247.50	412.50	165.00	247.50
1983	167.00	445.00	178.00	167.00
1984	334.50	557.50	223.00	334.50

* From 1975 onwards, the rates are as follows: for gravity, 2 cavans (50 kgs.)/ha. during the wet season and 3 during the dry; for pump systems, 3 cavans/ha. during the wet and 5 during the dry. These are expressed here in cash equivalent based on the government's support price for palay.

Source: NIA.

charged during the wet season, and 3 cavans per hectare is charged during the dry season in areas served by gravity systems with the exception of the Upper Pampanga River Improvement Irrigation System (UPRIIS) where 2.5 cavans of 3.5 cavans for the wet and dry season respectively, are charged.

Special rates charged in a few specific systems under this revision are as follows:

(A) Pump Systems

1. Solana (Tuguegarao, Cagayan) and Bonga Pumps 1, 2, & 3 (Laoag, Ilocos Norte) = 8 cavans per hectare during the wet season and 12 cavans during the dry season.
2. Libmanan-Cabusao Pump Irrigation System (LCPIS) = 6 cavans per hectare for both seasons.

(B) Systems serving crops other than rice.^{11/}

For crops such as sugarcane, except in hacienda Luisita, Tarlac where ₱29,000/yr for 2,000 hectares is charged, banana, and other annual crops, 5 cavans per hectare/year is charged in gravity systems & 8 cavans in pump systems. The payment however should be in cash equivalent based on NFA support price.

^{11/}Note that hectarage of other crops represent a very insignificant proportion of the total irrigated area. In 1982, of the total service area of 513,926 hectares, only 2,819 hectares planted to other crops was irrigated by the NIS.

There is a special feature of the present structure of fees. Farmers can either pay in kind (palay) or the equivalent amount in cash based on the government support price of palay. Collection in kind, however, is not implemented very seriously by NIA because of the tremendous losses that it suffers from handling palay collected due to its lack of post-harvest facilities. The advantage of the present scheme on NIA's side is that there is an automatic adjustment mechanism on the cash equivalent of the fee. Everytime the support price for palay increase, the cash equivalent of the fee also increases. Despite this mechanism however, irrigation fee rate has been declining in real terms (Table 4), not to mention the fact that fee collections have been less than O & M fund releases (Table 5).

System-specific rates (e.g. pumps) are changed upon the recommendation of the office of the Regional Irrigation Directors (RID) which has jurisdiction over the system and approved by the NIA Board of Directors. Specific guidelines are followed in whether or not to approve fee increases. Resolution 20 series of 1978, of the NEDA states that the government assumes responsibility for paying the interest on funds invested in NIA irrigation projects. NIA should charge fees that are just sufficient to defray costs of operating and maintaining the systems plus repaying the construction costs within 50 years without

Table 5. NIA Irrigation Fee Collections and O & M Fund Releases at the System Level.

YEAR	O & M Fund Releases at System Level (₪ M)			Total Irrigation Fee Collections (₪ M)	Service Area of NIS (has.)
	Personnel Services	Others	Total		
1979	59	7	66	45	477,239
1980	77	9	86	59	472,008
1981	93	10	103	53	492,336
1982	94	14	108	57	508,578
1983	87	14	101	73	572.234

Source: NIA

interest. Thus, pump systems which entails higher O & M costs charge higher fees. Except the fact that it has a reservoir, it is not apparent why rates at UPRIIS are higher than other gravity systems. O & M costs are no greater than in other gravity systems.

Farmers, in general are consulted about any proposed rate changes. This is because, as part of the above general guideline, NIA also considers that irrigation fees should:

- a) be within the farmer's capacity to pay,
- b) not impair the incentive to use irrigation water, and
- c) not be charged to repay costs of power, reforestation, roads, and flood control in multi-purpose projects.

It is hereby suggested that NIA should also consider results of research studies on farmer's capacity to pay. For example, Moya^{12/} found that in LCPIS, farmers have very little left for water fees after deducting all cost of inputs from the gross returns from rice.

With the present structure of prices, it is highly unlikely that farmers can afford to pay higher fees. For example, fertilizer prices have been increasing faster than palay prices. Furthermore, government pricing policy seem to depress domestic

^{12/}Moya, P. "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 Sasin Area, BRPDPO, San Jose, Pili, Camarines Sur, June 18, 1984. Also see Appendix Tables 1 & 2.

price of fertilizer above its border price. As a result rice production in general is receiving negative Effective Protection Rate.^{13/} It is significant to note however that under the present irrigation fee structure and collection rate, there is an implicit subsidy on irrigation (Table 6).

Based on NIA's estimates, NIS must collect at least 80 percent of the collectible irrigation service fees for the system to be able to recover O & M costs. On the average, the latest available data (1982) show that only 60 percent^{14/} of the total fees collectible in all NIA are collected. Thus, in 1982, collections fell short of the O & M costs by an average of 32 per hectare.

Given these observations, there is definitely a big room for recovering O & M expenditures by improving collection efficiency rather than increasing irrigation fee rate. For one thing, the farmers always act negatively to rate increases. In 1975, when the fee was increased, collection efficiency decreased from 64% to 27%. For another, farmers already

^{13/} David, C. op.cit.

^{14/} NIA defines this collection efficiency. For the rest of this paper, we shall be using the same definition.

Table 6. Implicit Tariff (IT) on Agricultural Inputs (%) for Rice Production.

Inputs	IT
Irrigation (NIA gravity) ^a	- 86
(NIA communal)	- 92
Irrigation pumps ^b	30
Hand tractors ^b	33
Four-wheeled tractors ^b	10
Agricultural chemicals ^c	23
Fertilizer ^d	10

^aIncludes subsidy due to low irrigation fee and low repayment rate.

^bBased on tariff rate.

^cBased on tariff rate.

^dBased on price comparison of urea, ammonium sulphate, mixed fertilizer and phosphate from 1973-1980.

Source: David, C. op.cit.

face an unfavorable incentives structure. Under this condition, farmers are less able to pay for higher irrigation fees, much less for penalties (that NIA imposes) attendant to non-payment of higher fees.

15/

In addition to interest penalties, NIA can sue non-paying farmers but legal sanctions have not been enforced. Non-water delivery to delinquent farmers has likewise not been enforced due to lack of water control devices.

SYSTEM LEVEL INFORMATION

A. The sample systems. Information on the system level were generated from a survey of 27 sample systems taken from seven regions of the country. Ten of those systems are communal and 17 are national (Table 7). Twenty-two of the samples are gravity^{16/} type, four are pump systems and one sample is a combination of pump and gravity.

The general idea of the survey was to understand the characteristics of systems which are viable (or which have a fairly good chance of becoming viable) rather than to do statistical tests. Therefore, samples were selected purposively. National Systems with high collection efficiency based on a priori information were included in the samples. More specifically, National systems which were viable^{17/} in 1982 based on NIA reports were taken. And, for purposes of comparison, systems with high deficits in 1982 were likewise taken. It should also be mentioned that communal sample systems were included in the study for purposes of determining whether or not there are size-related factors that explain differences in collection performance. It

^{16/} Run of the River systems are here considered as gravity systems.

^{17/} Collections were greater than O & M expenditures.

will be also interesting to note whether or not type of management has anything to do with better collection performance. Communal systems are managed by the farmers themselves while national systems are managed by hired personnel. Communal systems are also smaller than national systems.

Table 7. Number of Sample Systems by Type and by Region.

REGION	NUMBER OF SAMPLES		Total
	Communal	National	
I	4	3	7
II	-	3	3
III	3	3	6
IV	2	4	6
V	1	2	3
VIII	-	1	1
IX	-	1	1
TOTAL	10	17	27

Group interviews of farmer whenever possible were done to get their views regarding issues on O & M. In some instances, sample farmers were taken within the vicinity of the system office. There are a total of 76 farmers interviewed for this purpose.

The main criterion in selecting the sample farmers was their farm location ⁱⁿ relation to the main source of water (i.e., the main canal). As much as possible, equal samples were taken from the tail end, midstream, and upstream farms.

Majority of the farmers within the service area of the sample systems are tenants (Table 8). Their average farm size is around one and a half hectares, ranging from a minimum of .33 hectares to a maximum of 31.42 hectare (Table 9). Average paddy yield per hectare is 74 cavans during the wet season and 81 in the dry season.

The average design service area of the sample systems is 3,660 hectares -- 5040 hectares for the National and 309 hectares for the communal systems. Only 63% of the service area however is irrigated during the dry and 71% during the wet or a total of 134% for the whole year (Table 10).^{18/} Around 14 years old, the sample systems have undergone rehabilitation 4 times.

^{18/} Also see: Appendix Table 3 for a more detailed information.

Rice is the main crop grown in the service area of the sample systems. Only one system reported area planted to upland crops (vegetables) in the dry season but this is less than one half of one percent of the total irrigated area.

Table 8. Tenure status of farmers served 29 sample system, 1983.

TENURE STATUS	% OF FARMERS
Owner-operator	24
Leasee	35
Tenant	41

Table 9. Maximum, minimum, and Ave. Farm Size of landholdings within the service area, 27 sample systems, 1983.

SIZE CATEGORY	HECTARES
Minimum	.33
Maximum	31.42
Average	1.48

Table 10. Irrigated Area (wet and dry) as percent of the Design Service Area and Average Yield/ha. by Region, 27 sample systems, 1983.

REGION	PERCENT OF DESIGN SERVICE AREA IRRIGATED			YIELD/HA.	
	Dry	Wet	Total	Dry	Wet
	I	69	98	167	76
II	39	69	108	80	75
III	74	78	152	76	78
IV	68	64	132	95	80
V	63	50	113	79	74
VIII	34	47	81	70	60
XI	61	69	130	65	55
ALL	63	71	134	81	74

B. Operation and Maintenance. Except for the Angat Maasim River Irrigation System (AMRIS) the biggest of the samples, most of the national sample systems are composed of two operational sections under the office of the Irrigation Superintendent (IS) -- the Administrative section and the Operations and Maintenance section. The organizational structure of the sample national system is very similar to that shown in the Chart 3. On the average, the administrative section which deals mostly with office work is composed of the following regular staff:

Accountant = 1	Community Organizer = 2
Clerk: Billing = 3	Security Guards = 2
Accounting = 3	Janitor = 1
Bill Collectors = 2	Driver/Mechanic = 3
Radio operator = 1	Storekeeper = 1

In some of the systems, an Engineering Aide, a Draftsman and an Agriculturist are also regular members of the plantilla.

On the other hand, the operations and maintenance section which is in general responsible for the equitable and timely distribution of water to farmlots and maintenance of canals, structures and measuring devices, is composed of the following staff:

Watermaster = 5
Gatekeeper = 3
Dichtenders = 25
Equipment Operator = 1

In the pump systems a pump operator is part of the regular O & M staff.

The watermasters (WM) who are assigned to oversee the operation of a hydrologic area equivalent to 750 hectares directly supervise the Dichtenders (DT) and Gatekeeper (GK). The ditchtender is incharge of the maintenance of at least

3.5 km. of canals while the gatekeeper for the operation and maintenance of 3 major gates plus 1.5 kms. of canals.

The WM, DT and GK are also involved in billing and collection therefore, they are the ones in direct contact with the farmers. This is particularly true with the DT who, based on the farmer interviews, receive most of the complaints regarding the inadequacy of water supplied to farmers, particularly those at the tail-end.

Communal systems are managed by a set of officers composed usually of the President, Vice-President, Secretary and Treasurer who are elected by the members of the Farmer's Association for a tenure of 2-3 years. Canals are cleaned regularly by hired grass-cutters or by the farmer-members who elect to pay their irrigation fees^{19/} by rendering manual labor in the maintenance of system facilities. When canals need to be repaired/desilted, the association, depending on its liquidity position, either hires emergency repair crew, or farmer-members may decide to do it themselves and their man-days labor are credited to them as irrigation fees. A general repair and maintenance work is scheduled once a year usually before the onset of the rainy season.

^{19/} These fees are mainly used to pay NIA for the system's construction or rehabilitation cost. The excess is used for maintaining the system.

In the gravity systems, whether national or communal, water is delivered continuously during the wet season when water is sufficient. During the dry season however, water is distributed on a rotation method²⁰ based on a schedule prepared by the Irrigation Superintendent (for NIS) and the president in consultation with other officers and members (for CIS). Among the pump sample systems with the exception of Libmanan-Cabusao, the water is delivered upon the collective request of the farmers concerned. Water is however delivered only when collection efficiency in the previous planting season is at least 80 per cent.

Facilities in the few systems we had the chance to see, particularly the old NIS, are not something to be happy about. The canals are silted and turnouts either vandalized by farmers or left unmaintained.²¹ This probably explains why the percentage of the design service area irrigated for both wet and dry (134%) which is shown in table 8 is very much below the 160% which is based on hydrological data. In some instances, illegal turnouts are built by the farmers because they claim that the existing turnouts are not properly placed (faulty design) and that the rotational area is too large to be served by just one turnout.

²⁰ The general guideline for the rotation schedule is that farmers who regularly pay fees should be given priority. However, because of the lack of control facilities, this hard to follow.

²¹ This is consistent with the O & M phase I & II study of NIA systems financed by the World Bank in 1982.

Illegal checking of canals with logs or banana trunks by the farmers at the upstream is also common among NIS resulting in complaints of water shortages by the tail-end farmers. Conflicts similar to this are not however apparent among CIS. There appears to be a better cooperation among farmers most of whom are association members, in the communal systems.

Table 11 shows that average O & M expenditures per hectare among the sample systems is ₱171/hectare. Note however that pump systems are almost 3 times more costly to operate than gravity NIS. Around 92 percent of the total O & M cost is on personnel among the gravity national systems. Among the pump systems, only 35% is for personnel and 56% for power cost. The power cost among the pump systems is too big they can hardly cope up with the monthly electric bill. In fact during the survey, the Libmanan-Cabusao System power supply was cut off by the local electric cooperative due to a two-month unpaid electric bill amounting to more than a third of a million pesos.

C. Irrigation Fees and Collection. Collected twice a year once every after season, irrigation fee rates charged by the sample national systems are the same as those prescribed by NIA Board of Directors already discussed in the first section. Communal systems charge an average of one cavan per hectare per season which is used to pay for the amortization of the construction/rehabilitation cost by NIA.

Table 11. O & M Expenses per ha. by type system, 27 sample systems, 1983.

TYPE OF SYSTEM	O & M EXPENSES			Total
	Personnel	Power Cost	Other Cost	
A. NATIONAL:				
Gravity	138	0	12	150
Pump	157	246	39	442
Gravity & Pump	207	58	29	294
B. COMMUNAL:				
Gravity	23	0	44	67
Pump	27	87	101	215
ALL	110	33	28	171

For the NIS, bills based on the list of planted are (LIPA)^{22/} prepared by field personnel (the watermasters) are delivered to the farmers by the bill collectors or other field personnel (particularly the ditchtenders). Payments which, during the survey were all in cash, are either collected in the field or in the office. All collections are then deposited to the nearest Philippine National Bank (PNB) branch, the official depository of NIA, to be credited to NIA's operating capital. Farmers who get yields below 40 cavans per hectare (mostly due to calamities) are exempted from the irrigation fee but no cases of exemption were reported during the survey. Among communal systems, irrigation fees are paid to the association officers, particularly to the Treasurer.

Among the NIS, some farmer's association are deputized to collect fees from the members. The usual arrangement is to offer a graduated amount of bonus for a specific collection performance level. If collection efficiency (on current account) is 100%, the association is given 5% of the total collected fees; 4% if collection efficiency is 90%; 3% if collection efficiency is 80% and 2% if 70% efficient. The deputized associations are also given as much as 25% of all back accounts collected.

^{22/} The accuracy of this list was not a subject of our investigation. However, informal conversations with farmers indicate the possibility of inaccuracies--one reason why farmers refuse to pay.

Average collection efficiency among the sample systems is quite low -- below 60 percent from a low of 27% to a high of 100%. This is particularly true among the NIS samples. The result is, as commonly argued by NIA officials, that O & M is poor because they lack funds to efficiently operate the systems. But could't farmers argue in return that they don't pay because they don't get the right amount of water at the right time? We tried to look at some factors which possibly explain collection performance of the sample systems.

Generally, social scientists claim that farmer's payment behavior is affected by their capacity (economic) and willingness (sociologic) to pay. It is not our objective however, to test this hypothesis. Rather, we would like to show simple relationships of readily observable phenomena. Needless to say that resources did not permit us to undertake analysis beyond simple descriptions.

The capacity to pay thesis has been aptly shown in Moya's^{23/} paper on the Libmanan-Cabusao case. Farmers were found to have very little left after deducting cost of inputs (except irrigation) from the gross value of paddy produced. It is nevertheless worthwhile to mention that in the survey, sample systems which got high yields per hectare also had higher collection efficiency (Table 12).

^{23/} Moya, P. op.cit.

Unsettled conflicts among water users (e.g. illegal checking of canals by upstream farmers to the detriment of tail-end farmers) are also cited as possible explanation of low collection. Thus, there is a need for farmers' associations because farmers, when they work as a group, conflicts are minimized. Functional irrigation's groups are, after all, thought to be effective catalyst in modifying/redirecting the behavioral patterns of farmers concerning water use.^{24/}

Table 12. Relationship between Collection Efficiency and Average yield/ha.

AVERAGE YIELD/HA.	COLLECTION EFFICIENCY
75 and below	59
76 and above	62

Source: Appendix Table 3.

^{24/} Lintag, Carlos, Irrigator's Association Development Program in Philippine Irrigation Systems, Operations Department, NIA, Quezon City, 1979.

Indeed Table 13 shows that systems with higher percentage of service area covered by farmers' association had higher collection efficiency. More particularly, communal systems which are in concept owned by the farmers, had higher collection efficiency.

The need for communication/consultation between farmers and systems officials (particularly the IS) also seem to be an important factor. Farmer interviews indicate that water users feel the need to be consulted on matters of water distribution, water scheduling and canal maintenance (Table 14). In larger systems, dialogues between farmers and key system officials become more difficult. Interestingly, collection efficiency is higher among small size systems than the larger systems (Table 13). It should also be pointed out that in the sample system having the lowest collection efficiency, farmers complained that they never got the change to be visited by the IS even once during the past two cropping seasons.

The state of system facilities also tend to affect collection efficiency (Table 16). When they are new or newly rehabilitated and therefore working at relatively high efficiency level, farmers get their fair share of the water supply. But when system facilities are deteriorated, only the farmers near the source of water get sufficient water. Thus, it is usually

the case that farmers at the tail-end are more delinquent in paying their fees (Table 17).

Table 13. Proportion of Service Area covered by Farmer's Association and Collection Efficiency by type of systems, 27 sample system, 1983-84.

TYPE OF SYSTEMS	% OF SERVICE AREA UNDER FARMER'S ASSOCIATION	COLLECTION EFFICIENCY
A. NATIONAL:		
Gravity	37	62
Pump	83	55*
Gravity & Pump	5	45
B. COMMUNAL:		
Gravity	90	69
ALL	59	61

* This average is affected by the extremely low collection efficiency in Libmanan-Cabusao which is below 30%.

Table 14. Farmer's Perception whether or not they be consulted on some O & M Activities, 76 farmer respondents, 1984.

ACTIVITY	NO. OF FARMERS ANSWERING		% OF FARMERS ANSWERING	
	Yes	No	Yes	No
Water Distribution	52	24	68	32
Water Scheduling	40	36	53	47
Canal Maintenance	46	30	61	39

Table 15. Relationship between Collection Efficiency and Design Service Area, 27 sample systems, 1983.

DESIGN SERVICE AREA	COLLECTION EFFICIENCY
5,000 and above	44
1,000 - 4,999	65
below 1,000	72

Table 16. Collection Performance and status of National Systems, 27 sample systems, 1983.

SYSTEM STATUS*	AVERAGE COLLECTION EFFICIENCY
New system or nely rehab- ilitated	77
Old system not rehabilitated	38

* New systems are those either built or rehabilitated at least in 1980.

Old systems are those constructed earlier than 1977 or never rehabilitated since 1977.

Table 17. Delinquency Rate by Type of Farmers, 27 sample systems, 1983.

FARMER CATEORY	% OF FARMERS NOT PAYING REGULARLY
By Size:*	
Small	22
Large	36
By Location:	
Upstream	19
Mid-stream	31
Tail-end	30
Farmer's Asscoaition Affiliation	
Member	28
Non-member	31

*Small size farms were arbitrarily referred to by the IS respondents as those with areas less than the average size farm and large farms are those greater than average size.

Delinquent farmers can in principle be penalized in several ways. A one percent/month interest is charged on overdue accounts (with 3 months grace period); water supply will be cut-off from delinquent farmers; and legal sanctions can be imposed. It appears however, that except for the interest penalty, the others are not or, difficult to enforce. Water control facilities are inadequate to enable the systems to cut off water from the delinquent farmers only. As can be seen in Table 18 majority of the farmers interviewed were not aware of any case where water was cut off from delinquent water users.

Legal sanctions are likewise had to impose. Besides being costly, it should also be noted that farmers with high delinquency rates are the economically more powerful, large farmers (Table 18).

Table 19. Number of Farmers reporting knowledge of water cut off due to non-payment, 76 farmer respondents, 1984.

RESPONSE	NUMBER OF RESPONSES	
	No.	%
Yes	8	11
No	68	89

SUMMARY AND CONCLUDING COMMENTS

In the past, the government's program on irrigation has mainly been exemplified in construction of new and rehabilitating old systems. There was little emphasis on improved O & M; hence, NIS deteriorated fast. Costly rehabilitation had to be undertaken every seven years. The need to improve O & M in irrigation is, however, slowly being realized by NIA officials. Although it is not as yet explicitly stated in its corporate plan, there are indications which show their interest along this line. A study is presently being undertaken to evaluate the economic feasibility of undertaking an improved O & M project, possibly to be financed by foreign funding agencies. The establishment of farmers' associations has also been going on.

Staffing levels at the national level for O & M was not possible to determine. However, it must be pointed out based on the staffing patterns of the sample systems that there is more emphasis on operation than on maintenance. Ditchtenders are lacking and they are utilized as collection agents at harvest, the time most appropriate for them in maintaining their assigned canals. This picture may change in the future as NIA turns over to farmers' association a greater part of the NIS.

O & M expenditures by NIA which appear not affected by the specific project's source of fund for construction, were consistently greater than irrigation fee collection. Being a corporate body, NIA is working hard for financial viability, but it continues to be plagued by low collection.

There are suggestions to increase the irrigation fee rate. But the farmers are already saddled with increasing prices of other inputs. To minimize NIA's deficits (if not to be viable) therefore, increased collection should be the remedy. The success of this effort however, is directly related to the state of O & M. When there is timely and equitable distribution of water and, when there is less conflicts among water users, collection efficiency is higher. There is therefore, a need to upgrade NIA's facilities and strengthen irrigators' associations and other factors that effect O & M.

Poor O & M among NIS has resulted in the serious deterioration of systems facilities. The bulk of O & M expenditures of NIA have been on salaries and wages of personnel most of whom are not directly involved in operation and maintenance, but rather involved in administration^frelated matters. Casual observation shows that there is a sad state of water measurement and control devices, and also equipment for canal maintenance. Systems performances therefore, have been very much below design capacity.

Adequate O & M will be necessary to prevent deterioration of facilities and to improve system efficiency. However, adequate O & M per se is not possible without first upgrading the system facilities. Systems with heavily silted canals and without control and measuring devices will have negligible marginal response to O & M expenditures.

This implies that a detailed inventory of facilities would be necessary to estimate an "adequate" O & M level for each type of system. This study was not able to undertake this task given the resources, and therefore, could not provide estimates of how much O & M per hectare would be required to adequately maintain the various general types of systems. Suffice it to say that this aspect is the subject of a one-year study presently conducted at NIA.

We would like to end with a note that this study was constrained by the unavailability of information particularly at the national level. Partly, this was because of the lack of time to explore all possibilities of generating relevant information. More importantly, this was because of the tighter control that government corporations have assumed over the issuance of incriminating data most specially during this time of economic crisis. Suffice it to say therefore, that the information contained in this study are those that could be

determined given the present situation and given the resources for the study.

Appendix Table 1. Comparative net surplus per farm per annum, irrigated and rainfed farms, at constant 1984 prices. LCPIS, Camarines Sur.

	<u>Irrigated</u>		<u>Rainfed</u>	<u>Difference</u>	
	<u>Flood</u>	<u>Flood</u>		<u>Rainfed</u>	<u>Rainfed</u>
				<u>vs. flood</u>	<u>vs. flood</u>
				<u>free</u>	<u>prone</u>
	<u>(₱/farm)</u>				
Value of output	12874	8547	3809	9065	4738
Costs of production					
a) Material inputs	2270	1664	869	1401	795
b) Labor	3711	2820	1695	2016	1125
Hired	2092	2032	1032	1870	1000
Family	809	788	663	146	125
c) Misc. costs	2168	1568	927	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, P. (op.cit.)

Appendix Table 2. Comparative net paddy "surplus" per farm per annum, LCPIS, Camarines Sur.

	Irrigated		Rainfed
	Floodfree	Floodprone	
Net surplus ^{a/} ₱/year	3124	931	(290)
Plus family wage ^{b/} ₱/year	809	788	663
Plus seeds ₱/year	699	662	379
Net return to household ₱/year	4632	2381	752
Paddy equivalent ^{c/} kg/year	2824	1452	458
Approximate household consumption	1978	1956	1783
Seeds kg/year	426	404	231
Middled rice ^{d/} kg/year	1552	1552	1552
Net paddy surplus	846	(504)	(1325)

^{a/} From Appendix Table 1.

^{b/} Wage imputed as that of hired labor.

^{c/} At 1984 prices 1 kg = ₱1.64

^{d/} Based on kg milled rice per family of 6 members, converted to 60% of paddy equivalents.

Source: Moya, P. (op.cit.)

Appendix Table 3. Some key characteristic of the sample systems.

REGION	SYSTEMS	Design Service Area	Yield Per hectare		Collection efficiency	Date of construction	Year last rehab.	Irrigated area	
			Wet	Dry				Wet	Dry
A. NATIONAL									
GRAVITY:									
I	1. Tagudin RIS	1379	93	80	71	no data	-	773	1446
I	2. Amburayan IS	3613	88	88	54	1927	1984	2401	3500
II	3. Bagga IS	4000	-	-	66	1982	none	897	1441
II	4. Apayao Abulog ES	10453	-	-	71	no data	1983	5742	6554
II	5. Dummun IS	3000	75	80	83	-	-	176	-
III	6. CAMRIS	8849	88	84	36	1957	1984	3667	7336
III	7. UPRIIS MCIS	4823	54	69	41	1976	none	1108	3724
IV	8. Dumacaa RIS	2509	75	80	84	1054	1984	1833	1553
IV	9. Mabacan RIS	1600	67	82	40	1981	noneyet	523	523
VIII	10. Binahaan N & S	5000	60	70	29	1961	1983	1695	2329
XI	11. Cantilan RIS	1823	55	65	74	no data	1983	1106	1256
IV	12. Cavite FliskayAkle	720	55	55	72	1975	1980	660	720
V	13. Barit RIS	2230	80	-	90	1978	1983	-	1328
PUMP									
V	1. Libmanan/Cabusao RIS	3472	53	58	27	1981	noneyet	1325	1501
I	2. Sinacalan IS	128	45	80	90	1978	1983	84	53
IV	3. Cabuyac East RIS	604	94	100	47	1981	noneyet	535	540
PUMP & GRAVITY:									
III	1. Angat Maasim	31485	87	92	45	1925	1974	29010	24000

REGION	SYSTEMS	Design Service area	Yield Per hectare		Collection Efficiency	Date of Construction	Year last rehab.	Dry	Wet
			Wet	Dry					
B. COMMUNAL:									
GRAVITY									
I	1. Toyangotang B ISM	200	75	-	-	1981	1981	200	200
I	2. Barbarit CIS	27	55	55	-	1979	1984	27	27
I	3. GUMOP Norte CIS	150	55	-	92	1978	1978	40	40
	4. Tangal Perez CIS	4200	-	75	-	1981	-	3200	4200
III	5. Prenza ISA	500	90	85	36	1980	noneyet	380	400
	6. Baldias Nambalan	110	80	70	-	1979	1982	112	110
IV	7. Lantik 2 CIS	n/a	110	120	100	1950	1976	94	94
IV	8. DILA CIS	79	80	130	80	1976	1980	150	150
III	9. Pantoc CIS	1100	70	65	-	1983	noneyet	300	800
PUMP									
V	1. Puro Batya ISA	150	90	99	55	1983	1983	130	100

Appendix A. PRESIDENTIAL DECREE NO. 1067

A DECREE INSTITUTING A WATER CODE, THEREBY REVISING AND CONSOLIDATING THE LAWS GOVERNING THE OWNERSHIP, APPROPRIATION, UTILIZATION, EXPLOITATION, DEVELOPMENT, CONSERVATION AND PROTECTION OF WATER RESOURCES.

WHEREAS, Article XIV, Section 8 of the New Constitution of the Philippines provides, inter alia, that all waters of the Philippines belong to the State;

WHEREAS, existing water legislations are piece-meal and inadequate to cope with increasing scarcity of water changing patterns of water use;

WHEREAS, there is a need for a Water Code based on rational concepts of integrated and multipurposes management of water resources and sufficiently flexible to adequately meet future developments;

WHEREAS, water is vital to national development and it has become increasingly necessary for government to intervene actively in improving the management of water resources;

NOW, THEREFORE, I, FERDINAND E. MARCOS, President of the Philippines, by virtue of the powers in me vested by the Constitution, do hereby and decree the enactment of the Water Code of the Philippines of 1976, as follows:

CHAPTER I

DECLARATION OF OBJECTIVES AND PRINCIPLES

Article 1. This Code shall be known as The Water Code of the Philippines.

Article 2. The objectives of this Code are:

a. To establish the basic principles and framework relating to the appropriation, control and conservation of water resources to achieve the optimum development and rational utilization of these resources;

b. To define the extent of the rights and obligations of water users and owners including the protection and regulations of such rights;

c. To adopt a basic law governing the ownership, appropriation, utilization, exploitation, development, conservation and protection of water resources and rights to land related thereto; and

d. To identify the administrative agencies which will enforce this Code.

Article 3. The underlying principles of this Code are:

a. All waters belong to the State.

b. All waters that belong to the State can not be the subject of acquisitive prescription.

Article 4. Waters, as used in this Code, refers to water under the ground, water above the ground, water in the atmosphere and the waters of the sea within the territorial jurisdiction of the Philippines.

CHAPTER II

OWNERSHIP OF WATERS

Article 5. The following belong to the State:

- a. Rivers and their natural beds;
- b. Continuous or intermittent waters of springs and brooks running in their natural beds and the beds themselves;
- c. Natural lakes and lagoons;
- d. All others' categories of surface waters such as water flowing over lands, water from rainfall whether natural or artificial, and water from agriculture runoff, seepage and drainage;
- e. Atmosphere water;
- f. Subterranean or ground water; and
- g. Seawater.

Article 6. The following waters found on private lands also belong to the State;

- a. Continuous or intermittent waters rising on such lands;
- b. Lakes and lagoons naturally occurring on such lands;

- c. Rain water falling on such lands;
- d. Subterranean or ground waters; and,
- e. Waters in swamps and marshes.

The owner of the land where the water is found may use the same for domestic purposes without securing a permit, provided that such use shall be registered, when required by the Council. The Council, however, may regulate such use when there is wastage, or in times of emergency.

Article 7. Subject to the provisions of this Code, any person who captures or collects water by means of cisterns, tanks, or pools shall have exclusive control over such water and the right to dispose of the same.

Article 8. Water legally appropriated shall be subject to the control of the appropriator from the moment it reaches the appropriator's canal or aqueduct leading to the place where the water will be used or stored and, thereafter, so long as it is being beneficially used for the purposes for which it was appropriated.

CHAPTER III

APPROPRIATION OF WATERS

Article 9. Waters may be appropriated and used in accordance with the provisions of this Code.

Appropriation of waters, as used in this Code, is the acquisition of rights over the use of waters or the taking or diverting of waters from a natural source in the manner and for any purpose allowed by law.

Article 10. Water may be appropriated for the following purposes:

- | | |
|---------------------|----------------------|
| a. Domestic | f. Livestock raising |
| b. Municipal | g. Industrial |
| c. Irrigation | h. Recreational, and |
| d. Power generation | i. Other purposes |
| e. Fisheries | |

Use of water for domestic purposes is the utilization of water for drinking, washing, bathing, cooking or other household needs, home gardens, and watering of lawns or domestic animals.

Use of water for municipal purposes is the utilization of water for supplying the water requirements of the community.

Use of water for irrigation is the utilization of water for producing agricultural crops.

Use of water for power generation is the utilization of water for producing electrical or mechanical power.

Use of water for fisheries is the utilization of water for the propagation and culture of fish as a commercial enterprise.

Use of water for livestock raising is the utilization of water for large herds or flocks of animals raised as a commercial enterprise.

Use of water for industrial purposes is the utilization of water in factories, industrial plants and mines, including the use of water as an ingredient of a finished product.

Use of water for recreational purposes is the utilization of water for swimming pools, bath houses, boating, water skiing, golf courses and other similar facilities in resorts and other places of recreation.

Article 11. The State, for reasons of public policy, may declare waters not previously appropriated, in whole or in part, exempt from appropriation for any or all purposes and thereupon, such waters may not be appropriated for those purposes.

Article 12. Waters appropriated for a particular purpose may be applied for another purpose only upon prior approval of the Council and on condition that the new use does not unduly prejudice the rights of other permittees, or require an increase in the volume of water.

Article 13. Except as otherwise herein provided, no person, including government instrumentalities or government-owned or controlled corporations, shall appropriate water without a water right, which shall be evidenced by a document known as a water permit.

Water right is the privilege granted by the government to appropriate and use water.

Article 14. Subject to the provisions of this Code concerning the control, protection, conservation, and regulation of the appropriation and use of waters, any person may appropriate or use natural bodies of water without securing a water permit for any of the following:

- a. Appropriation of water by means of handcarried receptacles; and,
- b. Bathing or washing, watering or dipping of domestic or farm animals, and navigation of watercrafts or transportation of logs and other objects by flotation.

Article 15. Only citizens of the Philippines, of legal age, as well as juridical persons, who are duly qualified by law to exploit and develop water resources, may apply for water permits.

Article 16. Any person who desires to obtain a water permit shall file an application with the Council who shall file an application with the Council who shall make known said application to the public for any protests.

In determining whether to grant or deny an application, the Council shall consider the following: protests filed, if any; prior permits granted; the availability of water; the water supply needed for beneficial use; possible adverse effects; land-use economics; and other relevant factors.

Upon approval of an application, a water permit shall be issued and recorded.

Article 17. The right to the use of water is deemed acquired as of the date of filling of the application for a water permit in case of approved permits, or as of the date of actual use in a case where no permit is required.

Article 18. All water permits granted shall be subject to conditions of beneficial use, adequate standards of design and construction, and such other terms and conditions as may be imposed by the Council.

Such permits shall specify the maximum amount of water which may be diverted or withdrawn, the maximum rate of diversion or withdrawal, the time or times during the year when water may be diverted or withdrawn, the point or points of diversion or location of wells, the place of use, the purposes for which water may be used, and such other requirements the Council deems desirable.

Article 19. Water rights may be leased or transferred in whole or in part to another person with prior approval of the Council, after due notice and hearing.

Article 20. The measure and limit of appropriation of waters shall be beneficial use.

Beneficial use of water is the utilization of water in the right amount during the period that the water is needed for producing the benefits for which the water is appropriated.

Article 21. Standards of beneficial use shall be prescribed by the Council for the appropriator of water for different purposes and conditions, and the use of waters which are appropriated shall be measured and controlled in accordance therewith.

Excepting those for domestic use, every appropriator of water shall maintain water control and measuring devices, and keep records of water withdrawal. When required by the Council, all appropriators of water shall furnish information on water use.

Article 22. Between two or more appropriators of water from the same source of supply, priority in time of appropriation shall give the better right, except that in times of emergency the use of water for domestic and municipal purposes shall have a better right over all other uses; Provided, That where water shortage is recurrent and the appropriator for municipal use has a lower priority in time of appropriation, then it shall be his duty to find an alternative source of supply in accordance with conditions prescribed by the Council.

Article 23. Priorities may be altered on grounds of greater beneficial use, multi-purpose use, and other similar grounds after due notice and hearing, subject to payment of compensation in proper cases.

Article 24. A water right shall be exercised in such a manner that the rights of third persons or of other appropriators are not prejudiced thereby.

Article 25. A holder of a water permit may demand the establishment of easements necessary for the construction and maintenance of the works and facilities needed for the beneficial use of the waters to be appropriated, subject to the requirements of just compensation and to the following conditions:

- a. That he is the owner, lessee, mortgagee or one having real right over the land upon which he proposes to use water; and
- b. That the proposed easement is the most convenient and the least onerous to the servient estate.

Easements relating to the appropriation and use of waters may be modified by agreement of the contracting parties provided the same is not contrary to law or prejudicial to third persons.

Article 26. Where water shortage is recurrent, the use of the water pursuant to a permit may, in the interest of equitable distribution of benefits among legal appropriators, be reduced after due notice and hearing.

Article 27. Water users shall bear the diminution of any water supply due to natural causes of force majeure.

Article 28. Water permits shall continue to be valid as long as water is beneficially used; however, it may be suspended on the grounds of non-compliance with approved plans and specifications or schedules of water distribution; use of water for a purpose other than that for which it was granted; non-payment of water charges; wastage; failure to keep records of water diversion when required; and violation of any term or condition of any permit or of rules and regulations promulgated by the Council.

Temporary permits may be issued for the appropriation and use of water for short periods under special circumstances.

Article 29. Water permit may be revoked after due notice and hearing on grounds of non-use; gross violation of the conditions imposed in the permit; unauthorized sale of water; willful failure or refusal to comply with rules and regulations or any lawful order; pollution, public nuisance or acts detrimental to public health and safety; when the appropriator is found to be disqualified under the law to exploit and develop natural resources of the Philippines; when, in the case of irrigation, the land is converted to non-agricultural purposes; and other similar grounds.

Article 30. All water permits are subject to modification or cancellation by the Council, after due notice and hearing, in favor of a project of greater beneficial use or for multi-purpose development, and a water permittee who suffers thereby shall be duly compensated by the entity or person in whose favor the cancellation was made.

CHAPTER IV

Article 31. Preference in the development of water resources shall consider security of the State, multiple use, beneficial effects, adverse effects and costs of development.

Article 32. The utilization of subterranean or ground water shall be coordinated with that of surface waters such as rivers, streams, springs and lakes, so that a superior right in one is not adversely affected by an inferior right in the other.

For this purpose the Council shall promulgate rules and regulations and declare the existence of control areas for the coordinated development, protection, and utilization of

Control area is an area of land where subterranean or ground water and surface water are so interrelated that withdrawal and use in one similarly affects the other. The boundary of a control area may be altered from time to time, as circumstances warrant.

Article 33. Water contained in open canals, aqueducts or reservoir of private persons may be used by any person for domestic purpose or for watering plants as long as the water is withdrawn by manual methods without checking the stream or damaging the canal, aqueduct or reservoir; Provided, That this right may be restricted by the owner should it result in loss or injury to him.

Article 34. A water permittee or appropriator may use any watercourse to convey water to another point in the watercourse for the purpose stated in a permit and such water may be diverted or recaptured at that point by said permittee in the same amount less allowance for normal losses in transit.

Article 35. Works for the storage, diversion, distribution and utilization of water resources shall contain adequate provision for the prevention and control of diseases that may be induced or spread by such works when required by the Council.

Article 36. When the reuse of waste water is feasible, it shall be limited as much as possible, to such uses other than direct human consumption. No person or agency shall distribute such water for public consumption until it is demonstrated that such consumption will not adversely affect the health and safety of the public.

Article 37. In the construction and operation of hydraulic works, due consideration shall be given to the preservation of scenic places and historical relics, and in addition to the provisions of existing laws, no works that would require the destruction or removal of such places or relics shall be undertaken without showing that the destruction or removal is necessary and unavoidable.

Article 38. Authority for the construction of dams, bridges and other structures across of which may interfere with the flow of navigable or flutable waterways shall first be secured from the Department of Public Works, Transportation and Communications.

Article 39. Except in cases of emergency to save life or property, the construction or repair of the following works shall be undertaken only after the plans and specifications therefore, as may be required by the Council, are approved

by the proper government agency; dams for the diversion or storage of water; structures for the use of water power; installations for the utilization of subterranean or ground water and other structures for utilization of water resources.

Article 40. No excavation for the purpose of emission of a hot spring or for the enlargement of the existing opening thereof shall be made without prior permit.

Any person or agency who intends to develop a hot spring for human consumption must first obtain a permit from the Department of Health.

Article 41. No person shall develop a stream, lake, or spring for recreational purposes without first securing a permit from the Council.

Article 42. Unless otherwise ordered by the President of the Philippines and only in times of national calamity or emergency, no person shall induce or restrain rainfall by any method such as cloud seeding without a permit from the proper government agency.

Article 43. No person shall raise or lower the water level of a river, stream, lake, lagoon or marsh nor drain the same without a permit.

Article 44. Drainage systems shall be so constructed that their outlets are rivers, lakes, the sea, natural bodies of water, or such other water course as may be approved by the proper government agency.

Article 45. When a drainage channel is constructed by a number of persons for their common benefit, the cost of construction and maintenance of the channel shall be borne by each in proportion to the benefits derived.

Article 46. When artificial means are employed to drain water from higher to lower land, the owner of the higher land shall select the routes and methods of drainage that will cause the minimum damage to the lower lands, subject to the requirements of just compensation.

Article 47. When the use, conveyance or storage of waters results in damage to another, the person responsible for the damage shall pay compensation.

Article 48. When a water resource project interferes with the access of a landowner to a portion of his property or with the conveyance of irrigation or drainage water, the person or agency constructing the project shall bear the cost of construction and maintenance of the bridges, flumes and other

structures necessary for maintaining access, irrigation, or drainage, in addition to paying compensation for land and incidental damages.

Article 49. Any person having an easement for an aqueduct may enter upon the servient land for the purpose of cleaning, repairing or replacing the aqueduct or the removal of obstructions therefrom.

Article 50. Lower estates are obliged to receive the waters which naturally and without the intervention of man flow from the higher estates, as well as the stone or earth which they carry with them.

The owner of the lower estate can not construct works which will impede this natural flow, unless he provides an alternatives method of drainage; neither can the owner of the higher estate make works which will increase this natural flow.

Article 51. The banks of rivers and streams and the shores of the seas and lakes througout their entire length and within a zone of three (3) me . in urban areas, twenty (20) meters in agricultural areas and forty (40) meters in forest areas, along their margins, are subject to the easement of public use in the interest of recreation, navigation, floatage, fishing and salvage or to build structures of any kind.

Article 52. The establishment, extent, form, and conditions of easements of water not expressly determined by the provisions of this Code shall be governed by the provisions of the Civil Code.

CHAPTER V

CONTROL OF WATERS

Article 53. To promote the best interest and the coordinated protection of flood plain lands, the Secretary of Public Works, Transportation and Communications may declare flood control areas and promulgate guidelines for governing flood plain management plans in these areas.

Article 54. In declared flood control areas rules and regulations may be promulgated to prohibit or control activities that may damage or cause deterioration of lakes and dikes, obstruct the flow of water, change the natural flow of the river, increase flood losses or aggravate flood problems.

Article 55. The government may construct necessary flood control structures in declared flood control areas, and for this purpose it shall have a legal easement as wide as may be needed along and adjacent to the river bank and outside the bed or channel of the river.

Article 56. River beds, sand bars and tidal flats may not be cultivated except upon prior permission from the Secretary of the Department of Public Works, Transportation and Communication and such permission shall not be granted where such cultivation obstructs the flow of water or increase flood levels or as to cause damage to other areas.

Article 57. Any person may erect levees or revetments to protect his property from flood, encroachment by the river or change in the course of the river, provided that such construction does not cause damage to the property of another.

Article 58. When a river or stream suddenly changes its course to traverse private lands, the owners of the affected lands may not compel the government to restore the river to its former bed; nor can they restrain the government from taking steps to revert the river or stream to its former course. The owners of the lands thus affected are not entitled to compensation for any damage sustained thereby. However, the former owners of the new bed shall be the owners of the abandoned bed in proportion to the area lost by each.

The owners of the affected lands may undertake to return the river or stream to its old bed at their own expense; Provided, That a permit therefore is secured from the Secretary of Public

Works, Transportation and Communication and work pertaining thereto are commenced within two years from the change in the course of the river or stream.

Article 59. Rivers, lakes and lagoons may, upon the recommendation of the Philippine Coast Guard, be declared navigable either in whole or in part.

Article 60. The rafting of logs and other objects on rivers and lakes which are flodable may be controlled or prohibited during designated seasons of the year with due regard to the needs of irrigation and domestic water supply and other uses of water.

Article 61. The impounding of water in ponds or reservoir may be prohibited by the Council upon consultation with the Department of Health if it is dangerous to public health, or it may order that such pond or reservoir be drained if such is necessary for the protection of public health.

Article 62. Waters of a stream may be stored in a reservoir by a permittee in such amount as will not prejudice the right of any permittee downstream. Whoever operates the reservoir shall, when required, release water for minimum stream flow.

All reservoir operations shall be subject to rules to regulations issued by the Council or any proper government agency.

Article 63. The operator of a dam for the storage of water may be required to employ an engineer possessing qualifications prescribed for the proper operation, maintenance and administration of the dam.

Article 64. The Council shall approve the manner, location, depth, and spacing in which borings for subterranean or ground water may be made, determine the requirements for the registration of every boring or alteration to existing borings as well as other control measures for the exploitation of subterranean or ground water resources, and in coordination with the Professional Regulation Commission, prescribe the qualifications of those who would drill such borings.

No person shall drill a well without prior permission from the Council.

Article 65. Water from one river basin may be transferred to another river basin only with approval of the Council. In considering any request for such transfer, the Council shall take into account the full costs of the transfer the benefits that would accrue to the receiving basin on account of the

transfer alternative schemes for supplying water to the receiving basin, and other relevant factors.

CHAPTER VI

CONSERVATION AND PROTECTION OF WATERS AND WATERSHEDS AND RELATED LAND RESOURCES

Article 66. After due notice and hearing when warranted by circumstances, minimum stream flows for rivers and streams and minimum water levels for lakes may be established by the Council under such conditions as may be necessary for the protection of the environment, control of pollution, navigation, prevention of salt damage, and general public use.

Article 67. Any watershed or any area of land adjacent to any surface water or overlying any ground water may be declared by the Department of Natural Resources as a protected area. Rules and regulations may be promulgated by such Department to prohibit or control such activities by the owners or occupants thereof within the protected area which may damage or cause the deterioration of the surface water or ground water or interfere with the investigation, use, control, protection, management or administration of such waters.

Article 68. It shall be the duty of any person in control of a well to prevent the water from flowing on the surface

of the land, or into any surface water, or any porous stratum underneath the surface without being beneficially used.

Article 69. It shall be the duty of any person in control of a well containing water with minerals or other substances injurious to man, animals, agriculture, and vegetation to prevent such waters from flowing on the surface of the land or into any surface water or into any other aquifer or porous stratum.

Article 70. No person shall utilize an existing well or pond or spread waters for recharging subterranean or ground water supplies without prior permission of the Council.

Article 71. To promote better water conservation and usage for irrigation purposes, the merger of irrigation associations and the appropriation of waters by associations instead of by individuals shall be encouraged.

No water permit shall be granted to an individual when his water requirement can be supplied through an irrigation association.

Article 72. In the consideration of a proposed water resource project due regard shall be given to ecological changes resulting from the construction of the project in order to

balance the needs of development and the protection of the environment.

Article 73. The conservation of fish and wildlife shall receive proper consideration and shall be coordinated with other features of water resources development programs to insure that fish and wildlife values receive equal attention with other project purposes.

Article 74. Swamps and marshes which are owned by the State and which have primary value for waterfowl propagation or other wildlife purposes may be reserved and protected from damage operation and development.

Article 75. No person shall, without prior permission from the National Pollution Control Commission, build any works that may produce dangerous or noxious substances or perform any act which may result in the introduction of sewage, industrial waste, or any pollutant into any source of water supply.

Water pollution is the impairment of the quality of water beyond a certain standard. This standard may vary according to the use of the water and shall be set by the National Pollution Control Commission.

Article 76. The establishment of cemeteries and waste disposal areas that may affect the source of a water supply or a reservoir for domestic or municipal use shall be subject to the rules and regulations promulgated by the Department of Health.

Article 77. Tailings from mining operations and sediments from placer mining shall be dumped into rivers and waterways without prior permission from the Council upon recommendation by the National Pollution Control Commission.

Article 78. The application of agricultural fertilizers and pesticides may be prohibited or regulated by the National Pollution Control Commission in areas where such application may cause pollution of a source of water supply.

CHAPTER VII

ADMINISTRATION OF WATERS AND ENFORCEMENT OF THE PROVISION OF THIS CODE

Article 79. The Administration and enforcement of the provision of this Code, including the granting of permits and the imposition of penalties for administrative violations hereof, are hereby vested in the Council, and except in regard to those functions which under this Code are specifically

conferred upon other agencies of the government, the Council is hereby empowered to make all decisions and determinations provided for in his Code.

Article 80. The Council may deputize any official or agency of the government to perform any of its specific functions or activities.

Article 81. The Council shall provide a continuing program for data collection, research and manpower development needed for the appropriation, utilization, exploitation, conservation, and protection of the water resources of the country.

Article 82. In the implementation of the provisions of this Code, the Council shall promulgate the necessary rules and regulations which may provide for penalties consisting of a fine not exceeding One Thousand Pesos (P1,000.00) and/or suspension or revocation of the water permit or other right to the use of water. Violations of such rules and regulations may be administratively dealt with by the Council.

Such rules and regulations shall take effect fifteen (15) days after publication in newspapers of general circulation.

Rules and regulations prescribed by any government agency that pertain to the utilization, exploitation, development, control conservation, or protection of water resources shall, if the Council so requires, be subject to its approval.

Article 83. The Council is hereby authorized to impose and collect reasonable fees or charges for water resources development from water appropriators, except when it is for purely domestic purpose.

Article 84. The Council and other agencies authorized to enforce this Code are empowered to enter upon private lands, with previous notice to the owner, for the purpose of conducting survey and hydrologic investigations, and to perform such other acts as are necessary in carrying out their functions including the power to exercise the right of eminent domain.

Article 85. No program or project involving the appropriation, utilization, exploitation, development, control, conservation, or protection of water resources may be undertaken without prior approval of the Council, except those which the Council may, in its discretion, exempt.

The Council may require consultation with the public prior to the implementation of certain water resources development projects.

Article 86. When plans and specifications of a hydraulic structure are submitted for approval, the government agency whose functions embrace the type of project for which the structure is intended, shall review the plans and specifications and recommend to the council proper action thereon and the

latter shall approve the same only when they are in conformity with the requirements of this Code and the rules and regulations promulgated by the Council. Notwithstanding such approval, neither the engineer who drew up the plans and specifications of the hydraulic structure, nor the constructor who built it, shall be relieved of his liability for damages in case of failure thereof by reason of defect in plans and specifications, or failure due to defect in construction, within ten (10) years from the completion of the structure.

Any action to recover such damages must be brought within five (5) years following such failure.

Article 87. The Council or its duly authorized representatives, in the exercise of its power to investigate and decide cases brought to its cognizance, shall have the power to administer oaths, compel the attendance of witnesses by subpoena and the production of relevant documents by subpoena duces tecum.

Non-compliance or violation of such orders or subpoena and subpoena duces tecum shall be punished in the same manner as indirect contempt of an inferior court upon application by the aggrieved party with the proper Court of First Instance in accordance with the provisions of Rule 71 of the Rules of Court.

Article 88. The Council shall have original jurisdiction over all disputes relating to appropriation, utilization, exploitation, development, control, conservation and protection of waters within the meaning and context of the provisions of this Code.

The decisions of the Council on water rights controversies shall be immediately executory and the enforcement thereof may be suspended only when a bond, in an amount fixed by the Council to answer for damages occasioned by the suspension or stay of execution, shall have been filed by the appealing party, unless the suspension is by virtue of an order of a competent court.

All disputes shall be decided within sixty (60) days after the parties submit the same for decision or resolution.

The council shall have the power to issue writs of execution and enforce its decisions with the assistance of local or national police agencies.

Article 89. The decisions of the Council on water rights controversies may be appealed to the Court of First Instance of the province where the subject matter of the controversy is situated within fifteen (15) days from the date the party appealing receives a copy of the decision, on any of the following grounds: 1) grave abuse of discretion; 2) question of law; and 3) questions of fact and law.

CHAPTER VIII

PENAL PROVISIONS

Article 90. The following acts shall be penalized by suspension or revocation of the violator's water permit or other right to the use of water and/or a fine of not exceeding One Thousand Pesos (₱1,000.00), in the discretion of the Council:

- a. Appropriation of subterranean or ground water for domestic use by an overlying landowner without registration required by the Council.
- b. Non-observance of any standard of beneficial use of water.
- c. Failure of the appropriator to keep a record of water withdrawal, when required;
- d. Failure to comply with any of the terms or conditions in a water permit or a water rights grant;
- e. Unauthorized use of water for a purpose other than that for which a right or permit was granted;
- f. Construction or repair of any hydraulic work or structure without duly approved plans and specifications, when required;
- g. Failure to install a regulating and measuring device for the control of the volume of water appropriated, when required;
- h. Unauthorized sale, lease, or transfer of water and/or water rights;

i. Failure to provide adequate facilities to prevent or control disease when required by the Council in the construction of any work for the storage, diversion, distribution and utilization of water;

j. Drilling of a well without permission of the Council;

k. Utilization of an existing well or ponding or spreading of water for recharging subterranean or ground water supplies without permission of the Council.

1. Violation of or non-compliance with any order, rule or regulation of the Council.

m. Illegal taking or diversion of water in an open canal, aqueduct or reservoir;

n. Malicious destruction of hydraulic works or structures valued at not exceeding ₱5,000.00.

Article 91. A A fine not exceeding Three Thousand Pesos (₱3,000.00) or imprisonment for not more than three (3) years, or both such fine and imprisonment, in the discretion of the Court, shall be imposed upon any person who commits any of the following acts:

1. Appropriation of water without a water permit, unless such person is expressly exempted from securing a permit by the provisions of this Code.

2. Unauthorized obstruction of an irrigation canal.

3. Cultivation of a river bed, sand bar or tidal flat without permission.

4. Malicious destruction of hydraulic works or structure valued at not exceeding Twenty-Five Thousand Pesos (₱25,000.00).

B. A fine exceeding Three Thousand Pesos (₱3,000.00) not more than Six Thousand Pesos (₱6,000.00) or imprisonment exceeding three (3) years but not more than six (6) years, or both such fine and imprisonment in the discretion of the Court, shall be imposed on any person who commits any of the following acts:

1. distribution for public consumption of wate water which adversely affects the health and safety of the public.

2. Excavation or enlargement of the opening of a hot spring without permission.

3. Unauthorized obstruction of a river or waterway, or occupancy of a river bank or seashore without permission.

4. Establishment of a cemetery or a waste disposal area near a source of water supply or reservoir for domestic or municipal use without permission.

5. Constructing, without prior permission of the government agency concerned, works that produce dangerous or noxious substance, or performing acts that result in the introduction of sewage, industrial wate, or any substance that pollutes a source of water supply.

6. Dumping mine tailings and sediments into rivers or waterways without permission.

7. Malicious destruction of hydraulic works or structure valued more than Twenty-Five Thousand Pesos (₱25,000.00) but not exceeding One Hundred Thousand Pesos (₱100,000.00).

C. A fine exceeding Six Thousand Pesos (₱6,000.00) but not more than Ten Thousand Pesos (₱10,000.00) or imprisonment exceeding six (6) years but not more than twelve (12) years, or both such fine and imprisonment, in the discretion of the Court, shall be imposed upon any person who commits any of the following acts:

1. Misrepresentation of citizenship in order to qualify for water permit.

2. Malicious destruction of a hydraulic works or structure, valued at more than One Hundred Thousand Pesos (₱100,000.00).

Article 92. If the offense is committed by a corporation, trust, firm, partnership, association or any other juridical person, the penalty shall be imposed upon the President, General Manager, and other guilty officer or officers of such corporation, trust, firm, partnership, association or entity, without prejudice to the filing of a civil action against said juridical person. If the offender is an alien, he shall be deported after serving his sentence, without further proceedings.

After final judgment of conviction, the Court upon petition of the prosecuting attorney in the same proceedings, and after due hearing, may, when the public interest so requires, order the suspension or dissolution of such corporation, trust, firm, partnership, association or juridical person.

Article 93. All actions for offenses punishable under Article 91 of this Code shall be brought before the proper court.

Article 94. Actions for offenses punishable under this Code by a fine of not more than Three Thousand Pesos (₱3,000.00) or by an imprisonment of not more than three (3) years, or both such fine and imprisonment, shall prescribe in five (5) years; those punishable by a fine exceeding Three Thousand Pesos (3,000.00) but not more than Six Thousand Pesos (₱6,000.00) or an imprisonment exceeding three (3) years but not more than six (6) years, or both such fine and imprisonment, shall prescribe in seven (7) years; and those punishable by a fine exceeding Six Thousand Pesos (₱6,000.00) but not more than Ten Thousand Pesos (₱10,000.00) or an imprisonment exceeding six (6) years but not more than twelve (12) years, or both such fine and imprisonment, shall prescribe in ten (10) years.

CHAPTER IX

TRANSITORY AND FINAL PROVISIONS

Article 95. Within two (2) years from the promulgation of this Code, all claims for a right to use water existing on or before December 31, 1974 shall be registered with the Council which shall confirm said rights in accordance with the provisions of this Code, and shall set their respective priorities.

When priority in time of appropriation from a certain source of supply cannot be determined, the order or preference in the use of the waters shall be as follows:

- a. Domestic and municipal use
- b. Irrigation
- c. Power generation
- d. Fisheries
- e. Livestock raising
- f. Industrial use, and
- g. Other uses.

Any claim not registered within said period shall be considered waived and the use of the water deemed abandoned, and the water shall thereupon be available for disposition as unappropriated waters in accordance with the provisions of this Code.

Article 96. No vested or acquired right to the use of water can arise from acts or omissions which are against the law or which infringe upon the rights others.

Article 97. Acts and contracts under the regime of old laws, if they are valid in accordance therewith, shall be respected, subject to the limitations established in this Code. Any modification or extension of these acts and contract after the promulgation of this Code, shall be subject to the provisions hereof.

Article 98. Interim rules and regulations promulgated by the Council shall continue to have binding force and effect, when not in conflict with the provisions of this Code.

Article 99. If any provision or part of this Code, or the application thereof to any person or circumstances, is declared unconstitutional or invalid for any reason, the other provisions or parts therein shall not be affected.

Article 100. The following laws, parts and/or provisions of laws are hereby repealed:

a. The provisions of the Spanish Law on Waters of August 3, 1986, the Civil Code of Spain of 1889 and the Civil Code of the Philippines (R.A. 386) on ownership of waters, easements relating to waters, use of public waters acquisitive prescription on the use of waters, which are inconsistent with the provisions of this Code.

b. The provisions of R.A. 6395, otherwise known as the Revised Charter of the National Power Corporation, particularly section 3, paragraph (f), and section 12, insofar as they relate to the appropriation of waters and the grant thereof;

c. The provisions of Act No. 2152, as amended, otherwise known as the Irrigation Act, section 3, paragraphs, (k) and (m) of P.D. No. 813, R.A. 2056; Section 90, C.A. 137; and,

d. All Decrees, Laws, Act, parts of Acts, rules of Court, executive orders, and administrative regulations which are contrary to or inconsistent with the provisions of this Code.

Article 101. This Code shall take effect upon its promulgation.

Done in the City of Manila, this 31st day of December,
Nineteen Hundred and Seventy-Six.

(Sgd) FERDINAND E. MARCOS
President

By the President:

(Sgd) JACOBO C. CLAVE
Presidential Executive Assistant

Appendix B. FUNCTIONS OF THE SYSTEMS MANAGEMENT DEPARTMENT,
NIA

Provide assistance and advice on the operation, maintenance, repair and improvement of irrigation system.

Review plans and programs of work for operation, maintenance, repair and improvement of irrigation systems submitted by field offices.

Prepare annual financial requirements for the operation and maintenance of irrigation system.

Develop plans for the conduct of irrigation research to increase irrigated area, cropping intensity and average yield per hectare and exercise functional supervision over research stations laboratories in the field offices.

Perform other related functions

Operation and Maintenance Division

- Prescribe guidelines, standards and procurement for the proper operation and maintenance of irrigation systems; review and evaluate their implementation.
- Review annual plans and programs of target area for irrigation, drainage, and level of production, including budget estimates

of each irrigation system and consolidate into an overall plan.

- Prepare comprehensive reports per system on the status of water management as well as the efficiency of the physical structures in water utilization.
- Evaluate crop production reports and review recommendation for exemption from payment of irrigation fees.
- Perform other related functions.

Rehabilitation Division

- Formulate standards, guidelines and procedures for the repair/improvement of damaged existing facilities in all national communal and pump irrigation systems.
- Review and evaluate plans, programs and financial requirements submitted by field offices for the repair and improvement of facilities.
- Evaluate accomplishment reports in the repair and improvement work against approved plans and improvement work for the preparation of periodic reports and overall plans and programs.
- Perform other related functions.

of each irrigation system and consolidate into an overall plan.

- Prepare comprehensive reports per system on the status of water management as well as the efficiency of the physical structures in water utilization.
- Evaluate crop production reports and review recommendation for exemption from payment of irrigation fees.
- Perform other related functions.

Rehabilitation Division

- Formulate standards, guidelines and procedures for the repair/improvement of damaged existing facilities in all national communal and pump irrigation systems.
- Review and evaluate plans, programs and financial requirements submitted by field offices for the repair and improvement of facilities.
- Evaluate accomplishment reports in the repair and improvement work against approved plans and improvement work for the preparation of periodic reports and overall plans and programs.
- Perform other related functions.

Research and Development Division

- Develop plans for the conduct of irrigation research to increase irrigated area, cropping intensity and average yield per hectare
- Exercise functional supervision over research stations/ laboratories in the field offices.
- Evaluate, package and disseminate research finding/results and related development for utilization in irrigation system management and operations.
- Perform other related functions.

Appendix C. FUNCTIONS OF THE OPERATION DIVISION, OFFICE OF
THE RID

Responsible for monitoring and evaluating the operations and maintenance of national systems.

1. Reviews annual operating plans, budgets, program of works and repair and rehabilitation plans of national systems within the region.
2. Monitors and evaluates performance of national systems within the region with regards to operations, maintenance, and collections. Makes recommendations for improvement through the office of the Regional Irrigation Director.
3. Monitors progress of rehabilitation and repairs made by national systems in the region.
4. Evaluates crop production reports and reviews recommendations for exemption from payment of irrigation fees.
5. Conducts visual inspections of national systems in the region to appraise actual field conditions. Recommends changes through the Office of the Regional Irrigation Director.
6. Provides technical assistance to farmers to improve their production yields.¹

¹This function is done only in Region V.

Appendix D: FUNCTIONS OF THE ENGINEERING DIVISION, OFFICE
OF THE RID.

Responsible for identifying potential irrigation projects, determining economic and technical feasibility of potential projects, designing minor structures and supervising and monitoring the construction of irrigation projects in the region.

1. Identifies potential irrigation projects in the provinces within the region.
2. Conducts technical and economic feasibility studies of potential communal irrigation projects.
3. Prepares basic design data of proposed projects.
4. Designs and prepares plans/working drawings of minor structures and civil works for national and communal irrigation projects.
5. Prepares detailed cost estimates of proposed projects.
6. Prepares implementation plans and construction schedules of approved projects including funds, manpower, equipment and other requirements.
7. Inspects monitors, and evaluates the progress of on-going construction projects to ensure compliance with design specifications and/or contract provisions.

8. Prepares contract documents for projects to be contracted in accordance with NIA and government policies.
9. Monitors the formation of farmer's organization in communal irrigation projects/systems.

Appendix E. EXISTING FUNCTIONAL STATEMENTS
Irrigators Assistance Department

1. Formulates policies and guidelines in the takeover of the operations and maintenance of irrigation systems or parts thereof by established irrigators associations.
2. Develops strategies in the formation of irrigators association into functional and viable entities.
3. Develops training programs to develop skills of community organizers in establishing functional and viable irrigators associations.
4. Coordinates with other government and private agencies involved in agricultural development in providing agricultural services to farmers.
5. Assists field units in the formulation of agricultural development programs of foreign loan assisted projects and provide technical assistance in the implementation of such programs.
6. Monitors farm production inputs as a measure of correcting shortfalls and the movement of farm products to institute corrective measures whenever deficiencies occur.
7. Develops schemes in evaluating the impact of the construction of irrigation projects and the extent of assistance rendered to water users.

8. Supervises the activities of Agricultural Coordination Divisions in all regions, Agricultural Development Divisions in all foreign loan-assisted projects, and special projects like IOMP on WB-assisted projects and PBME in ADB-assisted project.
9. Coordinates the services of consultants engaged for the various foreign-loan assisted projects in the field of agronomy-institutions.
10. Collaborates with other NIA units and outside interested parties in the design and implementation of special studies on the management and operation of irrigation systems and related fields.
11. Submits reports to higher authorities and to the foreign lending institutions pertaining to irrigators assistance activities and other agricultural development programs.

Appendix F: Sample Contract for Services

Republika ng Pilipinas
 PAMBANSANG PANGASINAN NG PATUBIG
 (National Irrigation Administration)
 PUROK BLG. I
 Lungsod ng Laoag

KNOW ALL MEN BY THESE PRESENTS:

This Contract executed and entered into this day of _____
 at _____ Philippines by and between:

The NATIONAL IRRIGATION ADMINISTRATION, here inafter referred to as NIA, a government owned and controlled corporation created under P.A. No., 3601, as amended by P.D. 552 with principal office at NIA Bldg., RENA, Diliman, Quezon City, Philippines, representation in this agreement by _____ of NIA Region I with office at Urdaneta, Pangasinan who is duly authorized to bind it in this agreement;

- and -

The MEDINA-BANGAY LATERAL & Irrigators Association, Inc. hereinafter referred to us the ASSOCIATION, an association duly organized and registered in accordance with the of the Philippines, with principal office at _____ represented herein by its President _____ who is duly authorized to bind it in this agreement.

WITNESSETH, THAT

WHEREAS, NIA operates and maintains national irrigation systems.

WHEREAS, NIA employs Ditchtenders to undertake the operation and maintenance of there irrigation facilities.

WHEREAS, equitable water distribution and cropping schedule, increased agricultural production and farmers' farm income one better payment/collection of irrigation free can be satisfactorily attained by a joint participation of NIA and the ASSOCIATION in the operation and maintenance of the Ditchtenders' Section.

WHEREAS, the ASSOCIATION manifested its desire and intention to operate and maintain a Ditchtenders' section of Dingras River Irrigation System properly describes as follows:

LATERAL A sta 0 + 000 - sta 4 + 104.80

TOTAL LENGTH - - - - - 4.104 kms.

WHEREAS, NIA signifies its willingness and conformity to hire the services of the ASSOCIATION to operate and maintain the Ditchtenders' Section described above, including the collection of irrigation fees.

WHEREAS, the NIA and the ASSOCIATION have decided to jointly enforce discipline among water users; Association members and non-members alike.

NOW THEREFORE, for and in consideration of the foregoing premises, the parties hereby agree as follows:

I. OBLIGATION OF THE NIA

1. To guarantee the delivery of irrigation water both for dry and wet seasons based on the program area and pre-determined water requirement.
2. To provide the ASSOCIATION an advance information in case of inability to deliver water due to unavoidable circumstances.
3. To perform major repairs of the irrigation facilities that will be damaged by typhoons, floods and other causes of calamities.
4. To provide the ASSOCIATION with irrigation bills of the area at least ten (10) days before harvest time starts.
5. To furnish the ASSOCIATION Parcellary Map of the under contracts.
6. To provide technical supervision in the proper implementation of this agreement.

II. OBLIGATIONS OF THE ASSOCIATION:

1. To clear, maintain one provide minor repair to the irrigation facilities in the area under contract, to include farm ditches, turnouts on drains to the satisfaction of the NIA under existing policies particularly, MC No. 70s, 1972.
2. To maintain an office along the canal and more or least at the center of the area unser contract.
3. To appoint a member to represent the ASSOCIATION in case the President is not available.
4. To follow strictly the operations plan of the system.
5. To submit to NIA a list of planted area, 15 days after transplanting.
6. To attend to meetings, seminars and trainings called by the NIA.
7. In case of water shortage, to give priority in water service to members of the ASSOCIATION.
8. To serve and collect irrigation bills among individual members.
9. The representative, preferable the Treasurer, who shall assist in the collection of irrigation service fees, be bonded by an authorized bonding company.
10. To remit collection to NIA bill Collector every Friday or when collection reaches ₱500.00
11. To submit to NIA policies, rules and regulations.

III. RENUMERATION

The NIA agree to compensate the ASSOCIATION for services rendered under this contract the amount of ₱500.00 per month payable at the end of the month.

In addition, the Association will receive a collection bonus of 2.5% of their collection provided they had collected at least 70% of the total current account or 3.0% for collecting 100% in one year.

It must be made clear that no employee-employer relationships shall exist between the NIA and the ASSOCIATION under this CONTRACT. Hence, the ASSOCIATION shall not be entitled to GSIS and retirement benefits, health and accident insurance and vacation or sick leave.

IV. SPECIAL PROVISIONS

1. The NIA shall conduct a two (2) day live-out training for the ASSOCIATION members.
2. The NIA and the ASSOCIATION shall have a joint meeting to discuss the mechanics of operating and maintaining the SECTION.
3. The NIA and the ASSOCIATION shall jointly verify the reported irrigated and planted area covered cropping season.
4. Any complaints on irrigation within the area under contract should be the concern of the ASSOCIATION and will only be referred to the NIA if the case is already beyond their capabilities.
5. An evaluation meeting shall be held every after cropping season to thresh out and identify problems and consider solutions thereto any time the needs arises.

V. APPROVAL BY THE ADMINISTRATOR

This Contract is subject to the approved by the NIA Administrator or his duly authorized representative.

VI. EFFECTIVITY OF CONTRACT

This contract shall take effect upon approval of the NIA Central Office and shall be valid for a period of one (1) year and renewable thereafter. However, it may to terminated anytime before expiration by either party upon written notice to that

effect on or at least thirty (30) days prior to the date of termination.

VII. AMENDMENTS

The terms and conditions of this contract may be amended by both contracting parties as the need arises.

IN WITNESS WHEREOF, the Parties hereunto signed this Contract this _____ day of _____, Philippines.

NATIONAL IRRIGATION ADMINISTRATION

MEDINA-BANGAY LATERAL A IIRRI. ASSOCIATION INC.

BY: _____
Officer-in-charge

BY: _____
President

WITNESSES:

Chief Operations Division

Officer-in-Charge

APPROVED:

Administrator

Appendix G:

SURVEY OF IRRIGATION SYSTEMS IN THE PHILIPPINES
COLLEGE OF DEVELOPMENT
ECONOMICS AND MANAGEMENT

I. GENERAL INFORMATION:

1. Type of system (Pump, Gravity, Run of the River) _____
2. Name of the System _____
3. Owner of System _____
4. Year completed/Age of the system _____
5. Location/Area covered (municipalities/barrio) _____

6. Method of water delivery (continuous flow, rotation, others)

7. Region/agro climatic Zone (where system belongs) _____
8. Based on hydrological data what is the projected cropping
intensity of the system? Dry _____ Wet _____
9. Office/Address (where system belong) _____
10. Source of data (Person/Address) _____
11. Educational Attainment _____

II. SOCIO-ECONOMICS INFORMATION:

1. Farm sizes (has.) in the service area: (landholding)

Minimum _____ Maximum _____ Ave. _____

2. Tenure Status of the Farmers in service area.

TENURE	% of Farmers Served
Owner-operator	
Leasee	
Tenant	

3. Service Area/Irrigated and unirrigated area/yields.

ITEMS	1984(Dry)	1983 (Wet)
Design service area (ha.)		
Irrigated Area (ha.)		
a) rice crop		
b) non-rice crop (specify)		
i		
ii		
iii		
iv		
v		
Yield/ha.		
Irrigated Area:		
a) rice crop		
b) non-rice crop (specify)		

Items	1984 (dry)	1983 (Wet)
i		
ii		
iii		
iv		
v		

III. FINANCIAL INFORMATION:

1. Where do you get your budget for operation and maintenance expenditures for the system? _____

2. What was your approved budget for the last 2 years?
1983 _____ 1982 _____
3. a) Are the above amounts equal to/less than /greater than your proposed budget?
b) Why? _____

4. Do you think the approved budgets were sufficient to efficiently operate and maintain the system?
Yes _____ No _____
5. Construction and Rehabilitation
 - a) Total construction cost of the system ₱ _____
 - b) No. of times the system has undergone major rehabilitation since year completed construction _____

 - c) Year last rehabilitated _____

6. Actual System Income and Expenses

	1983	1982	1981	1980
Total Income (Collections, etc.)				
O & M Expenses:				
Personnel Services*				
Power Cost (for pumps)				
Other Cost (e.g. gasoline, oil, etc.)				
Total O & M Costs				
O & M Surplus (Deficit)				

* Includes salaries and wages, GSIS, Pag-ibig, COLA Amelioration allowance, 13th month pay, contractual services etc.

7. Existing Personnel in the system:

(For communal, also get the line up of offices and determine if they receive salaries and how much).

PERSONNEL	No.	No. of systems Reporting
A) Office based/Administrative		
Manager		
Asst. Project Manager		
Irrigation Superintendent		

- _____ Clerk _____
- _____ Supervising _____
- _____ Accounting _____
- _____ Billing _____
- _____ Bill Collectors _____
- _____ Radio Operators _____
- _____ Janitor _____
- _____ Security Guard _____
- _____ Farmer Organizers _____
- _____ Others (identify) _____

) Operation and Maintenance

- _____ Gate keeper _____
- _____ Watermaster _____
- _____ Pump Operators _____
- _____ Equipment Operators _____
- _____ Repair Crew _____
- _____ Ditchtenders _____
- _____ Grass cutters _____
- _____ Welders _____
- _____ Others (identify) _____

. Who among the above personnel are involved in the regular maintenance of the system? _____

Describe briefly the kind of maintenance work done by these personnel.

LINE-UP OF OFFICERS

(For Communal)

Officers	Tenure	TOTAL ANNUAL SALARIES PAID

9. Is financial viability an important objective of the system

Yes _____ No _____

10. If yes, describe the strategy used by the irrigation system in trying to attain or maintain financial viability.

Strategies

- a) _____
- b) _____
- c) _____

IV. FARMER'S ORGANIZATION PARTICIPATION

1. Do you think farmer-irrigators associations have an effect on collection? Yes _____ No _____

Why? _____

2. Does the system have a regular appropriations for farmer's associations? Yes _____ No _____

3. If Yes, state the amount of budgets.

Item	1983	1982	1981	1980
For Farmer trainings				
For Organizing farmers				
Other Related Purposes (specify)				

4. Farmer Irrigator's Association within the service area.

Name of Association	Year Organized	No. of Members	No. of ha. covered by association	Status*

* Describe if active, or if responsibilities on O & M are turned over to the association.

5. Describe the working arrangement between NIA and farmers irrigators association.

a) On Collection:

b) On Maintenance:

c) On Water distribution:

6. Who determines the actual distribution of water to the users?

7. Are farmers consulted in the planning of water distribution?

Yes _____ No _____

8. Does the system receive complaints from farmers on water supply?

not at all _____

seldom _____

often _____

very often _____

9. Who among the farmers usually complain about water supply?

Tail end _____

Midstream _____

Upstream _____

10. To whom are these complaints submitted?

(Specify) system personnel _____

11. Describe briefly how water is actually distributed to the users
(e.g. is there a water distribution schedule being followed?)

V. FEES AND COLLECTION

1. Present Irrigation Fee Rate: Dry _____ Wet _____
2. Has the rate ever been changed? Yes _____ No _____
3. If Yes, state previous rate (state yr) _____ Dry _____ Wet _____
4. Do you collect fees in kind? Yes _____ No _____
5. Collection and disposal of collections in kind.

ITEMS	1984 (Dry)		1983 (Wet)	
	Quantity	Value	Quantity	Value

Palay collected

Palay disposed

Losses due to spoilage

6. How many times (in a year) do you collect fees? _____

7. Please describe the process of billing and collection
briefly. _____

8. Are farmers associations involved in collection?

Yes _____ No _____

9. Collection Performance

	1984 (Dry)	1983 (Wet)
Collectibles		
Collections - Office		
Collections - Field		
Collections - Through Farmers Association		

10. Collection Problems: (Check and rank the first 3)

- 1. Inability to contact landowners or tenants/lease
- 2. Lack of travel funds and equipment for bill collectors
- 3. Unsettled right of way claims
- 4. Confusion over lessor - leasee of landlord tenant fee sharing
- 5. Low crop yields of farmers
- 6. Poor attitude of farmers towards irrigation
- 7. Anti-payment campaign
- 8. Poor water service
- 9. Late bill preparation
- 10. Others (specify)

11. Who are the farmers that normally give you collection problems (Please check one per category and indicate the approximate proportion of farmers not paying fees regularly).

Farmer category	%	of farmers not paying regularly
By size: Small _____		_____
Large _____		_____
Location (Relative to main source of water)		
Upstream _____		_____
Midstream _____		_____
Tail end _____		_____
Farmer's Association/Affiliation:		
Member _____		_____
Non-member _____		_____

12. What is the penalty/penalties for non-paying water users?

1. _____
2. _____
3. _____

13. How successful is the system in implementing these penalties?

Very successful _____ Failure _____

Successful _____

State reasons: _____

VI. COMMUNAL SYSTEMS SPECIFIC QUESTIONS:

1. Total number of farmers served _____

2. Number of farmers-members _____

3. Irrigation fee rates

members		non-members	
Wet _____	Dry _____	Wet _____	Dry _____

4. Are farmer-members involved in maintaining (e.g. cleaning canals, etc.) the system?

Yes _____ No _____

5. If yes, describe briefly the responsibility of the members in maintaining the system. _____
