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STUDY OF

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**INFRASTRUCTURE
INVESTMENT AND MAINTENANCE
IN THE
REPUBLIC OF THE PHILIPPINES**

PREPARED FOR

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A P P E N D I X

STUDY OF
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IN THE REPUBLIC OF THE PHILIPPINES

EXECUTIVE SUMMARY

NATURE OF THE STUDY

This study, started October 1, 1984, has been undertaken primarily to assess possible options for USAID assistance in the Philippines which would strengthen maintenance capabilities in those infrastructure sectors which show the strongest linkages to the rural employment opportunities and incomes. USAID/Manila wished to have this assessment in hand as it developed its programs for the FY 1986 - FY 1989 period. The specific areas of concern addressed by the study include:

- the linkages that exist in rural areas and smaller cities between infrastructure investment and maintenance on the one hand and productive employment and income on the other.
- current policies and programs of the Philippine Government reflecting priorities for infrastructure investment and maintenance and the institutional environment for the maintenance of infrastructure.
- an overview of existing or planned programs supported by other donor agencies in the field of infrastructure development and maintenance.
- possible options for USAID support of programs in the field of infrastructure development and maintenance.

In addition, Terms of Reference are to be prepared for specific feasibility studies or technical programs suggested by the study. These are submitted separately from this report.

To undertake this study a team of four U.S. professionals, assisted by two Filipino economic researchers, made a review of literature, conducted a number of interviews with government officials in Manila and three selected regions in Luzon, the Visayas and Mindanao, and the staffs of various donor agencies. Following completion of fieldwork, the team made further reviews

and analyses of government budgets and other documents. This report summarizes the findings stemming from these endeavors.

INFRASTRUCTURE, EMPLOYMENT AND PRODUCTIVITY

Slightly over half (52 percent) of all employment in the Philippines is in the sector of agriculture, fishing and forestry. The output per worker in this sector is only half of the average output per worker. The largest group of low income families depend on this sector for livelihood. With few exceptions, employment in the sector is entirely outside Metropolitan Manila. Similarly, service workers account for one-sixth of all employment and their productivity per worker is also low; only three-quarters of the national average. Service employment is found in all barangays, poblaciones and cities, as well as Metropolitan Manila. Many service workers, therefore, are engaged in activities that serve the farmer and their incomes are linked to his level of productivity and well-being.

How the various forms of infrastructure may best serve these groups and the direct and indirect relationships between the availability and quality of infrastructure on the one hand, and agricultural output and rural incomes on the other, has been the first concern of this study.

SECTOR REVIEW

Roads

Farm-to-market roads are the essential link between the farmer, his market, and his sources of supply. It has been demonstrated, once again, in the various studies reviewed for this analysis that upgrading a farm-to-market road system lowers transportation costs and thus increases the farm gate price for products, encourages the farmer to deliver more of his produce directly to the market rather than depending on an intermediate buyer, lowers the costs to the farmer of supplies such as fertilizer and encourages their use, and results in a noticeable increase in average farm income in the area served. Job opportunities and incomes in activities serving this farmer also increased as a result of the farmer's improved income. Better roads connecting market

towns with major port cities and metropolitan markets have the same effect of lowering transportation costs, leaving a larger share of the final market price for the farmer and reducing the price farmers must pay for supplies derived from major manufacturing centers or from abroad.

Because of the clear and demonstrable links between better roads and higher incomes for farmers and those dependent upon them, the road sector is one in which efforts may be concentrated -- if there are gaps in the existing system for providing and maintaining roads. Furthermore, there are a range of useful activities possible, ranging from better maintenance practices, through restoration to entirely new roads.

The existing road network, and programs for improving it and maintaining it, have been reviewed and in general the findings are as follows:

The national road network, built and maintained by the Ministry of Public Works and Highways (MPWH) is to a large degree complete, though upgrading of the system is a continuing activity -- as it would be anywhere in the world. Through the Fourth and Fifth Highway Projects the Philippines is receiving assistance from the World Bank for its current programs of road restoration and improvement. Maintenance is not adequately funded but the amounts allocated for 1985 have been increased somewhat and are proportionately more than for local roads. A maintenance system has been developed that is gaining acceptance by MPWH engineering offices around the country, and under the Fifth Highway Project the Government is committed to further improvements in the way maintenance works are programmed, funded, managed and executed.

The provincial road system, which is the responsibility of the offices of the Provincial Engineers, consists largely of short lengths of road linking the national network with truly local roads. The demand for new roads is likely to be affected by local developments but, because of current fiscal constraints, most capital outlays are for road restoration and rehabilitation. Various donors, including the World Bank, the ADB, Japan through OECF and USAID are providing assistance. Funding for the maintenance of provincial roads is lower, in relation to what is needed, than for national road maintenance and the maintenance effort is subject to more problems. Nevertheless, a system for programming, managing and carrying out the maintenance of pro-

vincial roads has recently been developed and implemented in 15 provinces. The implementation of this system should be extended to other provinces.

At the next level are municipal roads, which are the responsibility of the various municipalities. (Typically, there may be 20 municipalities in a province.) Little is known about the capabilities of municipalities to discharge this responsibility, however. Only a handful have any engineering capability and their resources, including national government contributions, are limited. Various donor programs do provide assistance for improving municipal roads, along with other local roads. Regarding maintenance, the Ministry of Local Government (MLG), with assistance provided through the ADB, hopes to learn more about municipal capabilities so that improved systems, appropriate to municipal resources, can be developed.

At the lowest level are barangay roads, which most directly affect individual farmers and other rural dwellers. Until the beginning of this year barangay roads were the responsibility of several units in the MLG and the barangays themselves. Early this year, the MPWH was directed to provide overall supervision and possibly equipment for maintaining these roads. Construction restoration and improvement of barangay roads may be undertaken by MPWH, provincial engineering offices and the barangay brigades themselves. This effort continues to be supported by various donors, including the World Bank and USAID, and this assistance is funneled through either MPWH or MLG. While MPWH has been directed to provide support for the programming and management of barangay road maintenance, it has not been able to expand its staff to meet this task and, to date, MPWH has no system, comparable to the one for national roads, in place to program, direct and control maintenance of barangay roads. Since there are some 30,000 governmental units involved, an average of 250 per MPWH district, barangay road maintenance represents a substantial managerial task. Furthermore, the funding of barangay road maintenance is seriously deficient, amounting to perhaps 35-40% of what is needed.

It is clear then that local roads, particularly barangay roads, may be an appropriate area for continuing and expanded USAID programs of support. There is little immediate need for assistance to national roads, with the exception (discussed in the body of the report) of a technical assistance project on the enforcement of overloading regulations.

Ports

Water transportation of goods is essential to the economy of the Philippines. Efficient ports that provide low cargo-handling costs and rapid turnaround for vessels reduce transportation costs for both outbound products and inbound supplies. Such cost reductions can benefit the primary producers, including farmers and help make the Philippines more competitive in world trade. Generally, however, the impact of improved ports upon rural incomes is not so direct and immediate as it is in the case of rural roads. Also, the costs of improving and maintaining efficient ports can be borne directly by vessel operators in the form of user fees. Thus ports can generally be financially self-sufficient.

A review of ports in the Philippines was made and it was found that for those ports considered to be national ports, plus a select number of municipal ports, which together handle 97% of the traffic, an organization already exists for their operation, maintenance and improvement in the Philippine Ports Authority (PPA). The PPA is, in general, institutionally capable of carrying out its mission and would also be financially capable were it not for the effects of a 1977 Presidential Decree, which requires that PPA revenues be turned over to the national treasury. The PPA can use these revenues only with the approval of the Office of Budget and Management. In recent years the PPA has succeeded in obtaining only about half the funds it needs for port operation and maintenance, in spite of the fact that its revenues are sufficient to cover all operating and maintenance costs in addition to providing adequate coverage for its outstanding debt. If the PPA were allowed to retain all revenues for its own purposes, port maintenance would be much improved, albeit a better system for programming and managing maintenance is still needed.

With respect to the remaining municipal ports, of which there may be over 500, it should be noted that they handle only 3% of the country's waterborne traffic. Many of these ports are delapidated, some are incomplete and unlikely to be developed and all are under-maintained. Few if any, are financially viable and municipalities have no resources for their operation. Such fees as are collected are, theoretically, to be remitted to the PPA. Some

maintenance of these ports is done by MPWH and it has inventoried close to 300 which it considers may be maintainable. Nevertheless, a regular maintenance program for each port does not exist and major institutional problems must be resolved before an effective program can be implemented.

Given the capabilities of the PPA to operate and maintain national ports, and the relative unimportance of most municipal ports, together with the outstanding institutional problems that affect them, there seems to be little scope for significant USAID assistance in the ports sector. One possible exception to this is discussed in Chapter 7.

Potable Water

Water borne diseases are among the leading causes of illness and death in the Philippines. Diarrhea was the second most important illness in 1979, dysentery was eighth, and infectious hepatitis was tenth. Among causes of the death of infants under one year, diarrhea was third.

There is no public water supply for an estimated 53 percent of the population in rural areas or for 45 percent of the urban population outside Manila. The benefits of a safe public water supply include improved health and productivity for the working population, lower hospital and medical care costs, improved school attendance, improved personal standard of living and a better community atmosphere. Thus, an economic case can be made for new, or improved, potable water systems in both rural and urban areas. Even more important, however, is the socio-political justification -- there is a demand for better water supplies on the part of people and it is an appropriate way for government agencies to demonstrate their responsiveness to peoples' needs.

Linked to better water supplies is the question of sanitation. Outside of Metropolitan Manila, over half the population use unsanitary toilet systems (pit privies, etc.) or have no toilets at all; open ditches are common receivers of human and animal wastes. The hazards posed to nearby water sources are obvious. Even septic tanks and water sealed privies can pose a danger if they aren't properly policed. While rural sanitation is an early need, in urban areas the need for increasingly sophisticated means of

collecting, treating and disposing of wastewater is foreseen in the not too distant future.

In the area of rural water, the need is to provide good water supplies to those who don't have such supplies now. Therefore, in spite of the current emphasis upon maintenance in a time of straitened public finances, this is one sector in which capital expenditures are needed, as foreseen by the Government in its "Rural Water Supply and Sanitation Master Plan; 1982-2000". At the same time it appears fairly certain that the resources available for maintaining existing rural water facilities are inadequate and the degree of support the MPWH is able to provide local water committees and associations may not be sufficient.

Therefore, both the provision of new and expanded rural water systems and maintenance of existing systems would seem to be fields of endeavor in which USAID would be able to strengthen the existing Barangay Water Program and initiate a new program to support current maintenance efforts.

In the area of urban water supplies, it should be noted that there is an existing agency, the Local Water Utilities Authority (LWUA), responsible for supporting local water districts in the provision of good water to urban dwellers. Normally, it can fund new urban systems and expansions to existing systems on the basis of full cost recovery. Overall, LWUA appears to have the institutional capability to fulfill its mission. It currently has few local funds, however, and is unable to establish new local water utilities or utilize the unspent balances of already committed foreign loans. If any help is extended in this area it should be in the form of locally-generated pesos.

Flood Control

In a country like the Philippines, with heavy annual rainfall and frequent typhoons, constant efforts are required in flood control and storm drainage to minimize damage to croplands and settled areas. The effect of successful measures is to encourage planting of crops in rich bottomland areas, thus adding to local and national productivity. By their very nature, however, flood control structures are subject to periodic damage from heavy

storms and if they aren't promptly repaired, damage to crops and structures from subsequent storms can reach disastrous levels. Thus the economic value of early repairs can be very high. Successful efforts to restore flood control facilities to full effectiveness can have a quick impact and lasting positive influence on productivity.

Visits in the field and discussions with MPWH officials revealed that current funding for repairs to flood control systems is far from adequate, so that needed repairs aren't undertaken and large areas of cultivated land remain at hazard. Furthermore, while MPWH has inventoried the flood control works to be maintained, the resources required for an adequate maintenance program have not been estimated and no system for the programming, direction, management and execution of routine maintenance, plus periodic extraordinary repairs occasioned by flood damage, has been developed.

This sector also seems to be one in which a program of assistance could be useful and welcome. Indeed, the Government has already requested some assistance in the repair of recently damaged flood control works. Assistance in repair works alone is not sufficient, however; the development of a systematic approach to maintenance is equally important.

Irrigation

National irrigation systems completed in the last decade have been observed to increase rice output 200 to 600 percent in the areas served. The wet season yields are increased because of firm water supplies and, in the dry season, a new crop may be grown. In some areas two and a half or even three crops each year are made possible through irrigation. Some farmers shift from corn to rice with irrigation because of a higher market return. New irrigation systems, however, have been most effective when accompanied by agricultural extension work, increased use of fertilizer and better credit facilities that enable the farmer to afford more inputs. On the other side, the failure to maintain irrigation systems has resulted in farmers being forced to return to one crop a year because of low flow during the dry season.

Irrigation is an important enough sector, therefore, to warrant conti-

nued attention from USAID, which has in the past provided considerable sums for irrigation projects.

The construction operation and maintenance of national irrigation systems is the responsibility of the National Irrigation Administration (NIA). The NIA is also involved in the construction of smaller Communal Irrigation Systems, which are later turned over to irrigators associations for operation and maintenance, and in the provision of pumped irrigation systems where they are appropriate.

At the present time the NIA is involved in completing a number of major projects, for which it has received funding assistance from the World Bank, the ADB and Japan (OECF), plus a smaller USAID-assisted project, which have rather high capital demands. Given this situation and the fact that it takes a number of years to develop the full benefits from irrigation system investments, and contrasting this with the relatively high and quick returns to expenditures for maintenance, the Government is placing greater emphasis on the latter. With World Bank support, a prototypical operating and maintenance system has been developed and next year it is to be tested on 12 pilot systems. Extension of this system to other national irrigation systems may be an appropriate area for USAID assistance.

Generation and Distribution of Electric Power

A reliable source of electric power is essential for industry, communications and commerce as well as various home-based productive enterprises. For farmers currently producing at little more than the subsistence level, power is a luxury, related more to an improved quality of life than economic need. As farmers move up the productive scale, however, they will find more and more uses for electric power.

The growth rate of installed capacity over the past thirteen years has considerably exceeded the growth rate of the GNP. The present problem is to reduce dependence on oil-based power sources to conserve foreign exchange. Various programs are directed towards this end, including recent energy exploration projects, a possible World Bank loan to upgrade oil-fired generating plants in Manila (to reduce their fuel consumption) and the USAID-supported

gasifier projects to provide producer gas from wood or charcoal, to supplement diesel fuel for irrigation pumps.

Regarding power distribution, the local electric cooperative is the means for bringing electricity to small cities and towns and rural areas. At the end of 1983, 43 percent of the potential house connections had been made. The cooperatives to date have been able to finance their operations from revenues received from customers. However, as extensions are made to increasingly remote areas, the costs per connection are likely to rise and a subsidy element may be needed in the future. Electric lighting, of course, provides a range of benefits. It adds to household safety and security and makes home activities such as handicrafts, housework and homework possible in evening hours. For the time being, though, further system extensions are expected to be on a self-financing basis and external assistance is not foreseen, with the possible exception of CIP for certain items not made locally.

Telecommunication

Good telecommunication systems are of major importance to urban-based industrial, commercial and touristic enterprises, which require rapid access to information on markets, sources of supply and financial centers, but they have not yet entered the productive process in most areas of agriculture. The benefits of good telecommunications are rather indirect for most farmers. A possible exception is security and emergency calls. This is an area that can, however, be covered by police radio nets.

Improved telecommunications are important to the growth of commerce and industry but, because of the capital intensive nature of telecommunications, they tend to be ranked rather low under the current criteria established by the Cabinet. It should also be noted that telecommunications is another area which should be self-financing. Indeed, in the Philippines, it is dominated by the private sector. Any assistance to the sector should, therefore, be limited to programs such as CIP, with its appropriate safeguards.

POLICY OPTIONS

Maintenance and Investment

The main thrust of this study has been the maintenance of infrastructure and the various organizations that are involved in maintenance activities. This has been in response to the study scope of work but also because maintenance has until recently been given a lower priority. Yet a solid economic case can be made for maintenance expenditures, since they:

- make it possible to get a high level of service from a facility or piece of equipment for the major share of its life.
- prolongs the useful life of the facility or piece of equipment and postpones the time when it must be replaced.

On the other side of the coin, if maintenance is deferred or is inadequate the benefits stemming from a project are eroded and maintenance costs rise because of a change in the nature of the work -- what might have been routine, now requires a major effort.

Nevertheless, capital investments are still required, even in a time of financial stringency. Over the longer term, population growth must be accommodated and new areas opened for exploitation. In the shorter term, there may be various reasons for continuing capital outlays. Facilities that have deteriorated to the point where they can no longer be maintained must be restored, assuming that other investments are in place that depend upon the facilities so that economic returns will be high and early. In other instances there may be security factors and socio-political reasons. Such reasons may lie behind the building of roads to serve currently isolated areas or the provision of rural water supplies as a measure of responsiveness by authorities.

Institutional Development

In all programs, whether they are for investment or maintenance, the development of institutional capability and the human resources that will ultimately provide that capability is important. This means that most, if not all programs should include a training component. For maximum effect-

iveness training should be in-country, if at all possible, and should concentrate on the task at hand. Trainees should generally "learn by doing" and be able to immediately see the value of new techniques and practices.

Training programs must also be integrated with the advancement patterns of an organization. Furthermore, rather than providing training on a project by project basis, it may be better to develop sets of training programs and work programs intended to strengthen the capability of an entire organization to discharge its responsibility.

Finally, an issue that comes up frequently in institutional development, is the degree to which organizational functions may be decentralized, as opposed to centralizing control and responsibility. Current thinking among various donor agencies favors decentralization and as much involvement as possible of local people. Given the advantages of that involvement, the shorter time for decision-making and the strengthening of local institutions that results, decentralization remains an appropriate goal. However, to decentralize without providing local bodies with the resources to meet their responsibilities may subvert the entire process. Sufficient resources and guidance should be provided. Also, a complementary approach is to design a program so that, in the short-term, physical accomplishments are considered less important than the development of capabilities. This approach is being used with some success in an ongoing World Bank-assisted program for Communal Irrigation Systems.

Need to Diversify Employment Opportunities in Secondary Cities as Well as Rural Areas

There is an interdependency among rural areas, small towns and secondary cities which requires effective functioning at each level. Growth at one level generally requires, or creates opportunities for, growth at another level. Thus, if rural areas are to increase in productivity and wealth, job opportunities must be created in market towns and secondary cities as well.

This report has focused more on rural areas and small towns, and priority has not been given to urban programs but, over the longer term, such programs will have to be considered if USAID is to have balanced growth as

one of its goals. In the near term, the World Bank has two urban projects aimed at regional and secondary cities and another project intended to help small enterprises, which will normally congregate in cities. USAID programs for the medium term could include assistance to small entrepreneurs and, possibly, re-establishing the City Development Assistance Project, which was generally considered rather successful.

SPECIFIC PROGRAMS IN SELECTED INFRASTRUCTURE SECTORS

In the sector by sector review of infrastructure and organizational responsibilities summarized in the previous pages, three sectors -- local roads, rural water and flood control -- stand out as being most appropriate for the initiation or strengthening of USAID programs of assistance. A fourth, irrigation, is also a candidate but may be somewhat less important.

Within these four sectors, specific programs which might be suitable vehicles for USAID support for infrastructure are suggested and listed below. These programs are largely concerned with infrastructure maintenance but capital investments have clearly not been excluded.

Local Roads

- Continuation of the Rural Roads Program as a program for road restoration, but with the addition of a revolving fund to assist poor provinces with the initial investment.
- Extension of the recently-developed maintenance management system for provincial roads to up to 6 additional provinces. This program would include technical assistance, training and equipment procurement, and it might later be extended to certain municipalities.
- Development of the institutional framework and a suitable management system for maintaining barangay roads, together with training for cadres and research into methods.
- Establishment of a liaison office to assist provincial engineers in locating spare parts for equipment obtained from excess property sources and the use of CIP as a means to provide spare parts that are not specific to brands of equipment originating outside the U.S.

(Also for all roads, technical assistance for reviewing the present vehicle weight and axle-loading regulations, and developing the institutions and procedures needed to enforce these regulations, is suggested.)

Rural Water Supply

- Strengthening of the Barangay Water Program, so it can continue to contribute to achieving the Rural Water Supply Master Plan goals, by establishing a revolving fund to assist provinces in the initial investment required.
- Supporting rehabilitation and maintenance of rural water supply facilities through technical assistance to develop a maintenance system, plus training programs and commodity assistance.

Flood Control Works

- Determination of which flood control systems can most profitably be repaired, followed by the provision of financial assistance for their repair.
- Technical assistance for the development of a management system for programming, directing and monitoring routine and periodic maintenance, plus extraordinary repairs of flood control works.

Irrigation

- Expansion of the number of systems that may be included in the implementation and evaluation of a newly developed system for the operation and maintenance of national irrigation networks. Implementation would include technical assistance, training and possible commodities.

Possible programs in other sectors are discussed in Chapter 7 of this report. Programs in these other sectors, however, are considered to have a lesser impact upon the poorer populations of rural areas than the ones identified above.

CHAPTER I

INTRODUCTION

This report is the work of a team provided by TIPPETTS-ABBETT-McCARTHY-STRATTON and EBASCO SERVICES, INC., both of New York, supported by DEVELOPMENT & TECHNOLOGY CONSULTANTS, INC., of Manila, under Contracts Nos. OTR-1406-I-00-1131-00 and OTR 1406-I-00-1181-00. Work orders for the study were signed in September, 1984 by AID Washington.

1.1 THE PROJECT CHARGE

The fundamental purpose of this project was to make an assessment of possible options for USAID assistance to strengthening infrastructure maintenance capabilities in those infrastructure areas which show the strongest linkages to facilitating rural productivity and employment.

A four-man team, consisting of a transportation engineer, a water engineer, an electrical engineer and an economist, was requested to start work in Manila October 1, 1984 and to submit a draft report November 30, 1984. After review by USAID, this final report is to be submitted on December 18, 1984.

The contractor was requested to undertake and report on four, and possibly five, tasks:

- (1) To determine the linkages between the presence of infrastructure and productive employment and output in areas outside Manila, with special attention to opportunities for low-income population in on-farm and off-farm employment in rural areas.
- (2) To conduct an overview analysis of the current Philippine Government infrastructure investment and maintenance priorities, policies, programs, practices and institutions that have an impact on the infrastructure maintenance environment.
- (3) To identify and provide an overview of existing and planned infrastructure programs of the donor agencies, such as the ADB and the IBRD, and assess their effectiveness.

- (4) To identify and formulate strategy options for USAID in view of USAID's interest in the creation of more jobs in rural areas and promotion of higher productivity among those employed, and of USAID/Manila's funding levels. To delineate the pros and cons of each option and the issues involved.

If the contractor believes additional analysis is considered necessary, then to specify the areas requiring additional study, to prepare a TOR for each activity identified, and to suggest a time-phased framework for accomplishment of each analysis.

The investigation was to be conducted by review of available literature and official documents, by interview of officials and other interested parties in Manila, and by field trips to various parts of the Philippines to see the problems at final hand and to discuss them with regional, provincial and municipal officials and district officials of national agencies. The research has been so conducted.

This is the report on points one through four of the charge.

1.2 APPROACH TO THE PROBLEM

The adequate maintenance of infrastructure is a problem long observed in the developing world. A recent study of the Philippines notes that through the decade of the 1960's "limited capital expenditure and low levels of maintenance resulted in an increasingly inadequate level of infrastructure, which by the end of the decade had become a serious bottleneck to expanding output".¹

The same study also reports that "between 1965 and 1972 almost half ... of government expenditure on infrastructure took place in only two regions: Rizal Province (which includes Manila) and Central Luzon (the provinces of Pampanga and Nueva Ecija)".² The concern that rural infrastructure is deteriorating and is not getting an adequate share of national investment funds is not new.

¹ Philippines, A Country Study, Nena Vreeland, Geoffrey B. Hurwitz, Peter Just, Philip W. Moeller, R.S. Shinn; American University, U.S. Government Printing Office, Washington D.C., 1982; p. 259.

² Op cit, p. 318.

Each member of the TAMS/EBASCO study team chosen for the project had had extensive work experience in the developing world and had encountered the problems elsewhere.

The team spent two weeks in Manila reviewing available literature, interviewing key people in USAID, the National Economic and Development Authority, the Asian Development Bank, and various national government agencies. Because of time constraints it was not possible to visit all regions of the country in order to see conditions at first hand. Therefore, plans were made to visit three regions in Luzon, Mindanao and the Visayas. To properly select these regions and make sure that various income levels would be represented, a table was prepared arraying all the regions by per capita gross domestic product, from the highest after Manila, Southern Tagalog (IV), to the lowest, Eastern Visayas (VIII) (Table 1-1). Of the three regions that were selected, Central Luzon (III) fell in the top third, excluding Manila, Western Visayas (VI) fell in the middle third, and Central Mindanao (XII) fell in the bottom third of the array. These three regions also provided the desired geographical distribution.

Two full days were spent in Bulacan, Tarlac and Pampanga provinces conferring with the Governors and their Provincial Engineering and development staffs, regional and district engineers in the Ministry of Public Works and Highways, personnel of local water utilities, staff of the National Irrigation Administration, officers of the local electric cooperatives and local businessmen. Various roads, barangay water projects and electrical systems were visited.

In the following week, a full day was spent in Lanao del Norte, about equally divided between the City of Iligan and the provincial capital of Tubod. In Tubod, the Governor made his staff available and joined in the discussion. The Provincial Planning and Development Coordinator, Provincial Engineer and local officials of NIA were interviewed and various projects visited. In Iligan, the manager of Iligan Port Mgt. Unit, PPA, the manager of the Iligan waterworks, the City Engineer and personnel of the Lanao del Norte local electric cooperative were spoken with. Next, a day and a half were spent in Isulan, the capital of Sultan Kudarat Province. The Governor

Table 1-1
 PHILIPPINE REGIONAL POPULATION, URBANIZATION AND
 RANKING BY PER CAPITA GROSS DOMESTIC PRODUCT (GDP)

<u>RANK</u>	<u>REGION & REGION NAME</u>	<u>PER CAPITA GDP 1980 (Pesos)</u>	<u>POPULATION ('000)</u>	<u>PER CENTAGE POPULATION</u>	<u>CUMULATIVE PER-CENTAGE</u>	<u>LARGEST CITY</u>	<u>POPULATION IN LARGEST CITY</u>	<u>POPULATION IN METRO AREA</u>	<u>% POPULATION IN LARGEST CITY</u>	<u>% ^{a/} URBAN</u>	<u>% RURAL</u>
1	NCR National Capital Region	13,449	5,926	12	12	Manila	1,630	5,926	100	100	-
2	IV Southern Tagalog	6,480	6,119	13	25	Batangas	144	-	2	37	63
3	XI Southern Mindanao	5,509	3,347	7	32	D a v a o	610	-	18	34	66
4	III Central Luzon	5,114	4,803	10	42	Angeles	189	-	4	42	58
5	VII Central Visayas	4,877	3,787	8	50	Cebu City	490	-	13	32	68
6	X Northern Mindanao	4,628	2,759	6	56	Cagayan de Oro	227	-	8	27	73
7	VI Western Visayas	4,478	4,526	9	65	Bacolod	262	-	6	28	72
8	IX Western Mindanao	3,599	2,528	5	70	Zamboanga	344	-	-	17	83
9	XII Central Mindanao	3,537	2,271	5	75	Iligan City	167	-	7	19	81
10	II Cagayan Valley	3,460	2,215	5	80	-	-	-	-	16	84
11	1 Ilocos Region	3,025	3,541	7	87	Baguio	119	-	3	24	76
12	V B i c o l	2,606	3,477	7	94	Legaspi	100	-	3	21	79
13	VIII Eastern Visayas	2,225	2,799	6	100	Calbayog	107	-	4	22	78
P H I L I P P I N E S		5,502	48,098	6		Manila	1,630	5,926	$\frac{5926}{48098}$ 12%	37	63

^{a/}Urban includes settlements of 5,000 or more.

Source: Statistical Yearbook, 1984

was an active participant in the discussions and interviews were conducted with the Provincial Engineer, the NIA's provincial irrigation staff, the Provincial Planning and Development Coordinator and other members of the Governor's staff. At the same time the MPWH District Engineer and his staff, plus the staff of the Maguindanao local electric cooperative were interviewed. Short visits were made to inspect roads, water supply facilities, irrigation projects, power distribution systems and the market and milling town of Tacurong.

In the third week, a full day was spent in Iloilo where the team first met the Governor, then conducted interviews with the Provincial Planning and Development Coordinator, the Provincial Engineer, the district office of NIA, the local office of the Farm Systems Development Corp., the manager of Iloilo Port Mgt Unit, PPA, the staff of Iloilo I local electric cooperative, and the Iloilo City Engineer and urban planning staff, plus the Region VI Director of the National Economic and Development Authority. Visits were made to various projects. A second full day was spent in Bacolod interviewing the Provincial Engineer (who is also Provincial Administrator), the Provincial Planning and Development Director, the District/City Engineer, a PPA official from Pulpandan sub-port and the Central Negros local electric cooperative. A visit was also made to the NIA district office in Bago and to the national irrigation system near Murcia.

Since completing the fieldwork the team has continued to interview various officials of national agencies and donor agencies, has further examined the available literature and has dug into the detailed budgetary figures for the various agencies concerned with the construction and maintenance of infrastructure.

The following report is the product of these efforts.

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CHAPTER 2

INFRASTRUCTURE, EMPLOYMENT AND PRODUCTIVITY

This Chapter is concerned with the general relationship between infrastructure and the growth of employment and productivity, with particular attention to the employment and earnings opportunities of the lower income population. To start, a description of the economy is provided followed by general evidence of the growth of employment and productivity and a general discussion of the role of infrastructure. Special attention is then given to particular forms of infrastructure -- roads, ports, irrigation systems, public water supply, drainage and flood control, sanitary drainage, electric power and its distribution and telecommunications. What role does each play in creating employment opportunities and raising productivity? How well can this role be isolated?

Finally, the chapter looks at the significance of the maintenance of existing infrastructure, how does it contribute to productivity and what the consequences are of a failure to maintain the infrastructure.

2.1 AN OVERVIEW

The concern of this project is with the Philippines outside of the Metropolitan Manila area (the National Capital Region) but aggregate statistics include the entire nation. A look at the national statistics will try to indicate which parts generally exclude Manila but the role of Manila will require some discussion.

The Structure of the Economy

The Philippine archipelago of some 7,000 islands is estimated to have a current population of about 53 million. The 1980 census found 49,098,000. For purposes of local government, the Republic is divided into the National Capital Region and twelve numbered regions, as shown in Table 1-1. Each region is divided into provinces and most of the local government activities take place at the Provincial level, or

lower. In the 12 Regions there are 73 provinces averaging around 600,000 in population, though with considerable variation, depending on the density of local settlement and the area covered. Some small island provinces have much lower populations.

Each province is divided into ten to fifty municipalities of from 1 to 70 thousand inhabitants. A number of secondary cities are organized separately from municipalities. In addition to those listed in Table 1-1, they include San Fernando in Region III and Iloilo in Region VI. The municipalities and cities are further subdivided into the smallest unit of local government, the barangay. A barangay in the municipalities will include 100 to 200 families — between 600 and 1200 people. There are many thousand barangays. Each barangay has a locally elected captain.

Most revenues are collected by the central government from personal and corporate income taxes, customs and export charges, and miscellaneous sources. Part of the national revenues are redistributed to the regions and provinces to cover most of the costs of local government. The provinces independently collect a real property tax, which is used to match some national funds in road construction and repair.

The national population is 37 percent urban, those living in settlements of 5,000 or more, including Manila, and 63 percent rural. If the NCR is excluded, the other 12 regions divide into 28 percent urban and 72 percent rural, as of the 1980 census.

This population distribution relates well to the current distribution of employment which finds 52 percent in agriculture, forestry and fishing (Table 2-1). The remainder of the rural population is engaged in a variety of functions in small hamlets under 5,000 -- mining, rice milling, construction, retail and wholesale trade and a variety of community, social and personal services such as school teaching and governmental administration.

Table 2-1
 EMPLOYMENT BY INDUSTRY SECTOR: 1970, 1980, 1983
 (In thousands)

	CENSUS			PERCENTAGE OF TOTAL		
	1970	3Q 1980	3Q 1983	1970	3Q 1980	3Q 1983
TOTAL	<u>11,358</u>	<u>16,434</u>	<u>19,522</u>	<u>100.0</u>	<u>100.0</u>	<u>100.0</u>
Agriculture, fishery and forestry	6,100	8,453	10,187	53.7	51.4	52.2
Mining and quarrying	51	94	124	0.4	0.6	0.6
Manufacturing	1,354	1,814	1,833	11.9	11.0	9.4
Electricity, gas and water	33	58	92	0.3	0.4	0.5
Construction	438	588	674	3.9	3.6	3.5
Wholesale and retail trade	838	1,660	2,193	7.4	10.1	11.2
Transportation, storage and communications	498	732	827	4.4	4.4	4.2
Financing, insurance, real estate and business services)		336	356		2.0	1.8
Community, social and personal services)	1,862	2,693	3,217	15.4	16.4	16.5
Industry not defined or reported	<u>184</u>	<u>6</u>	<u>19</u>	<u>1.6</u>	<u>*</u>	<u>0.1</u>
Trade and Services Total ^{a/}	<u>2,884</u>	<u>4,695</u>	<u>5,785</u>	<u>25.4</u>	<u>28.6</u>	<u>29.6</u>

* Under 0.05 percent.

^{a/} Includes trade, finance and business services, community and personal services and industry not defined.

Source: Statistical Yearbook, 1984; Tables 11.4 and 11.5.

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Employment in urban areas falls largely into three categories -- manufacturing, wholesale and retail trade and community, social and personal services. Construction and transportation, storage and communications also provide significant employment. Electricity, gas and water utilities and finance, insurance, real estate and business services provide employment mostly in the secondary cities and Manila. The port of Manila is also the base for some deep sea fishing vessels and a small share of fishing employment would be recorded there, as well as in some of the other port cities.

Statistics over almost three decades, 1956-1983, reveal a long, fairly steady decline in the proportion of employment in agriculture, forestry and fishing, from 59 percent in 1956 to 54 percent in 1970 and 52 percent in 1983 (Table 2-2). The economic turmoil of the last two years prevented much decline between 1978 and 1983.

It is interesting that the share of manufacturing has not increased over the 27 year period -- showing 12.5 percent in 1956, 11 percent in 1980 and 9.4 percent in 1983. The recent decline, again, is attributable to the financial stringency of the current period.

The share of transportation, storage and communication grew from 3 percent in 1956 to 4.4 percent in 1970 and has about held at that level since. Construction employment, a significant share of which is used to build infrastructure, grew from 2.6 percent in 1956 to 3.9 percent in 1970 and has held a bit below that level recently. Electricity, gas and water utilities, the smallest of all categories, had had a steady and significant increase in share, from 0.33 percent in 1956 to 0.47 percent in 1983.

The average annual growth rate of employment between 1970 and 1983, 4.3 percent, was significantly higher than for the 1956-1970 period, 2.8 percent. Growth in agriculture, forestry and fisheries at 4.0 percent from 1970 to 1983 was also definitely greater than the 1956-1970 rate of 2.1 percent. Other categories showed no increase in growth except for electricity, gas

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Table 2-2
EMPLOYMENT BY SELECTED INDUSTRY SECTORS, 1956-1983
(In thousands)

	Oct	Oct	Census	Nov	3Q 1978	3Q 1980	3Q 1983 ^P	COMPOUND ANNUAL GROWTH RATE		
	1956	1965	1970	1974				1956-83	1956-70	1970-83
Total Employment	7,702	10,101	11,358	13,824	16,118	16,434	19,522	3.5	2.8	4.3
Agriculture, forestry, fishing	4,548	5,725	6,100	7,684	8,422	8,453	10,187	3.0	2.1	4.0
Manufacturing	962	1,101	1,354	1,423	1,743	1,814	1,833	2.4	2.5	2.4
Construction	198	295	438	403	519	588	674	4.6	5.8	3.4
Electricity, gas, water, sanitary	26	22	33	36	49	58	92	4.8	2.7	8.2
Transport, storage and communications	228	339	498	491	699	732	827	4.9	5.7	4.0

PERCENTAGE OF TOTAL EMPLOYMENT BY SELECTED INDUSTRY SECTOR, 1956-1983

Total Employment	100.0	100.0	100.0	100.0	100.0	100.0	100.0			
Agriculture, forestry, fishing	59.0	56.7	53.7	55.6	52.3	51.4	52.2			
Manufacturing	12.5	10.9	11.9	10.3	10.8	11.0	9.4			
Construction	2.6	2.9	3.9	2.9	3.2	3.6	3.5			
Electricity, gas, water, sanitary	0.33	0.22	0.29	0.26	0.30	0.35	0.47			
Transport, storage and communications	3.0	3.4	4.4	3.6	4.3	4.4	4.2			

P - Preliminary Estimates.

Source: Statistical Yearbook, 1984; Tables 11.4 and 11.5.

and water utilities which rose at 8.2 percent from 1970 to 1983, against only 2.7 percent in 1956 to 1970.

The contribution to Gross National Product from the various sectors is in sharp contrast to the sector shares of employment. Agriculture, forestry and fisheries, with over half of all employment, constitutes only one quarter of GNP, while manufacturing, with about 10 percent of employment, also contributes one quarter to GNP (Tables 2-3 and 2-4). The explanation lies, of course, in the much heavier capital investment in manufacturing and in disciplined, continuous and more specialized work patterns in manufacturing.

The fastest growing sectors of GNP have been construction at 12 percent, electricity, gas and water utilities at 8.8 percent, and transportation, communication and storage at 7.6 percent.

Agricultural gross product has grown at only 4.1 percent, compared with an annual employment growth, in the 1970-1983 period, of 4.0 percent, indicating little increase in average output per worker. In manufacturing, on the other hand, gross product has had a 6 percent a year growth rate while employment grew only 2.4 percent annually, indicating a considerable increase in productivity per worker.

The gross output per worker can be approximated by dividing the employment figures in Tables 2-1 and 2-2 into the gross product for the same sector reported in Table 2-3. The results indicate that the gross product per agricultural, forestry and fisheries worker has not been quite half of that for all workers since 1974 (Table 2-5). The service sector is the next lowest with an average output per worker only 75 percent of the national average.

The highest yield has been in mining and quarrying where capital investment per worker is very high, but where wide fluctuations in international market prices can cause sudden shifts in yield per worker.

Table 2-3
GROSS NATIONAL PRODUCT AND GROSS DOMESTIC PRODUCT
BY INDUSTRIAL ORIGIN: 1970-1983
(In million pesos at constant prices of 1972)

<u>INDUSTRY</u>	<u>1970</u>	<u>1974</u>	<u>1980</u>	<u>1983</u>	<u>ANNUAL GROWTH RATE 1970-1983 (%)</u>
1. Agriculture, Fishery and Forestry	<u>14,734</u>	<u>17,465</u>	<u>23,732</u>	<u>24,845</u>	<u>4.1</u>
2. Industrial Sector	<u>15,048</u>	<u>20,710</u>	<u>33,471</u>	<u>36,048</u>	<u>7.0</u>
a. Mining and quarrying	1,093	1,403	2,236	2,082	5.1
b. Manufacturing	11,823	15,981	23,175	25,084	6.0
c. Construction	1,738	2,745	7,139	7,705	12.1
d. Electricity, gas and water	394	581	921	1,177	8.8
3. Service Sector	<u>21,232</u>	<u>25,964</u>	<u>35,503</u>	<u>39,232</u>	<u>4.8</u>
a. Transport, Communi- cations and storage	2,056	2,933	4,827	5,328	7.6
b. Commerce	12,295	14,351	19,345	21,438	4.4
c. Services	6,881	8,680	11,331	12,466	4.7
Gross Domestic Product at Market Prices	<u>51,014</u>	<u>64,139</u>	<u>92,706</u>	<u>100,125</u>	<u>5.3</u>
Net factor income from the rest of the world	(979)	600	(77)	(77)	17.8
Gross National Product	<u>50,035</u>	<u>64,739</u>	<u>92,629</u>	<u>100,048</u>	<u>5.5</u>

Source: Statistical Yearbook 1984, Table 3.10.

Table 2-4
 PERCENTAGE INDUSTRY COMPOSITION OF GROSS NATIONAL PRODUCT, 1970-1983

<u>INDUSTRY</u>	<u>1970</u>	<u>1974</u>	<u>1980</u>	<u>1983</u>
1. Agriculture, Fishery and Forestry	<u>29.4</u>	<u>27.0</u>	<u>25.6</u>	<u>24.8</u>
2. Industrial Sector	<u>30.0</u>	<u>32.0</u>	<u>36.1</u>	<u>36.0</u>
a. Mining and Quarrying	2.2	2.2	2.4	2.1
b. Manufacturing	23.6	24.7	25.0	25.1
c. Construction	3.5	4.2	7.7	7.7
d. Electricity, gas and water	0.8	0.9	1.0	1.2
3. Service Sector	<u>42.4</u>	<u>40.1</u>	<u>38.3</u>	<u>39.2</u>
a. Transport, Communications and Storage	4.1	4.5	5.2	5.3
b. Commerce	24.6	22.2	20.9	21.4
c. Services	13.8	13.4	12.2	12.5
Gross Domestic Product at Market Prices	<u>102.0</u>	<u>99.1</u>	<u>100.1</u>	<u>100.1</u>
Net factor income from the rest of the world	-2.0	0.9	-0.1	-0.1
Gross National Product	<u>100.0</u>	<u>100.0</u>	<u>100.0</u>	<u>100.0</u>

Source: Table 2-3

Table 2-5
GDP PER WORKER, BY INDUSTRY GROUP, 1970-1983
(In pesos of constant prices of 1972)

	<u>1970</u>	<u>1974</u>	<u>1980</u>	<u>1983</u>	ANNUAL ^{a/} GROWTH RATE <u>1970-1983</u> (%)
Agriculture, fishing and forestry	<u>2,415</u>	<u>2,273</u>	<u>2,808</u>	<u>2,439</u>	(1.5) <u>0.1</u>
Industrial Sector	<u>8,021</u>		<u>13,105</u>	<u>13,243</u>	<u>3.9</u>
a. Mining and quarrying	21,431		23,787	16,790	-1.9
b. Manufacturing	8,732	11,230	12,776	13,685	3.5
c. Construction	3,968	6,811	12,141	11,432	8.5
d. Electricity, gas and water	11,939	16,139	15,879	12,793	(2.9) 0.5
Service Sector	<u>6,278</u>		<u>6,542</u>	<u>5,933</u>	(0.4) <u>-0.4</u>
a. Transport, communica- tions and storage	4,129	5,974	6,594	6,443	3.5
b&c. Commerce and services	6,649		6,534	5,861	-1.0
Gross Domestic Product at Market Prices					(2.3) 1.0

^{a/} Entries in last column in parenthesis are 1970-1980 annual growth rates.

Source: Tables 2-1, 2-2, 2-3.

Manufacturing has grown from almost double the national average in 1970 to more than 2.5 times the national average in 1983. The yields in manufacturing, construction, and electricity, gas and water utilities all reflect the relatively high level of capital investment per worker, in comparison with the agricultural and the service sectors.

A further perspective on the Philippine economy comes from examining the commodity composition of exports. The traditional exports -- coconut products, sugar, forest products, mineral products, fruits and vegetables and other products, all grown or derived from Philippine natural resources -- were 90 percent of the dollar value of all exports from 1955 through 1974 (Table 2-6). The miscellaneous manufactured products, produced with Filipino labor largely from imported materials and components, developed rapidly, and by 1983 were 52 percent of all exports. This provided productive employment in manufacturing for Filipino labor, but required access to considerable foreign exchange to import the necessary materials, such as cloth for clothing and components for electronic equipment.

The serious decline in world prices for sugar, forest products, copper, gold and other mineral products from 1980 to 1983 also reduced the export value of these traditional exports. In some cases this has led to outright reduction in the volume of such products produced and exported.

The present economic circumstances of relatively low world prices for Philippine raw materials, high world real interest rates, and the extreme shortage of foreign exchange available to the Philippine economy have created an absolute decline in dollar earnings and in the foreign purchasing power of these earnings. The 1983 purchasing power of Philippine exports is probably 25 percent below the real purchasing power of 1980 exports. From press reports, it appears that real export earnings in 1984 are even lower.

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Table 2-6
 PHILIPPINE EXPORTS BY MAJOR COMMODITY GROUPS, 1955-1983
 (F.O.B. Values in Million U.S. Dollars)

Major Commodity Group	F.O.B. Values in Million U.S. Dollars					Percent of Total				
	1955	1970	1974	1980	1983	1955	1970	1974	1980	1983
T O T A L	419	1,142	2,725	5,788	5,005	100	100	100	100	100
Coconut products ,	152	212	609	811	680	36	19	22	14	14
Sugar and sugar products	111	196	766	657	321	27	17	28	11	6
Forest products	44	301	338	468	331	11	26	12	8	7
Mineral products	30	224	518	1,031	440	7	20	19	18	9
Fruits and vegetables	6	35	91	365	327	1	3	3	6	7
Abaca and products	29	17	46	31	25	7	2	2	1	1
Tobacco and tobacco products	4	15	31	30	35	1	1	1	1	1
Mineral fuel and lubricants	-	17	17	38	115	0	2	1	1	2
Chemicals	1	5	15	89	87	*	*	1	2	2
Textiles	2	5	20	33	25	*	*	1	1	*
Miscellaneous manufactures and others	37	114	271	2,198	2,586	9	10	10	38	52
Re-exports	3	1	3	37	33	1	*	*	1	1
Traditional (Coconut-Textiles)	379	1,027	2,451	3,553	2,386	90	90	90	61	48

* Under 0.5 percent.

Source: Statistical Yearbook, 1984

The lower income part of the population outside of Manila would be over half of the population, and would be found mostly in agriculture, forestry and fisheries, the service occupations, retail trade, some manufacturing and some construction. Since 1980 these sectors and their employees have lost ground.

Growth in Employment and Productivity

Growth in employment and growth in productivity per worker do not necessarily accompany each other. When they do it generally means a rising standard of living for most, possibly all, of the population. Long run factors affecting employment growth are population growth, degree of participation in the labor force, health, private capital investment in agriculture, industry and trade, public investment in roads, ports, irrigation, supply and distribution of electric power, and growth in demand for total output.

Increases in productivity tend to come from increases in the health, experience, level of education and skill of the labor force, increases in capital investment per worker, increases in technology such as development of high-yielding strains of rice, increased availability of electric power, and improved infrastructure per worker such as more and better roads, improved irrigation, and often the availability of telecommunications.

The advances in total employment, total output and output per worker are best measured over a sufficient number of years to iron out short-term cyclical fluctuations. Data from 1950 or 1956 to 1970 and from 1970 to 1980 or 1983 will tend to show primarily the long term influences. Currently, the Philippines are in a severe cyclical downswing arising from a number of causes: the worldwide recession of 1982 and 1983 and the continuing decline in world prices for major raw material exports of the Philippines such as sugar and copper ore, the unusually high world-wide real rates of interest which bear heavily on all debtor countries, the decline in confidence by investors in the Philippine economy since the summer of 1983, and the difficulty faced

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in getting foreign sources of credit to extend and expand credit available to the Philippines. These cyclical factors, which it is hoped will disappear in a few years, show up in preliminary estimates of employment, output and productivity for 1984. Since they are incomplete, are only estimates, and represent the exaggerated impact of the current cyclical downturn they will not be used for long term comparisons.

In the largest sector of the economy, agriculture, fishing and forestry, which accounted for 52 percent of total employment in 1983, and has sustained a 4 percent average annual growth rate since 1970, productivity grew hardly at all. Since 1970, however, there has been a steady expansion of the highway and road network serving agriculture, there has been a doubling of the hectares under irrigation, an improvement in seed and in the availability of fertilizer, and an increase in the credit and other services available to the farmer. On the other hand, a steadily expanding farm population has been forcing the opening up of less productive lands, that were more marginal under older technology, and the lower yields of these new areas have somewhat diluted the average higher yields of newly irrigated areas. The depressed prices for sugar have severely reduced the contribution to GNP of that crop. The credit stringency and the inflation in the price of imported fertilizer have also held back farm inputs. The growth rate in agricultural productivity between 1970 and 1980 was 1.5 percent, but it dropped to 0.1 percent for the thirteen year period 1970-1983 (Table 2-5).

Manufacturing employment maintained a fairly steady share of 11 percent of the total from 1965 to 1980 (Table 2-2), but the current cyclical downturn has cut it to 9.4%. Productivity in manufacturing, however, has steadily expanded, growing at a 3.9 percent rate between 1970 and 1980 and even 3.5 percent between 1970 and 1983. Manufacturing has been a sector in which developing countries have traditionally found increasingly remunerative employment for a growing population if energy supplies are available and private capital is willing to invest and organize production for attainable markets.

Total employment grew at a rate of 3.5 percent a year from 1956, but over the shorter period in 1970 to 1983, it grew at 4.3 percent.

Gross Domestic Product grew at 5.3 percent during the past 13 years. Productivity per worker grew an average of 1.0 percent a year from 1970 to 1983 (Table 2-7).

Agriculture, forestry and mining and quarrying lie outside the National Capital Region. A more than proportionate share, by population, of the other sectors operate within the NCR. The sectoral analysis indicates that employment outside the NCR may be growing as fast as within the Manila area, but that productivity outside may not be keeping pace with productivity growth in the NCR.

A number of demographic factors have contributed to growth and productivity. The national population has been growing at a 2.9 percent rate from 1948 to 1980, but at only 2.75 percent from 1970 to 1980. The National Capital Region grew at a faster rate -- 4.2 percent since 1948, 4.1 percent since 1970. Outside of Manila, growth was about 1/10 percent slower than the national average.

Participation in the labor force of those 15 to 64 years of age has increased from 53 percent in 1965 to about 65 percent in 1983. The actual labor force has grown 4 percent a year since 1970.

Table 2-7
GROWTH OF EMPLOYMENT, OUTPUT AND PRODUCTIVITY
BY SECTOR, 1970-1983
(Compound Annual Growth Rates)

<u>SECTOR</u>	<u>EMPLOYMENT</u> (%)	<u>GROSS DOMESTIC</u> <u>PRODUCT</u> (%)	<u>OUTPUT</u> <u>PER WORKER</u> (%)
Agriculture, fishing and forestry	4.0	4.1	0.1
Mining and quarrying	7.1	5.1	-1.9
Manufacturing	2.4	6.0	3.5
Construction	3.4	12.1	8.5
Electricity, gas and water	8.2	8.8	0.5
Transportation, communications and storage	4.0	7.6	3.5
Commerce and Services	5.5	4.5	-1.0
T O T A L	4.3	5.3	1.0

Sources: Tables 2-2, 2-3 and 2-5.

The general health of the population has improved steadily as shown by the following statistics of life expectancy at birth.

	<u>Y e a r s</u>	
	<u>Male</u>	<u>Female</u>
1960	51.2	55.0
1970	54.2	57.2
1980	59.8	63.4
1983	60.7	64.3

Longer lives mean more years of productivity and a steady increase in the experience of the labor force.

The educational attainments of the population have grown continuously. The World Bank provides the following comparison (drawn from Philippine official sources) between 1960 and 1981 in school enrollment.

	<u>1960</u>	
Number enrolled in <u>primary</u> school as percentage of age group	95%	110%
Number enrolled in <u>secondary</u> school as percentage of age group	26	63
Number enrolled in <u>higher</u> education as percentage of population 20-24	13	26

The increase in education and experience has enabled Filipino workers to find increasing employment abroad, particularly since the increase in Middle East oil revenues in 1974. The remittances of the Filipino workers have added to the Gross National Product in the net factor income from the rest of the world (Table 2-3).

In addition to these demographic factors, the increase in capital investment in the Philippines and the expanding benefits of research

on high-yielding rice and other products have contributed to employment growth and to increased productivity. Capital flight since mid 1983, however, has acted as a check on growth and productivity.

Agricultural statistics on crop production, hectares under cultivation and yields per hectare over 33 years provide a more detailed view of how output and productivity have grown.

Details for seven leading food crops and two basic commercial crops are presented in Table 2-8. A long term average growth rate is presented for 1950-1980, ending before the current economic stringency started. A shorter period, 1970-1983, growth rate is shown for comparison. In the case of palay, the short period shows a higher growth rate for yield than the longer period, because the high yielding strains were introduced after 1970.

Most of the food crops show some decline in area harvested between 1980 and 1983 -- reflecting the tightness of credit as well as of marketing potential.

The growth of area planted to sugar cane has been stopped by the poor market for sugar since 1980.

The steady increase in area harvested is partially the result of the steady expansion of farm-to-market transportation facilities -- both roads and ports, and also of the steady growth of irrigated areas. Irrigation has also contributed considerably to the growth of palay yields.

A review of the role of infrastructure in the increase of employment and productivity will precede a look at specifics.

Table 2-8
 CROP PRODUCTION, AREA HARVESTED & MEAN YIELD
 FOR SELECTED FOOD AND COMMERCIAL CROPS: 1950, 1970, 1980, 1983

<u>Y E A R</u>	<u>QUANTITY</u> (['] 000 MT)	<u>AREA</u> <u>HARVESTED</u> (['] 000 ha)	<u>MEAN</u> <u>YIELD</u> (MT/ha)
<u>PALAY (FC)</u>			
1950	2,606.1	2,214.0	1.177
1970	5,233.4	3,113.4	1.681
1980	7,835.8	3,636.8	2.154
1983	7,730.5	3,239.6	2.386
AAGR - %			
1950-1980	3.7	1.7	2.0
1970-1983	3.0	0.3	2.7
<u>CORN (FC) SHELLED</u>			
1950	573.7	909.0	0.631
1970	2,008.2	2,419.6	0.830
1980	3,122.8	3,201.1	0.980
1983	3,125.9	3,157.5	0.999
AAGR - %			
1950-1980	5.8	4.3	1.5
1970-1983	3.5	2.1	1.4
<u>BANANA (FC)</u>			
1950	161.4	97.7	1.652
1970	896.0	235.2	3.810
1980	3,977.1	317.6	12.522
1983	3,667.6	315.4	11.629
AAGR - %			
1950-1980	11.3	4.0	7.0
1970-1983	11.5	2.3	9.0
<u>MANGO (FC)</u>			
1950	27.4	32.9	0.833
1970	151.7	45.5	3.334
1980	377.2	39.2	9.630
1983	400.1	42.5	9.415
AAGR - %			
1950-1980	9.1	0.6	8.5
1970-1983	7.7	-0.5	8.3

FC - Food Crop

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(Table 2-8 cont'd.)

<u>Y E A R</u>	<u>QUANTITY</u> (['] 000 MT)	<u>AREA</u> <u>HARVESTED</u> (['] 000 ha)	<u>MEAN</u> <u>YIELD</u> (MT/ha)
<u>PINEAPPLE (FC & CR)</u>			
1950	56.5	15.2	3.717
1970	233.4	28.8	8.104
1980	1,280.7	62.7	20.440
1983	963.8	51.4	18.763
AAGR - %			
1950-1980	11.0	4.8	5.8
1970-1983	11.5	4.6	6.7
<u>OTHER FRUITS & NUTS (FC)</u>			
1950	80.6	48.8	1.652
1970	288.4	70.8	4.073
1980	524.4	71.7	7.083
1983	443.2	74.0	5.990
AAGR - %			
1950-1980	6.4	1.3	5.0
1970-1983	3.4	0.3	3.0
<u>ROOTCROPS (FC)</u>			
1950	664.3	185.5	3.581
1970	1,316.3	252.4	5.215
1980	3,469.6	486.3	7.129
1983	2,659.8	432.5	6.150
AAGR - %			
1950-1980	5.7	3.3	2.3
1970-1983	5.6	4.2	1.3
<u>VEGETABLES INCLUDING ONIONS</u> <u>& POTATOES (FC)</u>			
1950	52.5	20.2	2.599
1970	310.2	62.8	4.939
1980	505.3	68.8	7.512
1983	447.5	65.1	6.874
AAGR - %			
1950-1980	7.8	4.2	3.6
1970-1983	2.9	0.3	2.6

FC - Food Crop
CR - Commercial Crop

(Table 2-8 cont'd.)

<u>Y E A R</u>	<u>QUANTITY</u> (<u>'000 MT</u>)	<u>AREA</u> <u>HARVESTED</u> (<u>'000 ha</u>)		
<u>COCONUT (CR)</u>				
1950	846.1	985.0		0.859
1970	1,726.2	1,883.9		0.916
1980	4,540.2	3,125.9		1.462
1983	3,494.0	3,209.4		1.089
AAGR - %				
1950-1980	5.8	3.9		1.6
1970-1983	5.6	4.2		1.3
<u>SUGARCANE (CR)</u>				
1950	654.0	129.5		5.050
1970	2,594.6	366.1		7.087
1980	3,120.8	424.6		7.350
1983	3,432.5	423.6		8.103
AAGR - %				
1950-1980	5.3	4.0		1.3
1970-1983	2.2	1.1		1.0
<u>YEAR</u>	<u>QUANTITY</u> (<u>'000 MT</u>)	<u>AREA</u> <u>HARVESTED</u> (<u>'000 ha</u>)	<u>QUANTITY</u> (<u>'000 MT</u>)	<u>AREA</u> <u>HARVESTED</u> (<u>'000 ha</u>)
TOTAL: ^{a/}	<u>FOOD CROPS</u>		<u>COMMERCIAL CROPS</u>	
1950	4,275.8	3,609.2	1,613.0	1,465.9
1970	10,670.0	6,406.3	4,530.5	2,540.1
1980	21,837.0	8,222.1	7,972.0	3,910.8
1983	20,116.9	7,727.6	7,144.5	3,928.7
AAGR - %				
1950-1980	5.6	2.8	5.5	3.3
1970-1983	5.0	1.5	3.6	3.4
TOTAL:	<u>FOOD CROPS & COMMERCIAL CROPS</u>			
1950	5,888.8	5,075.1		
1970	15,200.5	8,946.4		
1980	29,809.0	12,132.9		
1983	27,261.4	11,656.3		
AAGR - %				
1950-1980	5.5	2.9		
1970-1983	4.6	2.1		

^{a/} Total include crops not shown here.

Sources: Statistical Yearbook, 1984: Tables 5-1, 5-2.

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The Role of Infrastructure

Infrastructure has been defined in this project to include roads and bridges, ports and harbors, irrigation systems, water supply, flood control, drainage and sewerage, electrification and telecommunications. All are essential to the functioning of a civilization with a substantial degree of exchange, technological development and modernization. Each form requires relatively heavy capital investment and is expected to have a very long life—approaching permanence. The benefits are very widespread. For some sectors it is very difficult to collect from all users a price for use equivalent to the benefit. Such elements must be constructed by public bodies that can borrow large sums and repay from tax revenues. Other elements, such as water, electrification and telecommunications can collect from individual users appropriate fees, but they are most efficiently provided by one supplier, a monopoly, that should be regulated as to prices charged by a governmental body to prevent exploitation of the public.

The construction of infrastructure components is estimated to involve about one-third of the construction activity in the Philippines.

No category or combination of categories of the GNP tables, or from the Input/Output studies for 1974 and 1979 cover transportation infrastructure to the exclusion of those providing transportation services. An estimate of the share which infrastructure represents of total economic activity can only be rather crude. Adding the electricity, gas and water sector and the transportation, communication and storage sector in Table 2-3 and 2-4 gives the following share of total GNP: 1970 - 4.9%; 1974 - 5.4%; 1980 - 6.3%; 1983 - 6.5%. The 1974 Inter-Industry (Input-Output) Accounts of the Philippines indicate that electricity, gas, water, rail transport, other land transport, water transport, air transport and communications together accounted for 2.8 percent of the total value of transactions in the economy at producer prices. If one-third of construction activity is added, the total becomes 3.8 percent.



Every sector of the economy uses some aspects of infrastructure, but the extent of use varies considerably. The degree of variation is indicated in the 1979 Interindustry (Input-Output) Study. This divided the economy into 12 sectors. The total output of each sector was the result of the intermediate inputs from each of the 12 sectors and the primary inputs of wages, depreciation, net indirect taxes and the contributions from ownership including the productivity of land. The primary inputs represent the value added which contributes to Gross Domestic Product, but the intermediate inputs are essential to the production process of the sector. The total value of all the inputs to produce the crops, livestock and poultry sector (sector 1) output is considered equal to unity or 1.0. The total input at market prices of the electricity, gas and water (sector 8) is divided by the total value of all inputs to the crops, livestock and poultry sector and the result is 0.0021920. This is known as Technical Coefficient A. If it is multiplied by 100 the result is 0.2192 or 2/10ths of one percent of all inputs to crop, livestock and poultry. When the total value of contribution by transportation, communication and storage (sector 09) to sector 1 is divided by the total value of the output for sector 1 the result is .0065878, or 0.66 percent of sector 1 output. The sum of sector 8 and sector 9 technical coefficient is 0.0087798, or 0.88 percent of sector 1. A rough estimate of the contribution of infrastructure to the outputs of each sector has been made by adding the coefficients for electricity, gas and water and for transportation, communication and storage. The sum of these for each output sector is shown in Table 2-9. The output sectors are arrayed from the sector with the smallest combined coefficient for the infrastructure inputs to the largest combined coefficient.

The sector for which the infrastructure inputs make the smallest percentage contribution is crops, livestock and poultry for which the combined coefficient is 0.0087798, or 88/100 of 1 percent of total inputs to the sector. Next are forestry and mining. Food manufacture is fourth lowest of the 12 sectors, with a 1.64 percent input. Other manufacture is relatively high with 2.90 percent, and trade is highest with 3.78 percent.

The lowest requirement for public infrastructure would be in subsis-

tence agriculture in which the primary inputs of fertile soil, seed, rainfall and human labor, supplemented by the labor of draft animals, create the product. Specialization and exchange are within the family and the local community, and there is no need for contact with the outside world.

Table 2-9
1979 INPUT/OUTPUT TECHNICAL COEFFICIENTS A FOR
ELECTRICITY, GAS AND WATER, AND TRANSPORTATION,
COMMUNICATIONS AND STORAGE

<u>Output Sector</u>	<u>Sector Number</u>	<u>COMBINED COEFFICIENTS</u>	
		<u>Technical Coefficient A</u>	<u>Percent of Total Input for Sector</u>
Crops, Livestock and Poultry	01	0.0087798	0.88
Forestry	03	0.0114831	1.15
Mining	04	0.0137822	1.38
Food manufactures	05	0.0163973	1.64
Electricity, gas and water	08	0.0189015	1.89
Fishing	02	0.0192939	1.93
Construction	07	0.0196318	1.96
Banking, insurance and real estate	11	0.0204191	2.04
Other manufacturing	06	0.0290128	2.90
Other services	12	0.0312365	3.12
Transportation, communications and storage	09	0.0367699	3.68
Trade	10	0.0377992	3.78

Source: Statistical Yearbook, 1984; Table 3.47.

The movement into commercial agriculture requires the ability to get the crop to market and this requires roads and often ports. As the production process requires commercial fertilizers, special seeds, mechanical equipment and petroleum-based fuels, a network of supply must be built up, again using roads and ports.

The networks of distribution and of supply require the existence of small towns in touch with the farmers and also with more distant markets and sources of supply. These small towns may provide the initial processing of the agricultural product, as in rice mills.

Small towns need to relate to intermediate size cities which may produce some of the required supplies and which have more extensive transportation and communication links with the rest of the world.

Cities require a public water supply and controlled drainage. Large cities require central sanitary drainage (sewerage) systems.

Electric power for lighting and for energy have become modern necessities for cities and towns. In the 1974 Interindustry Study, with 121 sectors, no use of electricity, gas or water is shown for the production of palay or corn, but it becomes a 1 to 3 percent component of many non-food manufacturing sectors. Its peak use is for private medical services, 4.8 percent of all inputs, and hotels, 7.3 percent of inputs.

The Communications sector in the 1974 study had no inputs to palay, corn, sugar cane, coconuts or a total of 13 of the 18 specific agricultural sectors. It had some, though relatively small, input to each of the other sectors. Its most prominent role was in Services Incidental to Transport where it was 1.9 percent of total inputs.

In general, infrastructure requirements relate directly to the level of specialization and exchange involved in the production of a product or service. The farther removed from subsistence agriculture,

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the greater the degree of infrastructure support required for the production process. Even for commercial agriculture, the infrastructure support for towns, cities and a central city like Manila, are a partial contribution to the production and marketing of the product.

For growth in output and increases in productivity infrastructure support is necessary. It is a generally accepted doctrine that infrastructure is a necessary but not a sufficient condition for economic growth.

The particular contributions to growth and productivity of each type of infrastructure will be examined separately.

2.2 TRANSPORTATION

Transportation modes include highway, rail, water and air. Rail use has been declining in the Philippines as traffic has been lost to the expanding network of good highways. There are only two rail lines -- on Luzon and on Panay, and this report will not examine their role. The air transport network provides an effective way for businessmen and government officials to move around the Islands. It is important to both the economic and the political cohesion of the Republic. The users tend to be inhabitants of Manila and secondary cities and not the rural or non-rural poor. While the air transport network contributes substantially to the economy of the Philippines as a whole it has minimal direct impact on agricultural output. No further attention will be given it.

The highway system and the port system will be examined in more detail since all but a small fraction of goods in the Philippines moves by one or both of these modes.

Roads

Transportation by road is the leading form of transportation. Transportation by water is the second leading mode, and the two are used together for origin to destination movement of many products.

Roads of concrete provide the most durability under heavy loads, the most resistance to destruction by weather and traffic, the highest speeds and the lowest operating costs of any type. Many national roads and some regional roads are of concrete. The total kilometers of concrete roads grew between 1964-65 and 1983 at an annual rate of 9.7 percent, considerably faster than the growth in GNP, or in employment. Concrete highways, however, are only 5.3 percent of the total kilometers of the road system. (Table 2-10)

Asphalt roads provide a good hard surface, lower costs and high speeds for vehicle operation when new but are much more subject to destruction by heavy trucks and heavy rainfall. They comprise over 7 percent of the national road network, but have been increased at less than 2 percent a year over the past 18 years.

Table 2-10
KILOMETERS OF ROADS BY SURFACE TYPE
1964-65 to 1983

	All Types	Concrete	Asphalt	Gravel and Earth
1964-65	55,778	1,462	8,211	46,053
1970-71	73,532	3,353	10,947	57,955
1974-75	87,306	5,758	12,780	66,222
1980	150,290	8,538	12,742	129,010
1983	155,540	8,170	11,225	136,144
Annual Growth Rate 1964-65 to 1983	5.7%	9.7%	1.7%	6.0%
Percentage of Total				
1964-65	100.0	2.6	14.7	82.6
1970-71	100.0	4.6	14.9	78.8
1974-75	100.0	6.6	14.6	75.9
1980	100.0	5.7	8.4	85.8
1983	100.0	5.3	7.2	87.5

Source: Statistical Yearbook, 1984; Table 13.13.

Gravel roads with good drainage can provide a good ride at fairly high speeds if not obstructed by potholes, but they give more wear and tear to vehicles than paved roads. They are also more subject to destruction by heavy loads and wet weather.

Roads of earth without a gravel cover are extensive in connecting farm areas to the gravel and paved road network. They handle lighter loads but are more subject to developing potholes than gravel roads, and some become impassable in wet weather.

The current statistics on gravel roads and earth roads admit to an uncertainty as to proper classification of many kilometers of such roads. For a comparison over time, therefore, the totals of gravel and earth roads have been combined. Together, they have been growing at 6 percent a year over the past 18 years, and now comprise over 87 percent of the total road system. The rate of growth of these roads has been more than double the rate of increase of hectares under cultivation.

The combined total of all roads, outside the NCR, now provides 1.14 km of road per square km of arable land, though the road to arable land ratio varies from region to region.

Almost all agricultural products require a road trip on their journey to market. On Luzon all rice and corn move by road to mill and then to market. In the Visayas most sugarcane moves by road to a sugar central (some moves by private rail). The raw sugar moves by barge to a transshipment point. Copra is hauled to oil processing plant or to port by truck. Vegetables, fruit, dairy products, all move by truck. Beef and hogs may be moved by truck to a port for shipment to Manila for slaughter.

The reverse movement of fertilizer, seed and equipment from port or mill to retail outlets and to farm again is by road.

Building new roads into fertile land can provide a strong impetus for economic growth and social improvement. A detailed study of the

impact of six rural roads reconstructed in six provinces in 1976 and 1977 illustrates the impact.¹ The improvement work consisted of:

- a) widening right-of-way to 15 meters;
- b) gravel surfacing of the 6-meter travelled way;
- c) provision of 1.5 meter shoulders;
- d) side ditches and culvert pipe drainage; and,
- e) construction of permanent bridges.

The combined area served included 26 barangays with an area of 8086 hectares, supporting 4684 households with a total population of 27,950. About 90 percent of the households earned their living from agriculture. The roads provided farm to market transportation and, in addition, provided increased access to health care, education and community activities.

Economic results included:

- a) Reduction in transport costs: The freight charges for shelled corn dropped from P70 to P30 per ton, enabling the farmer to increase his share of the market price. Transportation as a whole was deemed significantly more reliable. Transfer costs and double handling were practically eliminated.
- b) Increase in production of major crops: Production volume of seven major marketable crops within the influence area increased 40 percent within two years after project completion. Fruits and vegetables, for example, increased by 62 percent and 46 percent, respectively. Farm inputs such as fertilizers and pesticides, which experienced 20 percent price increase outside the area, increased only 12 percent within the area because of the decline in transport costs.
- c) Increase in farmgate share of ultimate market price: For the seven major cash crops the average farmgate price went up by 59 percent while the market price went up by 26 percent, a year after project completion. Before the project, 69 percent of agricultural products were sold at the farmsite and 31 percent were brought to market. A year and a half after project completion, 60 percent of the produce was brought to the market.

^{1/} Rural Roads Evaluation Report, USAID/Philippines with Department of Local Government and Community Development, Manila, 1978.

Farm income in the influence area went up by nearly 40 percent while non-farm income rose by 20 percent. Unemployment and under-employment were significantly reduced due to accessibility offered by the roads to other areas of opportunity. Commercial enterprises increased from 78 to 166, including variety stores, trading, cottage industries, storage and other businesses where regularity of marketing of commodities is an important aspect of operations.

The increased mobility had other benefits. Health services were utilized much more as 14 new health facilities were opened along with the initiation of nine health programs. Enrollment in educational facilities increased 10 percent and the number of dropouts and transferees declined 55 percent. An improvement was observed in the frequency of farm extension service visits, in postal service and in peace and order.

The improvement in transportation encouraged the expansion of other programs such as health and farm extension service, but clearly the improvement in the roads was the dominant factor in the improvement of economic and social conditions in the areas affected.

The extent and quality of the highway network relates closely to the types of agriculture being practiced. In a quick field survey in seven provinces in three Regions, a variety of conditions were observed.

Several cavans of palay would be hauled on a sledge pulled by a carabao over one or more kilometers of flat field to a roadside for pickup by a buyer's truck, jeepney or even motorcycle sidecar. The motor driven vehicle required a passable road to get to a buying station or rice mill. The larger the network of paved roads in good condition the larger the area the rice mill could serve.

Sugar cane, when harvested, is transported by heavily laden trucks which require a strong surface to avoid destruction. In Negros Occidental province, a major producer of sugar cane, a concrete road was financed by the World Bank to provide such service.

Vegetables and dairy products require a hard surface road in good condition to travel quickly to an urban market without spoilage. In Bulacan province, large plots of vegetables were observed next to a good hard-surface road connecting to the north-south expressway to Manila. In Tarlac province, local businessmen said a good hard-surface road into the rolling country in the western part of the province would make it possible to develop dairy farming there to serve the Manila market. Without such a road, only bush crops such as coffee, or tree crops such as coconut could be developed.

Between towns and secondary cities, and in connections with Manila, high quality roads are required to handle the heavy volume of traffic in each direction. These are the ultimate roads for bringing crops to market and for originating the supplies of fertilizer, seed and equipment destined for farms.

The quality of roads has been defined in a rather subjective rating system with the following definitions:²

- | | |
|------------------|--|
| Good: | Few or no potholes. |
| Fair: | Not more than five potholes per 100 meters and/or slightly corrugated. |
| Bad: | More than five potholes per 100 meters and/or heavy corrugations and/or rutted. The pavement, if any, starting to break up. Maximum travel speed about 40 km/hour. |
| Very Bad: | Just passable for all vehicles with two-wheel drive. The travel speed varies between ten to 30 km/hour. |

In one province, where road conditions are probably no worse than average, the provincial development coordinator had made a detailed current survey of barangay roads in 34 of the 43 municipalities

^{2/} National Transportation Planning Project, Part III - Roads, Appendix III-4-2, p.4; Interagency Technical Committee on Transport Planning, Manila 1982.

in the province. The survey covered 1,970 km of roads. The surface composition of these roads was:

Gravel	45.30%
Earth	38.08%
Gravel & Earth	16.20%

The quality distribution was as follows:

Good	3.28%
Fair	48.53%
Bad	48.18%

The chief cause of the low quality ratings, he believed, was the inadequate funding for maintenance. These funds came from the central government, and there had been no increase in the number of pesos provided per kilometer since 1979, despite the steadily eroding purchasing power of the peso.

Detailed studies have been made on vehicle running costs on paved and gravel surfaces in good, fair, bad and very bad conditions. The National Transportation Planning Project adopted the following estimates of the percent increase in cost over those for a vehicle running on a paved road in good condition:³

R o a d		Cost Increase
<u>Surface</u>	<u>Condition</u>	<u>Percent Over Paved-Good</u>
paved	Fair	20
	Bad	40
	Very Bad	60
gravel	Good	30
	Fair	50
	Bad	80
	Very bad	120

^{3/} Op. cit., p. 10.

Road conditions also influence vehicle speeds. A paved road in good condition would allow an average speed at 92 percent of maximum while gravel roads in bad condition would allow only an average of 50 percent of maximum, and a typical earth road, 35 percent of maximum.

The quality of the road, the type of surface and the condition resulting from the quality of maintenance all influence how effectively the road system serves the farm-to-market function.

New roads of earth or gravel, and even of asphalt, can quickly deteriorate if not properly maintained. The great advantages to rural income and to rural social structure can gradually evaporate if the road system is allowed to decline into a bad condition.

A very high priority was requested in several provinces to giving all roads a gravel surface in order to make them into all weather roads, and to providing maintenance for the municipal and barangay roads adequate to lift them out of the bad category.

The construction of new roads will continue to be needed to open up new areas to more intensive cultivation as population grows. Such new roads should be planned with careful attention to the types of traffic eventually expected, to the accompanying programs to develop the productivity of the areas, and to the comparative needs for new roads elsewhere and for better maintenance of the existing road network.

As a general proposition, improved maintenance and upgrading of barangay and municipal roads is a universal problem, and attention to it will contribute to net real income and employment opportunities for the lower income half of the population. The development of a new road, on the other hand, is a place-specific type of project, and the relative merits of any specific new road depend on the comparative internal rate of return the whole project would produce.

Ports and Water Transportation

For an archipelago of several thousand islands, water transportation has been essential to the economic, as well as political, integration of the Islands. Currently there are 19 Port Districts under the Philippine Ports Authority. These districts administer 68 ports which are described as primary, secondary or tertiary ports and 77 minor ports for a total of 145. These ports handle 97 percent of the total traffic of government ports. Many more municipalities have ports used for fishing or very minimal cargo handling. There are 477 additional government ports which account for only three percent of the cargo traffic of government ports. In addition, there are a number of private ports, some quite large, operating under the regulation of the PPA. One is the Port of Bacolod which handles a very heavy passenger service with Iloilo, as well as cargo.

Total tonnage of port throughput in 1981 was almost 10 million tons through the NCR and almost 15 million through the other ports for a national total of 24,800,000 tons. In passenger traffic the NCR handled 2,300,000, and the other ports handled 12,700,000 people. Lower and middle income people travel among the islands by water.

The nature and significance of the water cargo transport system was well described in a recent report of the National Transportation Planning Project.⁴

"The archipelago of the Philippines is an integrated economic unit with Metro Manila as its hub. The sea, far from being a barrier, is a medium for communication, and inter-island domestic freight traffic flows tend to be strongly oriented to Luzon. As a consequence, each of the various islands and the areas of Luzon apart from the central area tend not to have locally integrated economies but instead operate as resource sub-regions for the main manufacturing, distribution and consumption center of Metro-Manila and its immediate neighborhood. Only in Luzon are there reasonable long distance freight road traffic movements, and these too have Manila as the main origin/destination. Many of these movements, in the past, used coastal shipping or railway services, but, with the improvement of the Luzon road system, most freight traffic has diverted to road.

^{4/} NTPP, op. cit., pp 16, 17, 52, 53, 54.

" Since inter-island traffic is almost invariably moved by sea, it follows naturally that main centers of production outside Luzon will be located in the hinterland of a port and traffic will drain to the nearest port of exit. This is natural because sooner or later, the traffic must be loaded on to a ship or barge and the marginal cost per km of movement by sea is considerably less than by road... This pattern of movement is further reinforced by the fact that, outside Luzon, populations tend to be located in coastal areas with major concentrations in and around ports. These areas, therefore, form important markets for the sale of primary produce as well as the point of exit for a surplus production not locally consumed.

"The dominant position of Manila as a production, processing, and distribution center for the Philippines is unlikely to be challenged in the foreseeable future. The availability of reasonably reliable public utilities, a suitable workforce and the very important advantages of a widespread range of raw, semi-processed and processed industrial materials coupled with ease of commercial communications, as well as a large and relatively high income market, make the Capital Region an obvious location for those manufacturing companies which have backward and forward links with other production companies... Only Cebu City was developing as a secondary commercial center with particular importance for the southern Philippines.

"These different economic roles accepted by the various regions and islands, which results in the north-south-north pattern of domestic trade, should not be ascribed to inadequate means of communication within and between regions other than Metro-Manila. All the important centers have always been able to communicate by sea in the same way as they could communicate with Manila. Even areas of great land mass, notably Mindanao, have coastal population concentrations, so that inter and intra island linkages by sea have always been possible, allowing production linkages to be formed if so desired. Indeed, some such linkages do exist, for example copra movements from many islands of the South Philippines to processing plants in Iligan and Zamboanga, and the important, though secondary, role played by Cebu City, as a production, commercial and social sub-center for the South Philippines. . .

"Freight traffic movement in the Philippines relies almost exclusively upon road and sea transport. Almost all inter-island and export traffic is moved by sea and, where suitable roads are available, intra-island traffic movements are by road. Metro Manila is the hub for most domestic movements particularly road movements in Luzon. . .

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"Mindanao, the other very large land mass of the Philippines exhibits an entirely different pattern of freight movement from that in Luzon. Whereas in Luzon, traffic is generally attracted towards the center of the island (the Metro-Manila area) and is frequently long-distance, there is no comparable central attractor in Mindanao. Instead, freight movements are relatively short in length and drain outward to the nearest port from its hinterland. Of course, the main population centers in Mindanao are in and around port towns thus providing the main attractors, for commodities produced in Mindanao, for island consumption, as well as the point of exit for outward movements for domestic consumption elsewhere in the Philippines.

"The outstanding product of the Visayas is sugar and sugar-based products. The transport of sugar cane from the plantations to the sugar centrals and of sugar product from the centrals to consolidated centers is performed by private railways and road vehicles. Export traffic is mainly consolidated at the very large facilities provided on the island of Guimaras across the strait from Iloilo in Panay. Movements of sugar from the main producing islands for consolidation and dispatch from Guimaras is performed mainly by barge.

"Cebu City, and to a much lesser extent Iloilo City, is one of the very few significant secondary processing and distribution centers, outside Metro Manila for consumer goods. It produces a fairly wide range of commodities, but its most important output in terms of the domestic freight transport system is beer since it supplies all the south Philippines and the Bicol using a sophisticated privately operated tug and barge system.

"Of traffic passing through the private and public ports,..the main qualitative patterns are as follows:

General Cargo: passes mainly through the port of Manila, destined, either directly or occasionally via some secondary distribution centers, to all the main population centers in the Philippines.

- Grains** - pass mainly from the Mindanao ports of General Santos, Cagayan de Oro, and to some extent Cotabato, from Iloilo in the Visayas and from the two ports of San Jose and Calapan in Mindoro destined for Manila and Cebu.
- Copra** - originates in public ports spread throughout the Philippines destined mainly to private ports, two in Mindanao at Iligan and Zamboanga, and two in the Bicol at Tabaco and Jose Panganiban.
- Cement** - In Mindanao, cement production is concentrated mainly at Iligan with three major production plants. There are two other plants in Mindanao, one in Surigao, the other in Davao. The Visayas have two plants in Cebu. All production for domestic consumption is to supply the South Philippines and the Bicol and is carried to all main population centers either directly or via secondary distribution centers.
- Fertilizers** - These are mainly from overseas sources and are imported for the most part into Manila, Iloilo, Zamboanga, Davao, Cagayan de Oro and General Santos. A small proportion of domestic consumption is produced in Bataan. Consumers in North Luzon are supplied by truck but output is transported by barge or small ship to other destinations throughout the Philippines.
- Oil** - Originates in Bataan and Batangas and is transported to all main population centers by sea.
- Minerals** - These are mainly exported as concentrates or ore. A substantial movement of limestone from Bohol to Cagayan de Oro is to supply the Philippine Sinter Corporation with a necessary raw material. Copper concentrates are exported from La Union, Cebu and Marinduque. Chrome ore is exported from Zambales, Nickel ore from anchorages in Palawan and Sinter ore from Cagayan de Oro.

Timber - Logs are mainly exported using anchorages and log ponds in the vicinity of the logging activities....

"The development of production in the agriculture sector, particularly rice, corn, copra and sugar will, for a great part, be so geographically widespread as to have only minor implications for total traffic on any particular section of the arterial road network. The situation is not quite the same for the ports, since inter-island movements of freight are almost entirely seaborne and there could be occasions when major developments in the hinterland of a port require review of port facilities since, in this case, the additional production will eventually be concentrated at the sea port. This is particularly true in Mindanao, where substantial increases in grain production are expected from the Cotabato-Agusan River Basin Development Project."

The producer of agricultural products benefits from having transportation costs to market for his produce and inbound for supplies as low as possible. The efficient operation of the port system contributes to low cost transportation by keeping cargo-handling costs and ship turn-around times at a minimum. Savings in transportation costs on agricultural products tend to get passed back to the farmer in higher farm gate prices, and savings in transportation of fertilizer and supplies tend to mean lower costs to the farmer.

Savings which benefit manufacturing operations outside Manila help create manufacturing employment for residents of cities in other ports than Manila.

In these general ways, efficient expansion and maintenance of the port system contribute to the employment and productivity opportunities of the lower income portion of the population.

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2.3 WATER AND INFRASTRUCTURE

Water is essential for the life and growth of both crops and humans. In too large quantities in a short period it can be highly destructive. When contaminated with human waste it can cause disease to large, concentrated populations. An essential aspect of infrastructure construction and maintenance has to do with the supply and control of water.

Irrigation

Irrigation of rice and other crops has been practiced in the Philippines for centuries.

Irrigation adds to yield per hectare in several ways. It can increase the yield during the rainy season by providing a steady, sure source of water to supplement rainfall. It can provide a second crop on the same soil in the dry season when lack of rainfall would leave the soil barren. In some areas irrigation makes possible the harvest of two and one-half crops, or even three crops, in a year. Finally, soil that would otherwise not produce grain crop may become suitable for grain with irrigation.

Irrigation is provided by large national projects, by communal projects and by private pumping. National projects tend to be large with investment in dams, control gates, partially lined canals and many distribution channels to serve a wide area. Communal systems involve controlled diversion of the gravity flow of existing watercourses, with some dams as storage facilities, and diversion channels over a more limited area. Pumping systems draw on ground water as a source of supply.

From 1970 to 1982 the growth of hectares under irrigation has been at a rate of 6.4 percent a year. The Government of the Philippines has been investing in and encouraging the expansion of irrigation to achieve self-sufficiency in rice as soon as possible. By the end of 1982, 663,000 hectares were under national irrigation systems,

588,000 hectares under communal systems and 191,000 under pumped systems. The 1,442,000 hectares comprised 46 percent of all areas that are considered potentially irrigable. Each province has a detailed inventory of land considered irrigable.

A review of post-evaluation reports of several irrigation projects in Mindanao indicates that total output of rice increased, or was expected to increase three hundred to six hundred percent as a result of the projects. All these increases were from land predominantly used to grow a wet season rice crop. The irrigated wet season yields were expected to almost double the non-irrigated yields. A full irrigated dry season would be added to the wet season output, and some land in corn would be converted to irrigated rice, which would give the farmer a higher return.

Some of the increase in yield was the result of using more fertilizer, better strains of rice and better farm management. Each irrigation project was accompanied by considerable agricultural extension effort and by an improvement in the credit facilities available to farmers.

The net income of the average farmer in the irrigated areas is expected to double or triple after payments for fertilizer, etc. With higher farm income, areas have experienced more activity in wholesale and retail trade, banking and cottage industries. More opportunities for earning supplemental income have occurred.

The economic internal rates of returns for two projects were about 17 percent, an acceptable number.

Once completed, there remain problems of efficient operation and effective maintenance. Over-irrigation can waterlog soils and reduce yield. Siltation and aquatic plant growth can slow the volume of flow and reduce the benefits. One province visited during a field trip reported that the flow obstruction in a fairly new project was so great that they were back to one crop a year.

There is no question that irrigation projects have added substantially to rice output in the past decade. There are still opportunities for more projects. Each project, however, must stand on its own feet and provide an economic internal rate of return adequate to justify the additional capital expenditure.

During the present period of budget and credit stringency, it is particularly important to provide adequate maintenance so the systems do not slip backward and give lower yields.

Potable Water

The lack of safe and adequate water supplies for domestic use -- human consumption, personal hygiene, household cleanliness, and public services is a serious public health problem. These, along with inadequate water for industrial processing, retard economic progress. An adequate supply of piped water, together with a knowledge of personal hygiene and household cleanliness, constitute the most important weapons in the war against filth-borne diseases. The lack of just plain water for purposes of personal hygiene and household cleanliness is a significant contributory factor to disease. Inadequate and unsafe water supplies contribute to human energy loss, high death rates, medical expenses and shortened life expectancy which retard the development of both agriculture and industry.

The leading water borne diseases are gastro-enterities, colitis, dysentery, hepatitis, typhoid and cholera. Among the ten leading causes of illness in the Philippines in 1979, diarrhea was number two, with a rate of 466 per 100,000 population, dysentery was number eight with 61 per 100,000, and infectious hepatitis was number ten with 19 per 100,000. Among the leading causes of death diarrhea was fifth with 35.8 per 100,000, 5.4 percent of all deaths. Among the leading causes of death of infants under 1 year of age diarrhea was third with 5.1 per 1,000 live births, and dysentery was tenth with 0.4 per 1,000 live births.

The present public water supply system serves 53 percent of the total population -- 82 percent in Metropolitan Manila, 55 percent in other urban centers, and 47 percent in the rural areas.

Outside of Metropolitan Manila two national organizations assist in the organization of provision of public water supply, the Local Water Utilities Administration (LWUA), and the Rural Waterworks Development Corporation (RWDC). LWUA makes loans to local Water Districts serving cities or municipalities with populations of at least 20,000. It aids in the formation of Water Districts by providing them with technical assistance as well as loans to finance construction. New water districts were organized at a rate of 25 per year between 1974 and 1983. In 1980, 753 municipalities were eligible for LWUA assistance. The RWDC encourages and assists the formation of rural waterworks associations (RWA's) to make adequate water service available to residents of rural areas. A total of 763 municipalities are eligible for RWDC assistance.

Public water supply is provided at three levels:

Level I - point source: a well or spring not more than 500 meters from the farthest user. It may supply 50 households.

Level II - a point source plus a piping system leading to communal faucets which are not more than 25 meters from the farthest house. Five to seven households may be supplied per faucet. An electrically driven pump and a storage tank may be parts of the system.

Level III - an individual house connection system generally for urban areas of 2,000 to 20,000 persons and up.

The announced goal of the government is to raise the coverage of public water supply systems to about 70 percent of the total population by 1987 and to around 90 percent by 1992. Direct financial grants from the National Government are limited to point source development works (Level I) with a minimum 10 percent equity from the water associations. The cost of the distribution systems will be borne by the associations through loans from RWDC and LWUA. The local association is responsible for maintenance and operation, and for collecting fees or service charges to cover operating costs and debt service.

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Metered water service with individual household connections provides the greatest opportunity for collecting enough revenue to cover both operating costs and debt service. At Level I, and probably at Level II, it would be difficult to recover capital costs. Some public subsidy is therefore necessary to finance expansion at these levels. The public benefits include improved health and productivity, decreased hospital and medical care costs associated with water-borne diseases, improved school attendance, improved personal standard of living and improved community atmosphere. The benefits are generally well worth the costs.

Flood Control and Storm Drainage

The damage that can be done by a large volume of water moving rapidly is immense. Flooding from heavy rainfall concentrated from hills and mountains into river channels and flood plains, can wash out crops, destroy highways and bridges, flood city streets and the ground floor of buildings, and even destroy buildings. Ocean storms can wash out beaches, piers and structures built on unprotected shores.

The destruction of public and personal capital in cities, towns and rural areas, as well as the seasonal efforts of farmers, that can be caused by flooding warrants heavy investment to protect property from the intense attacks of water. In a country with the heavy annual rainfall of the Philippines, and the frequent occurrence of typhoons which let loose extremely heavy rainfall in a short period, constant efforts are required in flood control and storm drainage.

A wide range of projects are utilized to restrict the damage of flooding. Starting with the upper reaches of a watershed, reforestation and control of forest harvest are used to constrain rapid runoff of heavy rains. Upstream impoundment dams are used to collect heavy runoff and store it to be released later when water levels are lower. These upstream dams may also be used to store water for irrigation and/or to produce hydroelectric power. The water retained may even serve recreational purposes.

River channels are dredged periodically to enable them to handle the large volumes of heavy storms. Where flooding has been frequent, levees and dikes are built to contain the rising water levels of heavy storms and protect the adjacent farm lands or urban settlements. Various methods are used to prevent erosion of vulnerable parts of river banks, by straightening watercourses and by special riverbank protection measures. Special floodways may be built to carry heavy runoffs. A variety of hydraulic control structures may be used to divert unusually high water into the least harmful paths.

In areas where some flooding every few years seems inevitable, flood plain zoning can be used to restrict land use to uses which will sustain the least damage from flooding. These may be recreational uses, or some types of agriculture.

Flood control systems have been developed for Metropolitan Manila, the Lower Agusan area, Pampanga River Control, Bicol River Flood control, and the Tarlac River and Agno River. The Updated Philippine Development Plan, 1984-1987 expects 288 river control and drainage projects to be implemented during the four year program. In addition, 49 multi-purpose small water impounding dams will be built. Also 174 seawalls will be built to protect coastal communities.

The value of any project depends on the present value of the crop or structure or other property that would be protected against periodic flooding over the life of the project. This must be determined on a case-by-case basis.

Some recent storms have been so great that they have washed away existing flood control structures. This exposes vast areas, built up under expectation of effective flood control, to further destruction. The restoration or improvement of the damaged or destroyed facilities would warrant a high priority in view of the property and farm lands at risk.

Sanitary Drainage

Public systems for the disposal of waste from the human body have been recognized as necessary public health measures since ancient times. The development of the septic tank has made public facilities less necessary in moderate size urban centers. Where public water supply is drawn from ground water under or near an urban settlement there is always a possibility that contamination will seep from septic tanks, and particularly from open pits, into the aquifer. The water source then would require extensive treatment before use for household purposes.

In the Philippines, only Metropolitan Manila is served by a public sewer system. Pre-feasibility studies are underway for Baguio, Cebu, Zamboanga, Butuan, Ozamis, and Daet in the province of Camarines Norte. The Baguio study has led to a construction contract award financed by the Japanese government, with completion expected in 1986.

With rapid population growth in other urban centers, the need for public sewerage systems to protect public health may grow at increasing speed.

A recognition of the importance of public sewerage systems appears in the Updated Philippine Development Plan, 1984-1987, in Table 2.2, Proposed Hierarchy of Services and Facilities by Settlement Type. For the three largest population center categories -- major center, regional center and metropolitan center, a sewerage and drainage system is called for. In minor centers and urban satellite communities only a drainage system is suggested. The Infrastructure section of the Development Plan, however, makes very little reference to public sewerage systems.

It would seem appropriate to give attention fairly soon to all large and growing urban areas that are considered major centers or regional centers. Pre-feasibility studies started now could make preparation for sewerage systems which may be needed within the decade. Though there may be limited funds for capital expenditure at present,

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money spent on planning now will save a good deal of time when money does again become available.

The Rural Water Supply and Sanitation Master Plan contains an extensive proposal for improving human waste disposal in rural areas and small urban settlements. The program appears reasonable, but it is not mentioned in the Updated Development Plan. The provision of adequate potable water to rural areas and small urban settlements should probably take precedence over the problem of human waste disposal, even though the two subjects are related.

2.4 POWER

An electric power system includes the generation, transmission and distribution of electrical energy. Power systems are a basic part of a nation's economic infrastructure. Electric power is employed for a performance of essential electronic, thermal and mechanical functions in industry, communications, and commerce, as well as for a variety of purposes in the home. Electricity has made a substantial contribution to the growth in human economic productivity and to enhanced creature comforts during the last century.

The total production of power and the distribution outside Manila are of particular interest here.

Basic Power Sources

Power sources require very heavy capital investments: in dams for hydroelectric power, in oil-fired or coal-fired plants for thermal power, in special facilities tapping natural geo-thermal sources, or in nuclear power plants. Substantial loans have been made by the Asian Development Bank and the World Bank to make possible such capital investments in the Philippines. Such loans have been necessary, in part, because a large share of the investment requires purchase of foreign equipment and temporary employment of foreign specialists.

For many years the declining relative price of petroleum products encouraged expansion of oil-fired plants and a growth of energy consumption of 7 percent a year or more. Since the price increased brought about by OPEC between 1974 and 1979, there has been strong incentive to economize on the use of energy and to turn to non-oil sources. The growth rates of electrical production in the Philippines reflect these trends. From 1970 to 1979 electrical energy production increased an average of 8.2 percent a year. From 1979 to 1983 the growth rates has been 5.9 percent. Installed capacity of oil based electric plants (thermal and diesel) increased sevenfold from 1977 to 1979, but at only 2.4 percent a year from 1979 to 1983. Hydro-power capacity, on the other hand, grew slowly to 1979 but at 15.5 percent between 1979 and 1983. Geothermal capacity was not significant before 1979 but has grown at a rate of 27 percent a year since. At the end of 1983 installed capacity of all producers, public and private, was 28 percent hydro, 54 percent oil-based, 14 percent geothermal, 2 percent coal-fired and 2 percent nonconventional.

There has also been an effort to develop generating capacity at many points in the Philippines to make power readily accessible over a wide area. Currently 39 percent of capacity is in Metro Manila, 39 percent throughout the rest of Luzon, 9 percent in the Visayas and 12 percent in Mindanao. All have taken part in the seven-fold expansion of plant capacity since 1976.

The consumption of power grew from 1970 to 1983 at an average annual rate of 7.8 percent, faster than the growth in employment, 4.3 percent, or the growth in GNP, 5.5 percent. The sector distribution of power consumption has not changed a great deal over this period. The consumption by utilities has grown at 12.6 percent, faster than the average, while industrial consumption has grown 7.7 percent, residential consumption at 6.7 percent and commercial consumption, 6.0 percent. Of total consumption in 1983 the relative shares were:

industrial	43%
utilities	20
residential	19
commercial	18

No case has to be made for the importance of the contribution of

electricity to the expansion of industry, commerce and household well-being.

The production goals of the development plan to 1987 are to reduce dependance on oil sources from 61 percent to 50 percent and to slow the growth of energy consumption to 3 percent a year to enable non-oil sources to provide the growth.

Local Electric Cooperatives

The local electrical cooperative is the instrument for bringing electricity to small cities and towns and rural areas.

Rural electrification started with the 1971 chartering of two pilot projects, MORESCO in Region XII and VRESCO in Region VI. Since that beginning, a total of 118 cooperatives have been established and, within their franchise area, they have made service available to almost 2,300,000 households. In the past year slightly over 265,000 house connections were added to the cooperative lines. The rate of addition of new house connections is slowing, however, from the 1981 peak of almost 330,000. As of the end of 1983, 43 percent of the potential house connections had been effected.

Each cooperative is an independent corporation chartered by the National Electrification Administration (NEA). The NEA loans funds to the cooperative for construction programs, provides technical assistance, and periodically audits the job performance as well as the finances of the cooperative.

The cooperative itself maintains the substation through which it receives power from the National Power Corporation, constructs and maintains the distribution system through to the consumer, and performs the commercial functions of billing and collection.

The impact on families in rural areas was studied by the National Rural Electric Cooperative Association of the U.S. in 1981. A detailed survey was conducted of families and communities served by seven local electric cooperatives in seven widely distributed provinces. A carefully selected sample of 420 households and 350 enterprises were interviewed -- a total of 110 from each cooperative service area. Households were chosen to represent all income classes and various distances

from a population center. The results are best reported in the words of the report.⁵

"Households make up 89% of the total consumers in the seven cooperatives surveyed, and they use 37% of the total power delivered by the cooperative systems.

"Lighting is the principal application of electric service to households; and electric lighting is seen by the great majority of residential respondents in the seven service areas as a major factor in household safety and security. Lighting also is reported making possible home studying during evening hours and a wide variety of other household activities after sundown; sewing, cooking, and other home-making chores; handicrafts, repairs and other services; and job-related work.

"Electric lighting is recognized by most household as being cheaper than kerosene lamps or other alternatives, and many respondents cited measurable savings of money as well as time in using electric lighting. Respondents said that money saved as a result of using electricity was being used for additional food and other household essentials.

"Although appliances are not found in every household -- in contrast to lighting in all homes -- appliance use accounts for a major portion of the kilowatt-hours of electricity billed to residential consumers. Principal electrical appliances found in the homes of the sample families were: electric fans, refrigerators, television sets, and irons. It should be noted that there is limited use of electricity for cooking. In most service areas, wood, palm leaf stems, charcoal, and refuse is cheaper than electricity for heating at present rates.

"Over half of the households interviewed said that electricity had a great positive effect on the economic and social well-being of the family. A significant portion said that the family enjoyed added income made possible from electricity used in the home for producing goods or services for sale.

"Although data collected from the interviews and questionnaires threw light on housing, health, and nutrition conditions in small towns and the countryside, correlation with rural electrical service could be considered parallel rather than cause and effect. Find-

^{5/}"Report on the Philippine Rural Electrification Impact Survey (1981)", National Rural Electric Cooperative Assn., Washington, D.C., 1982.

ings were not always statistically significant. It is clear, however, that many heads of households see their electric service as a way to maintain and improve the family's level of living. The overall impact within a community appears to encourage upward mobility ...

"Almost half of the households in the survey indicated plans for purchase of some additional appliance in the next year, with television, refrigerators, stereo/phonographs, and fans listed in that order. Insufficient income was given in most cases as the reason for not having already purchased desired appliances. Most of the cooperatives offer a credit plan on favorable terms for housewiring in the homes of low-income families, but questioning revealed difficulty in purchasing appliances on credit in most locations...

"The survey found that minimum bill users (10 to 15 kWh per month or less) in the seven cooperatives ranged from one-quarter to more than one-half of total consumers. This is a significant statistic for measuring the level of accessibility and affordability at the lower economic level of the population.

"In rural electrification the following realities have been accepted on the basis of long and careful study:

- (1) People in all economic levels recognize the benefits of electric service and especially the money savings in electric lighting.
- (2) While people in all economic levels sign up for electric service from the cooperative systems, households with high incomes use large amounts of electric energy and households with low incomes use small amounts. KWh consumption is directly related to income.
- (3) Consumers generally increase their use of electricity as time passes, so if no new consumers were added to the system, power deliveries would increase over the months and years. Adding new consumers from lower economic levels dilutes the normal increase in use by consumers who have been on the line for some time.
- (4) With the number of consumers increasing and the total delivery of power growing, while the average household use holds relatively steady and the percentage of minimum bill users increases or remains about the same, it is clear that the Philippine electrification program is reaching the rural poor.

- (5) One major control factor in all this is the retail rate charged for electric service. When the rate goes up, use goes down. When the rate goes down, the use goes up...

"To appreciate the impact that the seven cooperatives have on project service area development, it is essential to trace how enterprise use and apply electricity in their operations. As noted, approximately 60% of all electric energy sold by the cooperatives is used by the enterprise sector, while less than 40% of the electricity distributed is consumed by the residential (household) sector. The remaining portion, about 4%, is consumed for public and security lighting purposes.

"Electric retail rates to the enterprise sector are generally set at higher levels than for household minimum bill users. Therefore, payments for electric service from the enterprise sector not only support the financial base for cooperative operations, but subsidize electricity costs to the residential sector, particularly lower income households which consume minimal amounts of electricity. These households in turn are able to take advantage of the competitive price of electricity over oil-based fuels which actualizes money savings, helping these households to maintain or improve their standard of living.

"The availability and proximity of electricity has played an instrumental role in determining where many types of enterprises locate their operations and an important role in determining their decision to expand enterprise operations. Road accessibility has played a similar instrumental role for determining enterprise location. The availability of private and public credit, however, appears to have play a lesser significant role in determining site specific location of enterprise.,,

"The great proportion of electricity consumed by the enterprise sector is used for work-related purposes (water pumping, fabrication, food processing, office work, etc.) and for refrigeration (preserving food and office work.) Only a small portion is utilized for lighting, which in most cases is used for service or income generating purposes. Therefore, it becomes evident that the great proportion of electricity provided by the cooperatives can be directly related to some type of productive or work-related end use. Based on rural electric energy application patterns in the U.S., and the data available from the study survey, rural electric usage in the Philippines appears quite comparable in respect to the amount of total electric energy that is expended for work or productive applications.

"The data collected in the survey furthermore suggests that electricity plays an important role in project area development by:

- (1) Maintaining current levels of manufacturing and agriculture enterprise production, and by accelerating the formation of meat production enterprises;
- (2) Extending operating hours for private and public enterprises;
- (3) Broadening types of services that can be provided to clients of both private and public enterprises;
- (4) Providing labor and money savings through the use of electric equipment, particularly to small business enterprises;
- (5) Allowing enterprises to become more efficient and attractive investments, which in turn expand operations and contribute to project area employment and income generation."

So far there is little indication of direct use of electricity in agriculture except for the pumping of irrigation water. Other uses may follow.

It is clear that the availability of electricity to lower income families in small town or rural areas definitely increases their quality of life and often enables them to increase their incomes.

The goal of the 1984-1987 Development Plan to expand coverage from the present 43 percent to 62 percent of total potential households in the rural areas is a worthy one.

2.5 TELECOMMUNICATIONS

Telecommunications facilities are important where time is very significant in the purchase or marketing of goods and services in a free market. They are not important in the production process for most agricultural products. They can be important in the kinds of production where quick access to replacement parts for machinery is necessary.

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Generally, telecommunication systems do not extend to rural areas. They are available in cities and towns, though there are some market towns and even provincial capitals that still lack telephone connections with the outside world. Short-wave radio facilities can be acquired by anyone to whom such communication is important. Many rural areas are within one-hour motor ride from telephone and telegraph facilities.

The extent of the communications network is described later in Chapter 5, Section 5.4. The extension of the network will contribute to the more efficient functioning of the market economy, which, in turn, helps improve the income of commercial farmers and other low income workers. Steady expansion of the telecommunications network is a necessary part of growth in output and in general productivity. The impact on the lower income half of the population, however, is so indirect that only minimal emphasis is placed on it in this survey.

2.6 THE IMPORTANCE OF MAINTENANCE

The construction of new infrastructure -- whether roads, irrigation systems, water supply, flood control or power distribution systems -- encourages development in the private sector to make use of the new facilities to expand output and increase productivity. Public investment and private investment thus work hand-in-hand. The usefulness of the new private investment depends, in considerable part, on the availability of the new infrastructure.

The deterioration of the infrastructure due to lack of maintenance gradually reduces its usefulness and simultaneously reduces the productivity of all the new private investment put in place in response to new infrastructure. This loss of productivity can be steady and continuous if the infrastructure is allowed to constantly deteriorate.

Severe damage to infrastructure by a typhoon or major flood can cause an almost instantaneous loss of productivity by the private sector.

Restoration of the infrastructure to its full effectiveness has rapid economic benefits because the private investment dependant on it

is already in place. New infrastructure, on the other hand, will not achieve its full benefits until the full new private investment is in place, which may take a number of years. Since the present value of future benefits is approached by discounting at the appropriate interest rate for the number of years between the present and the future, the more immediate the realization of full benefits, the larger the present value.

The construction of infrastructure involves a commitment to adequate continuous maintenance in order that the benefits may be received over a prolonged life. It is cheaper, and more productive, to maintain adequately and regularly over a long period, than to minimize maintenance expenditures and experience rapid decay and the need for more frequent replacement. In the design of infrastructure, the ease of maintenance and durability under stress conditions are important factors in the cost-effectiveness of the infrastructure specifications.

In general, maintenance and repair expenditure requirements will expand directly with the size of the infrastructure in place, and with its age. The steady expansion of the physical infrastructure in the Philippines over the past two decades thus has required a steady expansion in the funds available for maintenance, and in the capability to use the funds effectively.

The Updated Development Plan for 1984-1987 addresses this problem directly. It says⁶: "Infrastructure support will be geared toward the provision of basic transport, water supply, irrigation and flood control and social overhead facilities which will be supportive of the thrust for a balanced agro-industrial development and self-reliance. In the programming of resources, the maintenance of existing facilities will take precedence over rehabilitation, restoration, improvement, expansion and new construction, in that order of priority (emphasis added)".

The body of this report examines how well the various institutions of the Government of the Philippines are organized to finance and execute a program of emphasis on maintenance and rehabilitation of infrastructure.

⁶ Updated Philippine Development Plan, 1984-1987, National Economic and Development Authority, Manila, 1984; p. 14.

CHAPTER 3
 INSTITUTIONAL SETTING FOR THE MAINTENANCE OF
 TRANSPORTATION INFRASTRUCTURE.

3.1 ORGANIZATION OF THE SECTOR

The fixed plant of the transportation sector in the Philippines comprises the following elements:

Highways¹

National highways	24,140 kms, of which about 23% are concrete, 21% are asphalt, 53% are gravel or telford construction, and less than 3% are earth.
Provincial roads	29,725 kms, of which 3% are concrete, 9% are asphalt, 68% are gravel or telford construction and 20% are earth.
City streets	3,718 kms, of which 13% are concrete, 53% are asphalt, 30% are gravel and 4% are earth.
Municipal roads	12,240 kms, of which 13% are concrete, another 13% are asphalt, 48% are gravel and 26% are earth.
Barangay Roads	85,264 kms, of which roughly 11% are paved, 37% are gravel and the remainder earth.

¹ Source: Bureau of Maintenance, MPWH 1983 inventory, except for percentages under barangay roads, which came from a 1981 inventory. Because of the lack of data, the 1983 inventory assumed all barangay roads to be gravel.

(This inventory must be treated with a degree of caution. While national highways, as a group, consist of the more important and generally higher grade roadways, the criteria determining a national highway vs a provincial road are not always consistent; some political trade-offs are involved and some of the inventoried roads don't exist. Furthermore, the barangay roads shown are only those listed to be maintained through national funds. Other roads exist but they are considered to be of too low a standard to be eligible for such funding.)

Ports

National Ports

104 ports designated as National Ports grouped into 19 Port Management Units of the Philippines Ports Authority.

Municipal Ports

Some 500 ports, which range from modest, but locally important, facilities down to little more than half submerged stone jetties.

Private Ports

288 registered private ports, handling primarily bulk cargoes, which are supervised by the Philippine Ports Authority.

Airports

Civil Airports

Network of 83 airports operated by the Bureau of Air Transportation in the Ministry of Transportation and Communications.

Railways

Luzon Island

About 700 kms of narrow-gauge line extending north and south of Manila (not all of which is currently in use) that are operated by the Philippine National Railways.

Panay Island

Panay Railway, a specialized line, roughly 125 km long, serving primarily the sugar industry on the island.

The most recent information on the relative use of the different transport modes dates from 1980 and is found in the National Transport Planning Project reports. It is unlikely that relative shares have changed much since that time.

Table 3-1

APPROXIMATE NATIONAL MODAL SPLIT IN 1980
(Domestic traffic only)

	Freight		Passengers	
	Ton-kilometers (Billion)	Share (Per cent)	Passenger- kilometer (Billion)	Share (Per cent)
Road	22	(65)	53	(90)
Sea	12	(35)	4	(7)
Rail	0.04	(..)	0.4	(1)
Air	negligible	(..)	1.2	(2)
		<u>(100)</u>		<u>(100)</u>

From this table it can be seen that an overwhelming share of both freight and passengers is carried by road or sea transport. The volume of domestic passengers travelling by air from Manila to other islands is close to the volume carried by inter-island vessels but on other routes among the islands, sea transport clearly predominates.

Given the disproportionate share of traffic carried by road and sea traffic and the fact that air travel serves primarily those with higher incomes, or those on government business², the remainder of this section on the transportation will be devoted almost entirely to the institutional environment, for constructing and maintaining the country's roads and ports.

² According to National Transportation Planning Project data.

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The transportation sector is clearly dominated by the Ministry of Public Works and Highways (MPWH) which was created in 1981 by the merger of the Ministry of Public Works and Ministry of Public Highways. This Ministry is responsible for the construction, rehabilitation and improvement not only of highway but also for many other elements of the Country's infrastructure. Specific elements include:

National roads and bridges

Rural roads and barangay roads covered by externally-assisted projects

National and municipal ports - though these are funded and operated by others - plus harbors and coastal improvements

Civil airports outside of Manila and major cities - though airports are funded and operated by others

Artesian wells, springs and other water sources

Flood control and drainage works

Construction of school buildings and health facilities covered by special programs

MPWH is also involved in the construction (and later maintenance) of irrigation and water supply systems through autonomous agencies reporting to the Minister, as detailed in later sections of this chapter.

A major responsibility of the Ministry of Public Works and Highways is the maintenance of the network of national roads and, recently, under Executive Order 978, MPWH was once more charged with the task of supervising the maintenance of barangay roads. MPWH also maintains municipal ports throughout the country but the respective responsibilities of MPWH and the Philippine Ports Authority for such maintenance are not clearly defined.

Aside from the direct role played by the Ministry of Public Works and Highways, through its Bureaus and Services in Manila, its Regional Offices and its District Engineering Officers, MPWH also administers and monitors the funds for some local road construction and for local road maintenance, including provincial, city, municipal

and barangay roads.

Finally, on design standards, construction specifications, building techniques, maintenance norms, etc. the Ministry of Public Works and Highways is considered to be the repository of government expertise and is the accepted authority in such matters.

The second ministry to have a role in the transportation sector is the Ministry of Local Government (MLG). While the MPWH administers the national contributions to local road maintenance programs, and some local road construction programs, the MLG provides more direct support to provincial staff, including the provincial engineers, and is more closely involved in the development of the local road program. Also, it is the MLG that administers payments to provinces under various reimbursement programs, including the Rural Roads Programs, which reimburses provinces for up to 85% of construction costs for provincial, city, municipal and barangay roads.

The Ministry of Local Government may also have a role in determining the apportionment of the local government share of national revenues, which is distributed by the Bureau of Internal Revenue. This share of national revenues constitutes, particularly for the poorer provinces, a high proportion of their total revenues -- from which they must provide matching funds - equal to 50% of the national contribution -- for the maintenance of provincial, city and municipal roads.

The last ministry directly involved in the transportation sector is the Ministry of Transportation and Communications (MOTC). Perhaps most important from the standpoint of this report, is the fact that the Philippine Ports Authority (PPA) comes under the wing of MOTC and the Minister chairs the PPA Board. The Philippine Ports Authority is an autonomous body, which nominally funds port expansion and operations through user fees (berthing charges, wharfage

dues, arrastre income, etc.)³. It operates and maintains the 84 national ports, through 19 Port Management Units (PMU's), monitors the operation of 45 municipal ports and also monitors traffic and collects relevant fees at the country's private ports. The PPA undertakes feasibility studies for port improvements and seeks the necessary funds but actual design and construction is done by the appropriate bureaus of MPWH.

Through the Bureau of Air Transportation, the Ministry of Transportation and Communications operates and maintains the country's civil airports and navigation aids. As in the case of PPA, the Bureau also seeks funding for airport improvements but the design and construction are performed by MPWH.

Another autonomous agency under the Ministry of Transportation and Communications is the Philippine National Railways.

Except for those of the Ministry of Transportation and Communications Planning Service, which is involved in the allocation of capital funds and equity investments in the transportation sector, the remaining functions of the Ministry of Transportation and Communications, in the transportation sector, are primarily regulatory in nature. The Bureau of Land Transportation and Board of Transportation regulate road transport through registration of vehicles, licensing of drivers, franchising of carriers and enforcement of relevant statutes (including those on overloading). The Maritime Industry Authority, also within the MOTC, plays a similar role with respect to sea transport, albeit the Authority is also involved in the promotion of this mode. The regulation of air carriers is not under the MOTC, however. This is done by the Civil Aeronautics Board in the Ministry of Tourism.

³ Since 1977, the financial independence of the PPA has been sharply curtailed by Presidential Decree 1234. This is discussed in a later section of this chapter.

3.2 NATIONAL HIGHWAYS: LINE AGENCIES OF THE GOVERNMENT

Levels of Responsibility

The first line agency to discuss is the Ministry of Public Works and Highways and its primary responsibility for maintaining the national road network, and also municipal ports, and supervising the maintenance of barangay roads - as well as its construction responsibilities for all national roads and some local roads.

While the following discussion is devoted primarily to national roads (ports and barangay roads are covered in later sections), it should be borne in mind that the MPWH, as well as its regional and district engineering offices, is divided along functional, rather than sectoral, lines. (Figure 3-1) Thus, each of the three levels is also involved in the provision and maintenance of other elements of infrastructure, plus some local buildings.

Within the Ministry headquarters in Manila, staff functions come under the Deputy Minister for Planning, Administration and Finance. Six services cover:

- Planning
- Administration
- Finance and Management
- Legal Matters
- Manpower Development
- Comptrollership

Line functions of the MPWH are covered by bureaus. Under the Deputy Minister for Maintenance, Equipment and Design are the bureaus concerned with these disciplines. Under the Deputy Minister for Construction and Quality Control are the bureaus responsible for these disciplines. Thus, the six services listed above are paralleled by the following five bureaus:

- Bureau of Design
- Bureau of Construction
- Bureau of Maintenance
- Bureau of Equipment
- Bureau of Quality Control

A similar functional structure extends down through the Regional Offices and the District/City Engineering Offices, except that staff and line functions are not separated and some are merged. Thus, each regional office has seven divisions covering:

Planning and Design
 Construction
 Maintenance
 Finance and Management
 Administration
 Comptrollership
 Materials and Quality Control

and an eighth division covering Pumping Stations and Floodgates. Attached to the office of each Regional Director is a separate staff for regional equipment services, which functions as an arm of the Bureau of Equipment.

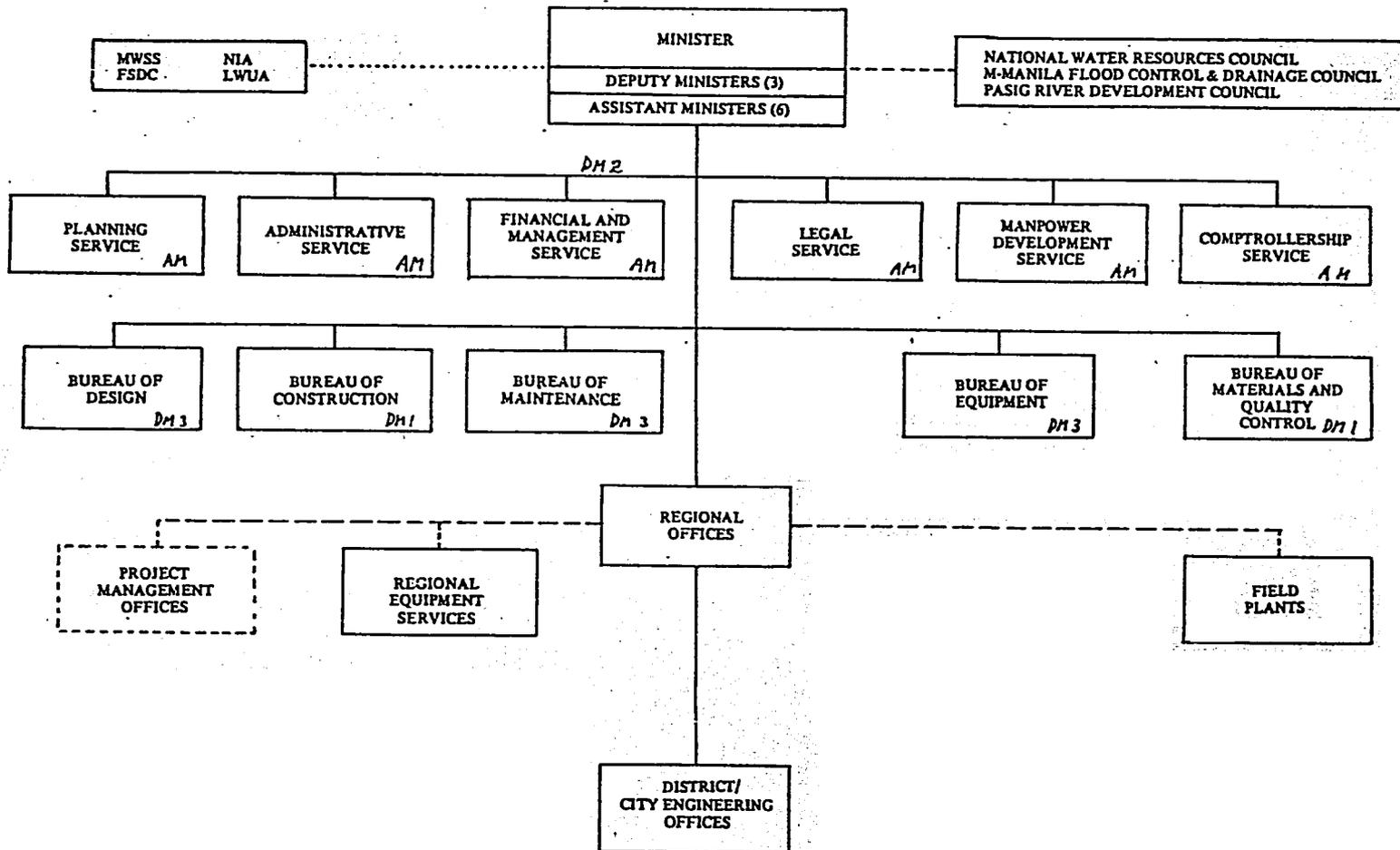
There are fourteen regional offices in the country, covering Region I-XII (two offices in Region IV) plus the National Capital Region. These offices act as miniature counterparts of the MPWH in their respective parts of the country and the divisions listed above, provide reports to and receive guidance and technical approvals from their respective services or bureaus in Manila.

Within each region are from 5 to 10 Districts, plus up to 10 Independent Cities. District boundaries follow provincial lines except that some provinces are divided into two districts. Thus, there are a total of 91 District Engineering Offices and 58 City Engineering Offices.

Each district engineering office has essentially the same functional division as the regional offices. Each of the seven basic functional areas noted above is the responsibility of a section within the district engineering office. There is no section for pumping stations and floodgates, but there is an eighth section, which is responsible for Building Code administration and enforcement within the district (Fig. 3-2). One feature to note is that district and city engineering offices normally do not have equipment; they must rent

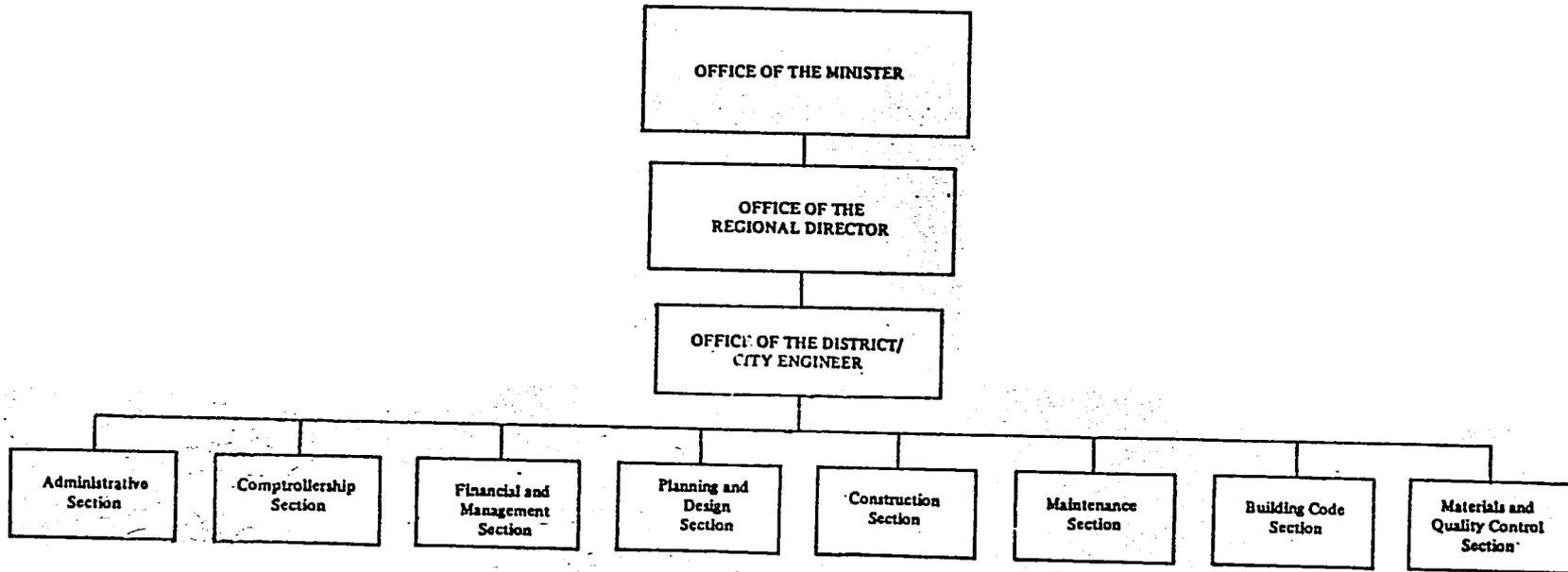
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Figure 3-1
 MINISTRY OF PUBLIC WORKS AND HIGHWAYS
 Organization Chart



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Figure 3-2
Ministry of Public Works and Highways
DISTRICT/CITY ENG'G. OFFICES
Organization Chart



it from the local representative of the regional equipment service - at approved rates, which are charged to the district or city maintenance budgets.

While the typical district engineering office has eight sections on the same level reporting to the District Engineer or his deputy, there appear to be several variations in the city engineering organizations. Some may still have their own equipment pools, for example, or they may have a separate electrical section (for street lighting).

The use of a functional division at all levels at MPWH rather than a sectoral division may have advantages in the use of personnel if skills in any given discipline are in short supply but it also has several disadvantages. For example, there is only casual contact, if any, between designers and those who must maintain a facility; or projects may be stalled between various stages, say between planning or design and actual realization. Repeated inquiries, however, as to whether any significant problems arose from this form of organization, brought forth replies to the effect that the difficulties encountered are generally not a result of the organizational split. At the same time, it is interesting to note that for major projects, a number of Project Management Offices have been established within MPWH, which guide these projects through the planning, design and construction phases at the national, regional and local levels. There were 29 of these project management offices in 1982. This having been said, outside of the lack of contact between designers and maintenance staffs, and the odd cleavage between maintenance organizations and equipment organizations, the functional form of organization does not materially affect maintenance. Within a separate road sector, a functional division would still be necessary.

Offhand, it would appear that there may be some duplication of tasks among the three levels of the organization and some redundant reviews by people who are well-removed from the actual site of the work to be done. In general, however, operating and capital programs

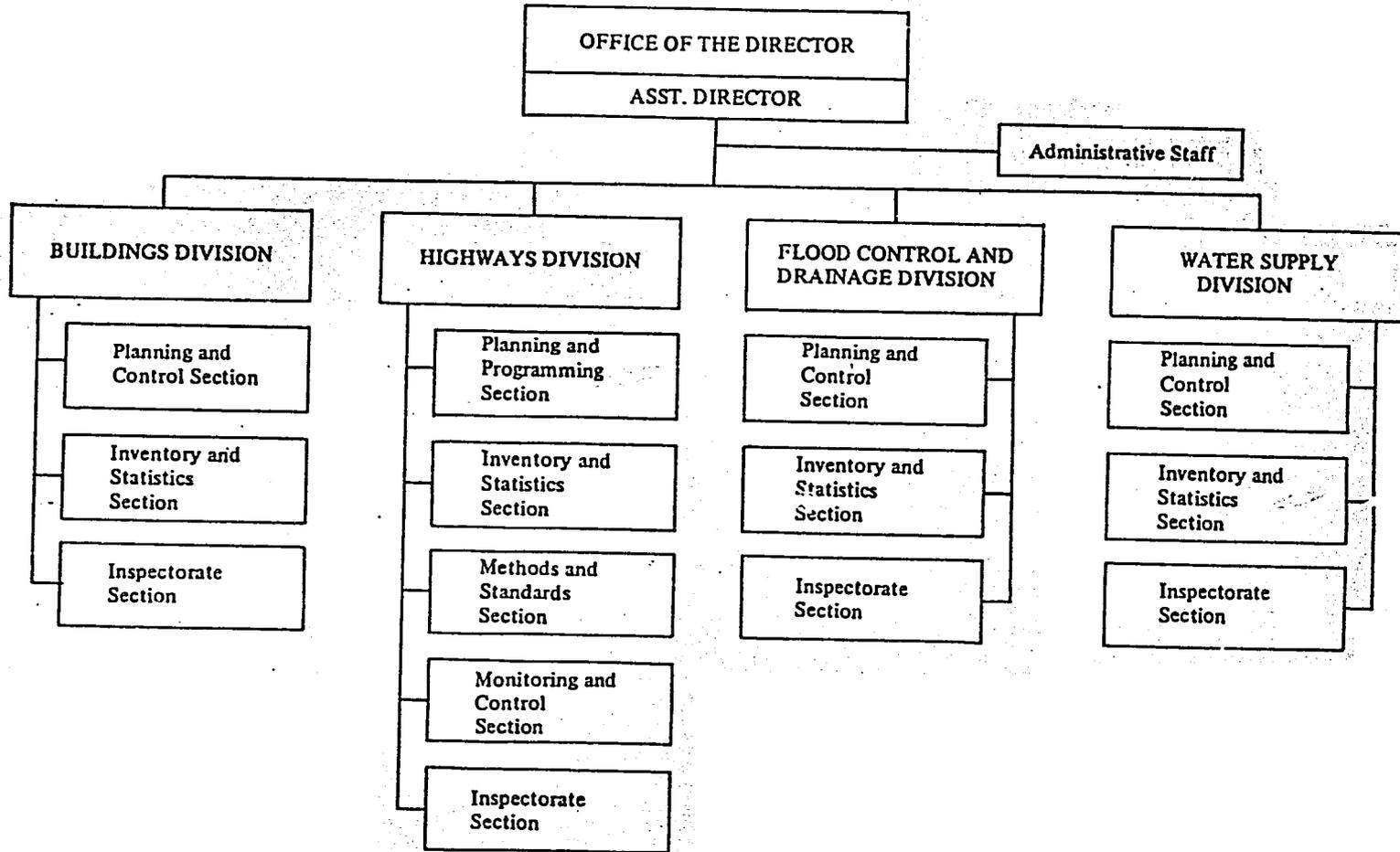
are developed initially and costed at the district level, then passed up through the regional offices to MPWH in Manila, where they are reviewed. Final programming of capital projects is done by the Planning Service. Maintenance programs are reviewed by the Bureau of Maintenance, then sent directly to the Budget Division of the Financial and Management Service. Once programs are established and funded, in most cases the regional offices are charged with implementing the programs in their regions and delegated the authority to do so. In the area of design and construction the amount of responsibility borne by various levels of MPWH, is essentially related to the size and complexity of the project, with district engineering offices undertaking smaller, simpler projects⁴ and the central Ministry carrying out the largest and most complex. In the area of maintenance, the Bureau of Maintenance provides overall supervision of maintenance programs, establishes maintenance standards, collects reports on damage from typhoons, etc., and monitors national and local road maintenance activities. Figure 3-3 shows the organization of this bureau. As far as actual road maintenance is concerned, however, the districts have the primary responsibility for scheduling and carrying out their programs for each year. An exception to this is equipment -- where responsibility is centered in the regional offices.

The staff of districts visited in Regions III, VI and XII varied from 87 up to 185. Typically, it seems that a district may have roughly 0.55 employees per km of road though this may be an artificial measure since climate conditions and methods differ and districts have other responsibilities besides roads.

⁴ Theoretically, District Engineers can enter into contracts of P500,000 or less; while Regional Directors have contracting authority up to P3,000,000. Both are subject to review at a higher level. In one of the regions visited, however, the complaint was voiced that, in practice, MPWH in Manila frequently contracts directly with Manila-based contractors for projects as low as P1,000,000, without the concurrence of the region involved. Typically, these contractors then broker the job, using the local contractors.

Inquiries in another region indicated that a similar problem did not exist there; the region and its districts were able to use their own lists of pre-qualified contractors. Nevertheless, an article in Bulletin Today on Nov. 13, 1984 indicated that the President was aware of a problem of big city contractors cornering government contracts and had informed mayors and governors that measures would be adopted to correct any inequities.

Figure 3-3
Ministry of Public Works and Highways
BUREAU OF MAINTENANCE
Organization Chart



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Sources of Funds and Budget Allocations

The source of funds for both operating and capital expenditures by the Ministry of Public Works and Highways is the National Budget. The funds are appropriated through several acts:

General Appropriations Act (which covers current operating expenditures and small capital projects of less than one year duration).

Public Works Act (which defines total obligational authority for large multi-year projects. Only a portion of these funds are spend in a given year).

Funds may also be appropriated by Presidential Decree but this appears to be a practice of the past.

Within the General Appropriations Act there are typically some thirty-five or more chapters. Appropriations for capital expenditures for national road projects may be found in the chapters covering:

Ministry of Public Works

National Priorities Support Fund (includes contingency funds for contract price increases stemming from energy costs funds for various feasibility studies and peso counterpart funds for foreign-assisted projects. Starting 1985, this chapter also includes all ESF funds)

Calamity Fund (for reconstruction of facilities, including roads, in cases of natural disasters, etc.)

Appropriations for maintenance of national roads and bridges are found only in the chapter covering the Ministry of Public Works and Highways.

Table 3-2 shows appropriations in recent years for maintenance of national roads and bridges (in addition to those for local road maintenance and capital outlays). It can be seen that the largest share appropriated for maintenance of the national road network is that which is determined on the basis of an approved rate per "equivalent maintenance kilometer (EMK). This is a standard formula that incorporates the number of EMKs in

Table 3-2
NATIONAL AND LOCAL ROADS
ALLOCATIONS FOR MAINTENANCE AND INVESTMENT
(All figures are P1,000's)

<u>ROAD MAINTENANCE</u>		GENERAL APPROPRIATIONS ACT				
		<u>1981</u>	<u>1982</u>	<u>1983</u>	<u>1984</u>	<u>1985</u>
<u>National Roads & Bridges</u>						
Allocation based on EMK formula		441,136	447,136	436,080	434,599	541,620
(Contingency)		(241,555)	(278,000)	(250,000)	(136,346)	(90,703)
Operational Support		17,835	19,868	21,000	22,129	24,135
(Equipment Operation & Maintenance)		(198,719)	(175,952)	(93,069)	(116,298)	(196,239)
<u>National Support for Local Roads & Bridges</u>						
Provincial & City Roads		183,515	182,685	183,940	181,463	182,611
Munic. & Barangay Roads		414,659	423,551	427,367	428,136	431,163
<u>Local Contributions*</u>						
All local roads		<u>299,087</u>	<u>303,118</u>	<u>305,654</u>	<u>304,800</u>	<u>306,887</u>
MAINTENANCE TOTALS (Excluding contingency & Equip. maint.)**		1,356,232	1,376,358	1,374,041	1,371,127	1,486,416
<u>CAPITAL INVESTMENT***</u>		GENERAL APPROPRIATIONS ACT				
National Roads & Bridges		106,590	117,300	170,000	-	-
Prov'l & City Roads & Bridges		64,105)	106,391	126,183	-	-
Munic. Roads & Bridges		35,345)			-	-
Barangay Roads & Bridges		409,290	180,894	238,117	188,128	100,000
(Construction Equipment)		(95,567)	(100,287)	(41,190)	(60,950)	(76,381)
Rural Roads Program****		32,559	179,773	240,000	240,000	199,762
Third Road Imp. Proj.		-	-	-	-	115,115
		PUBLIC WORKS ACTS				
Roads & Bridges		<u>1,062,904</u>	<u>4,897,683</u>	<u>3,944,389</u>	<u>2,679,782</u>	<u>2,089,692</u>
INVESTMENT TOTALS (Excluding equip. acquisition)		2,710,793	5,482,041	4,718,689	3,107,910	2,504,569
* Based on matching fund equal to 50% of the national contribution for all local road categories. Actual amount may be higher - see text.						
** Equipment maintenance excluded since use of equipment is charged against the EMK-based maintenance budgets at approved rental rates. Also, for maintaining other kinds of infrastructure is included in the equipment figure.						
*** Taken from MPWH Programs for the respective years, since the Public Works Acts each cover a multi-year period, indicating total obligational authority for each project for the full construction period. The same source is used also for investments with funds from the General Appropriations Act for the sake of consistency.						
**** Figures for 1983-1985 include small amounts for projects other than rural roads.						

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the road system and a flat amount for each EMK. The concept of EMK's was introduced in 1972, and the number of EMK's in a given road system has been derived by multiplying the actual length of road by factors that account for:

- surface type and width
- surface type and traffic volume

and adding the average length of bridge per kilometer times a factor for bridge type. The factors used through 1984 do not consider very low or very high traffic volumes, predominant truck traffic, terrain or climatic conditions. The flat amount per E.M.K. (P11,342) has not changed since 1976, so the basic allocation has varied only slightly since that time.

Recently, however, the MPWH Bureau of Maintenance has modified the EMK factors in order to discriminate among low volume roads and consider the higher traffic volumes on heavily travelled roads. Therefore, even though increases in the flat amount allowed per EMK have not been approved by the Commission on Audit, the 1985 budget allocation for maintenance of national roads and bridges is roughly 21% higher than in previous years.

In late 1983, a consultant to the MPWH Bureau of Maintenance, supported by the IBRD's Fourth Highway Loan, prepared a performance budget, based upon the physical feature inventory of national roads outside the Manila area that was then related to the cost of undertaking activities necessary for routine and periodic maintenance on the system⁵. This was compared to the amounts allocated for maintenance in the 1984 budget and it was found that only 61 percent of the routine maintenance budget varies directly with the surface type or bridge type. Other variables make up the difference. Thus, some distortion has resulted -- in relative terms, bituminous roads may get less than their proper share, whereas steel and temporary bridges may get more. It should be noted that regions receive an additional 7% in discretionary reserves, which they may use to correct imbalances among

⁵ Final Report, Highway Maintenance and Technical Assistance Project, RJA/TAMS, January 1984.

districts that may reflect the differences in the make-up of their road systems. At the same time, some regional imbalances may also result from use of the EMK formula. Furthermore, when both routine and periodic maintenance requirements were calculated under the performance budget the resulting amounts were 66.8% higher than the total amounts actually budgeted, so it is evident that, because of the ravages of inflation, maintenance on national roads is clearly underfunded under current budgetary restraints and practices.

Sources in the Ministry of Public Works and Highways indicate that when it starts the programming cycle (about 18 months before the year being budgeted), the MPWH normally receiving a ceiling for all appropriations from the Office of Budget and Management. It is nominally up to the Ministry to divide this between maintenance (and other operating) expenditures and capital investment. There is however, no formal mechanism for comparing the relative value of maintenance vs. investment. Early in the cycle, the maintenance budget is separated from the capital budget and several agencies, other than MPWH are involved, such as the Office of Budget and Management, and the National Economic and Development Authority (NEDA). Later, there may be item-by-item trades as the cycle proceeds, which are likely to reflect what one Asst. Minister stated is the current policy of MPWH: to grant maintenance the higher priority.

This is, in fact, quite evident from looking at Table 3-2. It is necessary to look at aggregates, however, since the amounts appropriated under the Public Works Acts and programmed for each year by MPWH are not broken down according to the categories of national, provincial, city, municipal and barangay roads.⁶ Total capital investments in Table 3-2 also do not include roads built under the Municipal Development Fund portion of the Economic Support Fund of USAID. The MDF includes more than roads, but

⁶In the 1984 Program, roads are categorized as Major Highways and Secondary/ Feeder Roads, with P2.31 billion programmed for the former and P0.37 billion for the latter. The programs for other years list individual projects, but classify them only as foreign-assisted or locally-funded and the project descriptions alone are not sufficient to establish the category to which they belong.

in U.S. Fiscal Years 1981-1983, the fund provided an average of \$18.3 million (about P164 million) annually. Leaving this amount aside and looking at the totals in Table 3-2, it can be seen that in constant pesos, while maintenance allocation declined by 37% between 1982 and 1984, programmed investments dropped by 74%. In 1982 the ratio of programmed investments to maintenance allocations was 3.85; in 1984 it was 1.60 and in 1985 it will be 1.47. This may not be a completely accurate picture, however. As discussed later, particularly at the provincial levels, there is some diversion of maintenance funds and resources to improvement projects, once funds are received at the operating levels.

One final note on the funding of highway work is that the amounts programmed for capital projects previously included a 12% allowance for inflation. (The allocations for maintenance have no such allowance and, therefore, are fully eroded by subsequent inflation). This 12% allowance proved to be insufficient in recent years, and the Capital Expenditures Adjustment Fund in the General Appropriations Act has been extremely difficult to tap. (Presidential approval is required.) Districts and regions have preferred instead, to scale a project down or reduce its standards if the original funds prove to be insufficient. The MPWH suggested that it be increased to 30% and the latest amendments to the Implementing Rules for P.D. 1594 have done just this.

Flow of Funds, Actual Expenditures

Once the budget comes into effect, on the first of the year, the initial documents received by individual agencies are Sub-Allotment Advices (SAA's) for the first quarter, issued by the Office of the Minister (of Public Works & Highways in this case). These state the activities and projects that have been authorized for expenditure in the quarter.

Actual releases of funds by the national government, however, are governed by documents called Cash Disbursement Ceilings (CDC's) issued by the Office of Budget & Management, which indicate that funds are actually available and fix the maximum amount that may be spent by an agency for a specific project or activity. These CDC's function as the obligating documents. While CDC's

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apply to quarterly allotments of funds, MPWH and its regional and district engineering offices have six months from the beginning of the quarter to actual' expend the funds.

Analysis of expenditures in 1982 and 1983 indicate that for maintenance about 95% of the amounts appropriated are actually spent. In the case of national highway maintenance funds, it would appear that virtually all of the money appropriated on the basis of the EMK formula, plus a small portion of the contingency allowance was actually spent. A somewhat lower proportion of the funds appropriated or programmed for capital investment were actually spent. About 70% of the money programmed from the General Appropriations Act and the Public Works Act in 1982 and 1983 was actually spent. This figure needs to be treated with caution, however, since expenditures may include funds from the last quarter of the preceding year and exclude some funds obligated in the last quarter of the year being looked at. Sources in the MPWH state that a much higher proportion of capital funds are now spent, since MPWH has been given the power to reallocate unspent funds from one project to another. A figure of 85% was cited for barangay roads.

Discussions with regional and district engineering staffs indicated that CDC's are generally received in timely fashion, so that maintenance work can proceed. The CDC's are issued, however, for four equal installments of the allocated funds and, therefore, allow limited flexibility in the scheduling of maintenance work. Some maintenance activities are only possible during the dry season and district engineers would prefer to schedule a higher proportion of the work during that period (generally from November through to May or June, albeit in parts of Mindanao and the Visayas the truly dry period may only extend from March through June). Except for the fact that funds obligated in one quarter may be spend any time within six months from the beginning of that quarter, district engineering offices have little opportunity to concentrate more maintenance work in the dry season.

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The overriding concern however, expressed at both the regional and district levels, is that the funds available for maintenance work are totally inadequate. The various regions and district engineering offices have developed their own approaches for coping with the shortage of funds and establishing maintenance priorities. Some concentrate on specific maintenance activities; others give priority to more heavily travelled roads.

Maintenance Management -- Programming, Directing, Monitoring

Since 1981 a consultant has been working with the MPWH Bureau of Maintenance and four pilot regions on the Highway Maintenance Technical Assistance Project supported by the IBRD Fourth Highway Project for the purpose of developing a new maintenance management system⁷, which would be more effective than the earlier system, a system that lacked consistency and did not include certain major activities. At the present time the MPWH is extending the new system from the pilot regions to the other regions of the country and this effort has been accompanied by an intensive training program to acquaint district engineering staffs with this system. During recent field visits, a regional maintenance chief and several district engineers were asked about the new system and the Highway Maintenance Management Manual completed in late 1983. They all produced copies and stated that it was used in programming 1984 activities and in current scheduling of work. In the Sultan Kudarat district engineering office the schedule for the current 15-day cycle, using the format developed by the consultant, was written on a blackboard for reference by all personnel.

The new system, called the Philippines Highway Maintenance Management System (PHMMS), is based upon the classification of maintenance work by field crews into specific activities, such as reshaping unpaved roadways, spot bituminous surface sealing, etc. The system, as developed, includes 70 activities, but this is expected to be reduced to 40 or 50 activities after revisions to the system are made on the basis

⁷ See Forrnote 5, above.



of subsequent experience in the field. Table 3-3 shows the activity groups and sub-groups currently in use.

Crews are now assigned, within a district or city area by activity, according to the work to be performed, rather than being assigned to a fixed section of road as was done formerly. Crew assignments are made by the area engineers (districts may have from 2 to 5 areas), who must also schedule equipment needs.

Annual Work Programs are prepared by district/city engineers at the level of the entire district or city. Maintenance activities to be addressed are determined by the type of roads in the district/city inventory. Quantities of labor, equipment and materials are based upon functions of the physical inventory, a separate assessment of physical conditions and the desired level of service. There are also functions of work methods; the method for any given activity may be a composite of labor-intensive vs equipment-oriented methods. Nationwide planning values have been used for these quantities in preparing the Annual Work Program for 1984. Later, as experience is gained in the use of the PHMMS, these values are to be adjusted to reflect local conditions. A "performance budget" is prepared by applying unit costs to the work programs.

Annual scheduling follows and workdays are distributed to months according to the weather and other conditions (to the extent possible within the quarterly allocation pattern for obligating funds). In theory, the system encourages more periodic maintenance, since 20% of the performance budget for 1984 is devoted to periodic maintenance, and some 71% of the amount budgeted for routine maintenance is for work on road surfaces, shoulders, drainage facilities and bridges. Unnecessary vegetation control is hopefully reduced. The performance budget also provides for the routine replacement of handtools.

Detailed scheduling and crew assignment is done on a 15-day cycle. The schedule details work to be done and who is to do it. The area engineer is supposed to inspect all roads in his area twice a month and

Table 3-3

ACTIVITY GROUPS AND SUBGROUPS

Group 100 Roadway and Related Features

- Subgroup 10 - Unpaved Surfaces
- 11 - Bituminous Surfaces
- 12 - Concrete Surfaces
- 13 - Unpaved Shoulders
- 14 - Drainage Features
- 15 - Bridges and Major Structures

Group 200 Roadside Maintenance

Group 300 Traffic Services

- Subgroup 30 - Signs and Markers
- 31 - Safety and Protection Devices
- 32 - Painting
- 33 - Visibility Control

Group 400 Vacant

Group 500 Preventive Maintenance

Group 600 Emergency Maintenance and Major Repair

- Subgroup 60 - Emergency
- 61 - Major Repair (Project)

Group 700 Maintenance Materials

- Subgroup 70 - Material Production
- 71 - Hauling and Stockpiling
- 72 - Material Manufacturing

Group 800 Support and Overhead

Group 900 Periodic Maintenance

use his observations in scheduling the work. Work needs are documented and written assignments are placed on daily activity cards. These are given to the foremen and capataces, and the completed cards serve as daily reports. (Figure 3-4) Activity standards are used by foreman as a guide to the purpose, work method and quantities appropriate to an activity.

The PHMMS addresses only management reporting and is separate from cost accounting. ("Standard Costs" are used for the various resources and applied to the work program. These are unit costs that incorporate all accountable costs borne by the MPWH in order to bring the resources to the job site and also allow for fluctuations during the year.) Two monthly summaries are prepared, using the activity cards as the primary source of information. One summary shows all data of maintenance during the month-man-days, accomplishments and costs. The second summary uses selected data and compares actual with planned performance. This last summary is a significant departure from the earlier system of reporting and control, which emphasized the control of expenditures along; not what is performed with the money.

Recent Project Experience

Not only in the four pilot regions but also in other regions visited during the present study, the Philippine Highway Maintenance Management System has received a generally positive reception. According to the IBRD-supported consultant's Fiscal Report, the system has yielded some early results:

- The MPWH Bureau of Maintenance is able to control the maintenance planning process and impose a uniform set of objectives. The process has been simplified, albeit district engineers still tend to believe that annual plans must specify exact locations.
- Crew sizes have decreased, indicating higher productivity.
- Motor grader productivity has improved.

Figure 3-4

MPWH HIGHWAY MAINTENANCE ACTIVITY CARD			Form TAD 1.1	
Activity Name			Act. No.	
District/City			Date	
—WORK ASSIGNMENT—				
Road/Bridge Name		From Km.	To Km.	Road Sect.
Crew Size	Foreman/Crew Leader			
Special Instructions				
—RESOURCES USED—				
Labor				
Transfer Total Man-Days From Other Side		— >		
Equipment		Material		
Description	No.	Description	Quantity	Unit
			.	
			.	
			.	
			.	
			.	
			.	
REPORTED BY			ACCOMPLISHMENT	
			Amount	Unit
			.	

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- The use of bituminous cold mix has been introduced.

Nevertheless certain major problems persist. Funding is inadequate and, since it follows a fixed formula, regional and district/city engineering offices may be discouraged from preparing the Annual Work Programs and performance budgets with the care that's needed. The Bureau of Maintenance forwards to the Budget Division of the MPWH Finance and Management Service only the budget request based upon the EMK formula; the Annual Work Programs and performance budgets remain as internal documents. The regional directors and district or city engineers don't fully appreciate the extent to which the performance budget can help them in a tight budget situation. Nevertheless, the Region III Chief of Maintenance stated that he now is in position to assign a higher priority to periodic maintenance items, even with a budget that falls far short of his needs. It was noted, however, that one periodic activity in the group he cited is bituminous surface treatment (road sealing) and he mentioned that, because of the price of asphalt, there is not enough money for a regular program of sealing roads, so spot sealing is used instead.

The IBRD-supported consultant has noted that engineering personnel still do not get out into the field enough and, also, that field crews are still not fully instructed on duties and techniques. This is evident from observation of the national roads in the various regions visited. There is little doubt that national roads are better maintained on the average than local roads (except for city streets) but certain activities, such as shoulder reshaping and ditch cutting are not what they should be. Typically, there was a considerable drop-off between the edge of the pavement and the unpaved shoulder and some edge crumbling was noticed. (In Region III some bituminous roads had been widened by a few inches on each side and this additional section was separating from the rest of the roadway). In Lanao del Norte, most of the length of the national highway linking the provincial capital of Tubod with the City of Iligan is a gravel, or telforded, road that has not been properly maintained. The provincial engineer stated

that the district had regraded the road during the two months before the team's visit and that subsequent rains had destroyed much of the work. While long sections of the road had a good crown, there were few places where ditches were in evidence and, particularly on uphill grades the section was flattened out and potholed. In some sections the road structure had already failed, so that rebuilding is needed. While rain is no doubt a major problem, it is most unlikely that the regrading (or any reshaping) was done properly in the first place or that there was any effective supervision. Related to this problem is one that stems from a lack of real models. Many engineers and equipment operators have not had an opportunity to see what a well-maintained road, paved or unpaved, actually look like and what are its features in reality.

As noted earlier, road maintenance equipment is controlled and maintained by the Regional Equipment Services (under the Bureau of Equipment) and their offices at the district level. This system of centralized control was instituted a number of years ago, in response to a situation in which equipment was often diverted from its proper use and was not maintained. The operation of the system has engendered several problems. When road maintenance equipment is scheduled for use by the district/city engineers they must file a request with the equipment service and a rental fee (covering depreciation, the cost of maintaining the equipment, insurance and an administrative burden of 25%) is charged against the district's FMK-based maintenance allocation. It used to be that if a piece of equipment was used at all, the district had to pay rent for a minimum of 20 days. This has now been modified by the Bureau of Maintenance, so that during the dry season the minimum rental is for 11 days and during the rainy season only the actual days of use are paid for. Nevertheless, rental rates are considered high by the district and city engineers and even the modified minimum tends to discourage equipment use. What also happen is that district engineers work out "understandings" with the local offices of the Regional Equipment Services, whereby their maintenance budgets are charged for, say, only 10-15 days, while the equipment is actually used for perhaps 20 days or more. Since equipment is scheduled for mainte-

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nance on the basis of recorded use, the result is that many pieces of equipment are under-maintained. The IBRD-supported consultant for the PHMMS has suggested that the fixed costs of equipment located within a district should be charged to the district's maintenance budget, whether it's used or not. The daily rental rates would then cover only the variable costs. This would encourage district/city engineers to make greater use of equipment.

Another problem that still remains is the diversion of maintenance funds and resources to project areas other than maintenance. This is less of a problem on the national road network than it is on provincial roads, since most road construction by MPWH is done by contract and the Bureau of Maintenance has tighter controls. There is still the problem, however, of diverting maintenance crews to emergency repairs. The General Appropriations Act includes a contingency fund for emergency repairs but its use requires Presidential approval and, also, the government's contracting procedures are too slow for emergency repairs by contract. It's easier for district engineers to divert their maintenance crews to do the needed repairs. While repairs are a valid part of maintenance, they aren't covered by regular allocations so diversion means that normal maintenance suffers. Since the MPWH districts once more have the responsibility for seeing that barangay roads are maintained, there will, no doubt, be pressure in the future to use crews and equipment intended for the national road system on barangay roads.

Vehicle Overloading and the Effect of Maintenance

Any discussion of road maintenance in the Philippines is not complete without some coverage of the problem of overweight vehicles. The problem stems primarily from a lack of enforcement capability and the type of vehicles used. It is aggravated, however, by inconsistencies in the regulations, which allow a Gross Vehicle Weight (GVW) that implies axle loadings higher than the legal maximum.

The most commonly used vehicle for highway transport is a 3-axle straight truck; it is the vehicle type that is also the most heavily overloaded. Because of this fact and the fact that registration fees for this common vehicle type are low, it is cross-subsidized by other types. Ironically, current regulations on Gross Vehicle Weight discourage the use of truck-trailer combina-

tions, which though they have a higher total vehicle weight will normally have lower individual axle loads. The legal maximum load on the most heavily loaded axle group (two axles 1.2 m or so apart) is 14,000 kg. but current GVW regulations imply a maximum load on the rear axle group of a 3 axle, 10-wheel truck of 18,000 kg. and loads of 23,000 kg or more were found to be not at all uncommon during surveys for the National Transportation Planning Project⁸.

The problem of overloading is most severe on the island of Luzon, largely because the roads are better. In the Visayas and Mindanao the poorer condition of the roads restrains overloading since owners are conscious of greater damage to their vehicles. Thus, the government may find itself in a position in which better-maintained roads will result in more overloading, which in turn will impose higher maintenance costs -- unless it finds a way to enforce overload regulations.

The National Transportation Planning Project maintained that the personnel and equipment existed in 1982 for an effective enforcement program. What has been lacking is the will and the administrative structures needed to mobilize an effective program.

* * *

In summary, a workable system for programming, directing and controlling maintenance work on national roads has been developed and is generally accepted by the MPWH, its regional offices and district/city engineering offices. Furthermore, the IBRD's 5th Highway Project, approved on Sept. 27, 1984 includes funds for continued support of the new maintenance management system. Nevertheless, some significant problems do remain, which are related to a funding formula that is somewhat anachronistic, (though the Government is now committed to change this), a current insufficiency of funds, the need for more training and greater awareness of the importance of field supervision, the lack of appropriate models, the system of equipment management, pressures to divert funds and resources from maintenance work and last, but decidedly not least, the chronic problem of overloaded vehicles on the road network.

⁸ National Transportation Planning Project, Final Report - Appendices, NEDA, MOTC, MPWH, PNR, PPA, MARINA - August 1982.

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3.3 PROVINCIAL, CITY, AND MUNICIPAL ROADS: LINE AGENCIES OF THE GOVERNMENT

Levels of Responsibility

The next set of line agencies to discuss includes the Ministry of Local Government (MLG), the provincial governments and the municipal governments, which carry the responsibility for programming and undertaking the maintenance of provincial and municipal roads, as well as the construction of local roads under various programs.

A special note is needed here regarding city streets. Those which are not a part of the national road network are maintained with funds allocated in the same manner as provincial roads. The city engineering offices, however, are a part of the Ministry of Public Works and Highways (MPWH). Therefore, the portions of the following discussion that relate to funds for the maintenance of provincial roads apply equally to most city streets, but regarding organizational structure and performance, the preceding discussion on the maintenance (and construction) of national roads is generally more relevant.

Like the MPWH, the MLG is divided along functional lines, with the staff functions of administration, finance and management, legal matters and planning coming under four services. Line functions are handled by two bureaus under a deputy minister:

Bureau of Local Government Development
Bureau of Local Government Supervision

Equally important, however, are a collection of 11 offices, secretariats and committees and 3 programs that are attached directly to the Office of the Minister. Among the first group is the Barangay Brigade Development Program Office and the Barangay Roads Development Program Office, which are both discussed in a subsequent section on barangay roads. Another is the Interagency Committee for National Government Aid to Local Government Units, which is concerned with the allocation of national government revenues to provinces and municipalities. The three programs attached to the Minister's office are of direct interest;

these are the Rural Roads Program (a reimbursement program supported by USAID), the Rural Roads Improvement Program (IBRD) and the Third Road Improvement Program (ADB).

The MLG also has regional offices, which carry administrative responsibilities for various development projects, including those under the three programs above. There are twelve regional offices (Regions I-XII), since the National Capital Region does not come under MLG and Region IV is not divided, as it is in the MPWH administrative structure.

The operative level for the construction, restoration and improvement of local roads, plus their maintenance, is the province and the municipality. Both these levels of government have their own elected officials, who are charged with governing in accordance with local needs and desires and are responsible to local legislative bodies. At the same time, provincial and municipal staff are given support and guidance by the MLG and the bulk of provincial and municipal revenues come from national sources.

With respect to provincial roads, primary responsibility lies with the office of the Provincial Engineer. This includes the responsibility to maintain the provincial road system (which averages 400 kms of roads) and, in cooperation with other agencies, to undertake necessary construction, restoration and improvement works. Provinces have their own pool of highway construction and maintenance equipment and the Provincial Engineer's office is responsible for its use and maintenance. (Provincial Engineers also retain a role in the construction of barangay roads, as discussed in a later section).

Municipalities have a similar set of responsibilities with respect to their road networks (averaging only 7.6 kms per municipality), when they are essentially urban in character, but they have few resources with which to discharge this responsibility and it is estimated that not more than a handful have any engineering capability. Little is known about the actual execution of municipal road maintenance programs, except that it is recognized that the condition of most of these roads is rather

poor. The MLG, may, with the assistance of an ADB-supported consultant, be soon taking a closer look at municipal road systems and local maintenance capability. Given the current lack of information, however, most of the following discussion is devoted to provincial roads. Municipal roads are referred to only when the information is available.

Referring back to the 3 programs attached directly to the office of the Ministry of Local Government, all of these programs involve the construction, rehabilitation and improvement of local roads but the specifics of their administration differ. Under the first program, (RRP), an individual province will construct, with its own resources, a road that is agreed to by MLG, and is then reimbursed by MLG for 75% of the cost. Construction is done by the offices of the provincial engineers. Under the second program (TRIP) the MLG program unit plans and budgets selected road improvements and administers their actual implementation, generally with the use of consultants. The province, however, must put up 20% of the cost if its a 1st Class province; 10% if its a 2nd Class province. For the last program (RRIP) the planning and budgeting is done by MPWH but then the funds are passed to MLG, which undertakes implementation of the projects in the same manner as TRIP. Other road construction programs undertaken by the provinces are planned and budgeted through the MLG Bureau of Local Government Development and provincial development staffs of individual provinces. Their realization is administered by provincial development staffs, in cooperation with the Provincial Engineers. These include programs supported by USAID through Development Assistance and the Economic Support Fund.

As in the case of the MPWH districts, the provincial engineering offices are responsible not only for roads but also for other infrastructure programs, such as those for barangay water, and also for various government buildings.

In contrast to the MPWH districts, however, the organizational form of the provincial engineers offices varies quite widely. Some are divided at the level of assistant provincial engineer into two major branches, one for support services and one for engineering (equipment

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maintenance can be found in either of these two branches). Each branch may have three divisions. Other offices simply separate the administrative function from engineering functions and have five divisions for the latter. Yet others have five or six divisions that are co-equal in the organizational line-up, though the maintenance section is typically much larger. In some cases, the construction function is combined with planning and design, with primary a professional staff, indicating reliance upon contracts. More typically, however, construction is a separate division, with a staff of foremen and workers, indicating considerable use of force account construction.

The MLG is currently considering a more uniform organizational form for provincial engineers' offices. In the proposed format the position of assistance provincial engineer would be dropped and four division chiefs would report to the provincial engineer. These divisions would be:

Administrative Division
 Planning, Programming & Quality Control Division
 Construction and Maintenance Division
 Equipment Division

While the idea of having only four men reporting to the provincial engineer is a good one, the danger that maintenance resources will be further diverted if the construction and maintenance functions are combined is very clear.

Regarding the resources of provincial engineers to discharge their functions, only one of the six provincial engineers visited by the team specifically stated that he was short of personnel. No direct comparison between staff and length of road to be maintained can be made, because there are varying practices on the use of permanent staff, contract staff (floating plantilla) and casual hires (at both the professional and worker level), there are the different approaches to road construction and, finally, the provincial engineering offices have other responsibilities besides roads. Looking solely at road maintenance crews and comparing man-days of labor needed for a model nationwide

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maintenance program vs. what provinces believed they could provide from their budgets, the consultant retained by MLG initially under the IBRD-supported Rural Roads Improvement Project found a shortfall of about 23%.⁸ In several of the provinces covered by subsequent maintenance feasibility studies, the same consultant found specific shortages of maintenance workers but also found that professional staff, aside from training and experience, were adequate.

A comparison of equipment actually working on road maintenance with what is needed may show a greater deficit. As discussed in the following section, the formula for allocating funds to maintain provincial roads makes no specific allowance for the cost of owning and maintaining equipment. Each provincial engineer has his own method for allowing for such costs. Provinces are able to purchase used equipment from MPWH, obtain it from USAID surplus equipment programs or secure it as a participant in another foreign-assisted program. The IBRD-supported consultant on the Rural Roads Improvement Program found that provinces that had not been included in a foreign-assisted program generally had much poorer equipment inventories. Much of the equipment in their inventories is of uncertain age and may be sidelined for lack of spare parts. Even when equipment is in operating condition, it may not be used because of the lack of fuel.

As a final note on the responsibilities of the various levels of government, it might be noted that the respective roles of MLG and MPWH are not entirely clear. Both Ministries share some responsibilities for both maintenance and capital improvements and this is brought out even more so in the next sections on funding.

Sources of Funds

Sources of funds for maintenance expenditures on provincial, city and municipal roads are the National Budget and local budgets. Amounts

⁸ RRIP - Final Report, Manpower Training and Technical Assistance,
Bergstralh-Shaw-Newman Inc., August 1984.

from the National Budget are appropriated in the chapter on National Assistance to Local Governments of the General Appropriations Act. Allocations to local governments are made on the basis of a fixed formula that provides $\frac{1}{2}$ the amount currently allowed per EMK on the national road system ($\frac{1}{2} \times 11,342 = P5,671$) for each actual kilometer of provincial/city road in the inventory of a province or city and roughly P3,000 per kilometer of municipal roads in a municipality. The local government must match this with an amount equal to 50% of the national contribution. Sources of the matching funds are (1) the same chapter of the General Appropriations Act under the heading of Local Government Share in National Internal Revenue and (2) local government revenues -- mainly from real estate taxes. The total amount available for maintenance under this formula is about P8,500 per km of road in a provincial inventory (and P4,500 for municipal roads). Currently, however, a number of wealthier provinces are providing added sums from their own coffers, so the average amount available for maintenance in the case of provinces is closer to P9,500 per kilometer. At the same time, poorer provinces are hard-pressed to come up with the mandated local contribution of 50% and may, therefore, fall short of the P8,500 figure.

Inasmuch as the formula for allocating national contributions to maintenance reflects neither physical characteristics (width, surface type, etc.) nor traffic levels, it is even less satisfactory than, the EMK formula used for national roads. The amounts allocated are found to be quite inadequate by provincial and city engineers, and there is also a major problem of inequitable distribution of national funds relative to maintenance needs. As of the end of 1983 (roughly contemporaneous with the similar calculation for national roads) the IBRD-supported consultant on the Rural Roads Improvement Project estimated that the total amount needed for provincial road maintenance, based upon a model performance budget and including the costs of owning and maintaining equipment was, at that time, about 66% higher than the amount provided under the current formulae for allocating national contributions and providing 50% matching funds; this is virtually identical with the extent of underfunding on national roads. Furthermore, there is a

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major problem of inequitable distribution of funds among provinces. While the average funding needed at the end of 1983, according to the report cited in the preceding section, was P14,125 per km, actual needs established by a performance budget ranged from a low of less than P10,000 per km to a high of nearly P30,000 in the case of a province with a high proportion of paved asphalt roads. (All these figures included equipment ownership costs.) Finally, the problem of the provincial road inventories must be mentioned, since they are not accurate and often reflect political compromises. Non-existent roads may be included while other key roads are not.

In subsequent feasibility studies, done with the support of the ADB under TRIP, the same consultant who prepared the Final Report on Manpower Training and Technical Assistance for the RRIP has developed performance budgets for each of the 15 provinces included in the Project⁹, which are based upon annual maintenance work programs and has shown how these budgets can be used to establish maintenance priorities and the best balance between labor intensive methods and equipment-oriented methods in a situation with a severe budget constraint. If budget requests could be prepared on the basis of annual maintenance work programs, showing activities and quantities based upon a physical inventory and condition survey, it would provide the means to decide where to cut or modify the program to fit within the amounts allocated and would also provide a measure of what is being left undone.

Capital funds for local road construction, restoration and improvements come from several sources. The General Appropriation Act has, in the past, included funds for "construction, rehabilitation, betterment and improvement (CRBI) of provincial, city and municipal roads". Now, outside of funds allocated for the Rural Roads Program (the reimbursement program supported by USAID) and the ADB's TRIP (Table 3-2) there are no longer any funds from this source.

⁹ Implementation: Ifugao, Nueva Vizcaya, Zambales, Aurora, Quirino, Palawan, Negros Occidental, Negros Oriental & Antique.
Feasibility: Tarlac, Cagayan, Isabela, Misamis Occidental, Capiz, Zamboanga del Norte.

As noted in the discussion of funding for national highways, road investments covered by the Public Works Acts are normally programmed by MPWH and the programs don't specifically refer to national, provincial, city or municipal roads as district categories. One program that shows up in the MPWH program is the IBRD-supported Rural Roads Improvement Program, though only the national portions are actually programmed by MPWH. Provincial Roads are programmed by the Special Projects Office of MLG.

Flow of Funds

Funds provided under the national contribution for the maintenance and repair of local roads (i.e. those based upon the fixed amount per actual kilometer of inventoried road) are administered by the MPWH, which at the beginning of each quarter issues an SAA for the amounts involved to each province, city and municipality. The Local Government Share of National Revenues, from which the matching funds are drawn, is distributed by the Bureau of Internal Revenue.

The actual obligation of local road maintenance funds does not follow the same pattern as those for national road maintenance. Instead, releases are based upon the provincial engineer (or city engineer or the appropriate municipal agency) receiving certification from the Provincial Treasurer (or a similar person at the city and municipal level) that funds are available for use. In one of the provinces visited, the provincial engineer stated that this certification often did not come through until nearly the end of the second month of the quarter, so that he was often operating on the balance of the previous quarter's funds -- which he contended severely limited his flexibility in matching maintenance efforts with seasonal changes. Other provincial engineers did not voice similar complaints.

A similar procedure is used for capital projects, such as the Rural Roads Program (for which reimbursement is received later) and the Third Road Improvement Project (TRIP). Funds for the Rural Roads Improvement Project (RRIP) are programmed by MPWH but passed to MLG for implementation. Actual construction work under RRIP, and also TRIP, is normally

undertaken by contract. The contracts are administered by MLG program units through the Ministry's regional offices, often with the assistance of consultants to MLG. The provincial engineers have no control (or interest, it would seem) until the road project is accepted.

Under the Rural Roads Program and the earlier CRBI program, work may be done either by contract or by force account. Provincial Engineers typically feel that they can save money by doing the work with their own forces but this approach poses the major danger of resources (not only funds, but also crews and equipment) being diverted from the maintenance effort.

Maintenance Management - Programming, Directing, Monitoring

Parallel with the similar effort on national roads, between 1981 and 1984 the MLG, with the help of consultants retained under the IBRD-supported Rural Roads Improvement Program, developed a manual for the guidance of provincial engineers in programming, directing and monitoring the maintenance of provincial roads. This manual was also reviewed and accepted by the MPWH in its capacity of final arbiter on all technical matters. Before the development of this manual, maintenance was largely a set of ad hoc responses to observed conditions or complaints. It has been generally viewed as a single, largely labor-intensive activity and crews have been assigned to lengths of road rather than being organized and assigned on the bases of separate maintenance activities. Visits to various offices of provincial engineers in six provinces indicated that the manual is gaining acceptance and is being referred to— even in those provinces not included in the initial IBRD-supported pilot project and the subsequent ADB-supported implementation phase and added feasibility studies. In some provinces, however, the old ways persist and the condition of the provincial roads is noticeably worse.

The system outlined in the MLG Maintenance Manual is similar to the one developed for the national road system. Once again, work is classified into specific maintenance activities and work crews and equipment are assigned on the basis of these activities. The system provides for:

Annual work programs and model budgets which can be compared to actual funds available.

Work programming and scheduling by activity - the system is simpler than the national system, however, and concentrates upon 25 selected activities covering both routine and periodic maintenance.

Direction of maintenance work through written instructions.

Control of maintenance activities - how funds are actually spent and how much is accomplished relative to objectives.

The system, as elaborated in the training sessions provided as an integral part of the project places stress upon increased contact between top provincial officials and the professional staffs of the provincial engineers' offices. With this increased contact the intent is to involve top officials in the decisions on where to cut maintenance activities in order to stay within available budgets.

Annual work programs are prepared by the provincial engineers and the maintenance activities to be included are determined by the physical inventory of the provincial road system. Annual quantities for each activity are used to develop model budgets and these are translated to object budgets showing the labor materials and equipment needed to undertake a complete maintenance program. Annual scheduling is then undertaken and needs per quarter are developed.

If the system is followed by a provincial engineer, it tells him what is needed, what activities are most important, and what resource quantities are required for these activities. It can thus be used to establish priorities. Most provincial engineers seem to establish their priorities in terms of roads (favoring more heavily travelled ones) rather than activities or, more appropriately, a mix of both considerations. Provincial engineers do prepare budgets showing labor, materials and equipment needs for the coming year, which means that an idea of what maintenance activities will be performed is, in fact, developed but it is not yet a formal part of the budgeting process; the amounts allocated each year are still based solely upon the length of road in the provincial inventory and a flat amount per kilometer.

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Recent Project Experience

Training sessions covering the use of the system outlined in the MLG Maintenance Manual have been held in a number of places throughout the country and, as in the case of the national Highway Maintenance Management System, there is the prospect of having a workable system that is increasingly accepted by provincial engineering staffs. In contrast to the MPWH, however, there is no system of strong centralized control (nor should there necessarily be one). Attendance at the training sessions by provincial engineering staffs has been largely up to the individual governors or provincial engineers. Therefore, outside of the provinces already affected either by the IBRD-supported pilot effort (6 provinces) or the ADB-support implementation or feasibility study effort (15 provinces), the impact of the new system has ranged from very considerable down to negligible.

Major problems continue to plague the provincial road maintenance effort (to say nothing of municipal roads). As in the case of national road maintenance, there are the problems of:

- inadequate funding, which is not equitably distributed.
- the use of an outmoded formula for maintenance allocations, even though the capability generally exists to prepare performance budgets based programs of physical activities.
- inadequate time in the field by engineering and supervisory personnel. In one province, it was stated that the maintenance engineer gets out into the field only once or twice in a two-week period and relies mainly upon verbal reports from foremen to know what is being done. In another, earth that had washed onto a paved roadway had been pushed back into windrows lying between the paving and the side-ditches over a distance of a kilometer or more. The provincial engineer was unaware of this practice.
- a lack of adequate instruction to foremen and capataces and poor techniques in the use of equipment. Once again, there is the problem of a lack of good models -- i.e. what does a well-maintained road actually look like. Maintenance standards are distinctly lower on provincial roads than on national roads. Subgrade failures because of inadequate drainage are more prevalent, potholing is more evident on both paved and unpaved roads and many roads have no crowns. Indeed, in one province they were little more than ill-maintained tracks (although a provincial roller was

noticed working on some tennis courts).

- poor scheduling and underutilization of road maintenance equipment. In one province, equipment is scheduled by the provincial engineer only in response to requests from capataces (In effect, they have taken over a management function); elsewhere, equipment can only be used with the express approval of the provincial engineer, himself, or even the governor. In a number of provinces, equipment is underutilized because of the lack of fuel.

Equipment that is sidelined because of a lack of spare parts (or the lack of funds, or authority to purchase them if foreign exchange is involved) seems to be much more of a problem for provincial engineers than for MPWH. (Tires, in particular were mentioned by provincial engineering staffs.) In part, the spare parts problems stem from the catch-as-catch-can system of equipment procurement, which leaves provinces with a mixed bag of equipment of uncertain age or origin. It is also, however, made worse by the fact that provincial engineering staffs often don't make the effort to locate spare parts.

Diversion of maintenance resources to other areas (emergency repairs, road construction or improvements, politically desirable projects such as playing fields, etc.) is a much more vexing problem for the provincial engineers than it is for the MPWH. This is because of several factors. One is the greater use of force account by provincial engineers for construction work -- this makes it easier to divert maintenance crews. Another is the lack of funds for emergency repairs, even if the capacity to contract quickly for such repairs were to exist. Finally, provincial engineers are in a situation in which local political pressures and the need to respond to such pressures are much greater. As the consultant who helped develop the MLG Maintenance Manual has noted, there is nothing necessarily wrong in being responsive to local needs and desires, as expressed through political channels. It's just that under the present system, maintenance suffers.

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In summary, while a system for programming, directing and controlling maintenance work on provincial roads has been developed under the

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aegis of the Ministry of Local Government and is gaining some acceptance by provincial engineering staffs, there is still a long way to go. The system must still be integrated with the actual budgeting process and few people on the provincial engineering staffs really understand how the system can be used to obtain more effective maintenance. A continuing training effort is needed, which can extend the effective use of the system to a larger number of provinces and can also extend deeper into the individual provincial engineering organizations.

3.4 BARANGAY ROADS: LINE AGENCIES OF THE GOVERNMENT

Current Responsibilities for Barangay Roads

Because of the extent of barangay roads, the number of administrative units involved (close to 40,000) and recent shifts in the responsibility for their construction and maintenance, a separate discussion of barangay roads is needed. As late as 1981, responsibility for the construction and maintenance of barangay roads was vested in the Bureau of Barangay Roads of the Ministry of Public Highways. The bureau had a regular budget and also had its own road maintenance equipment. In that year, the Ministry of Public Highways was merged with the Ministry of Public Works to form the present MPWH.

Responsibility for barangay roads passed to the Barangay Road Development Office -- attached to the Minister of Local Government. Provincial engineering offices were also involved to some degree and the equipment of the Bureau of Barangay Roads was transferred to the provincial engineers. Executive Order No. 777, which gave the MLG responsibility, specifically encouraged the use of locally-based labor (i.e. Barangay Brigades under the Barangay Captains) and labor-intensive methods for the maintenance of barangay roads.

Because of the lack of overall control and uniform standards and because other politically more attractive projects commanded the attention of barangay captains and the use of barangay road maintenance funds, the condition of the roads themselves has badly deteriorated. Therefore, early this year, Executive Order 972 was issued, directing

the MPWH to assume overall supervisory responsibility for the maintenance of barangay roads. The impact of this executive order is not entirely clear, however, some provincial engineers said they still had a responsibility to work with barangay captains in maintaining barangay roads, another said the order is to be applied on a case by case basis depending upon the condition of barangay roads in a given province.

It may be noted that the equipment that previously belonged to the old Bureau of Barangay Roads has remained with the provinces. Much of this equipment was already old at the time of transfer and provinces spent their own funds to rehabilitate many items. It is unlikely that they would willingly part with these pieces of equipment and because of their age district engineers aren't overly perturbed about it. Also, many districts have acquired new pieces of equipment from other sources.

Construction, restoration and improvement of barangay roads may be undertaken by the MPWH, (through the Barangay Roads Division of the Bureau of Construction), provincial engineering offices and, occasionally, by the Barangay Brigades themselves, albeit this has been under the direction of the provincial engineering offices. The IBRD is currently supporting a barangay road program (done by contract through MPWH) and barangay road construction is also supported with ESF, through the Municipal Development Program. Local officials would like the MLG to play a greater role in the construction and rehabilitation of barangay roads and have expressed discontent with the MPWH's "bureaucratic delivery of the goods" according to Business Day on Dec. 6, 1984.

Sources and Flow of Funds

Amounts appropriated in the National Budget for the maintenance of barangay roads are found in the same chapter of the General Appropriations Act as those for other local roads, the chapter on National Assistance to Local Governments. Allocations are made on the basis of a simple formula that provides P3,000 per km of road in a barangay inventory. (Other roads may exist, which are not in the inventory and receive no funding.) As in the case of other local roads, amounts appropriated from the National

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Budget must be matched by a local contribution equal to 50% of the national amount. Thus, a total of P4,500 is theoretically available to maintain each kilometer of barangay road. As in the case of national contributions to the maintenance of other local roads, the national amounts are administered by the MPWH, which issues an SAA for the amounts involved to the appropriate districts at the beginning of each quarter.

No estimates have been made, so far, of the amount of money needed for adequate maintenance of barangay roads. Given the lower service levels that may be tolerated and the narrower width of these roads, the cost will be lower than for, say, unpaved provincial roads. Not by a very large amount, however, and the use of labor-intensive methods may increase the cost over what it would be otherwise. Thus, the cost per km, as of the end of 1983, would probably have been in the range of P8,000-P9,000. There is a general concensus among both district and provincial engineers that the amounts currently available are woefully inadequate, particularly when the relatively high cost of administering the program and the extent of diversion that takes place are taken into consideration.

For the construction, restoration and improvement of barangay roads, funds may be appropriated in the General Appropriations Act (Indeed, barangay roads, are the only non-foreign-assisted road construction program still funded through the General Appropriations Act (Table 3-2.)) Some barangay roads are almost certainly included among the road projects funded under the Public Works Acts and programmed each year by the MPWH, including the IBRD Rural Roads Improvement Project, but they are not separately identified as such. Construction of barangay roads is supported also by the Third Road Improvement Project of ADB and by ESF (USAID).

Management of Barangay Road Maintenance

At the present time, the maintenance of barangay roads is undertaken by Barangay Brigades working under the Barangay Captains. Overall supervision and equipment, if it's needed or available, is provided by the MPWH through its districts and regional equipment services.

In theory, the area engineers of each MPWH district inspect barangay roads with the barangay captains and following these inspections sit down with each captain to prepare the annual and quarterly maintenance program for roads in a given barangay. Follow-up inspections are to be made at intervals to see if the programs are being followed or if the captains need any specific help.

The qualifier, "in theory" is used here, since -- if one reflects that within a district there may be 300-350 barangays and the district maintenance engineer may have from 3-5 area engineers on his staff, it can be seen that each area engineer must assist in program preparation and the development of schedules, then make follow-up visits to something close to 100 barangays. This is in addition to his normal responsibilities for the maintenance of national roads and other infrastructure items in his area. District engineers have not had their staffs augmented to cope with their new responsibilities for the maintenance of barangay roads, so it appears that area engineers have been given a difficult, if not impossible, task; a task that, if it were conscientiously undertaken could threaten the proper management of the national road network. A highly-placed official in MPWH has confirmed that some sort of supplementary organization is needed to manage barangay road maintenance and the MPWH Bureau of Maintenance has proposed that a new unit be added to each district engineering office, devoted solely to barangay road maintenance. This proposal foresees that one engineer, plus a clerk and a driver would be able to program, schedule and supervise the maintenance of about 500 kms of barangay road. This may be overly optimistic, since these 500 kms of road would be located in about 250 separate political units which would be providing the actual maintenance forces. Any organization that is developed would need to be structured with this in mind.

Techniques

Most barangay roads visited show the effect of inadequate and improper maintenance -- even in the wealthier provinces. Barangay roads are typically either earth or gravel. Few have any ditches, (though

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some are constructed as raised berms), mudholes are common and surfaces are rough. In many cases, only vegetation had been cut back.

Not only are there the issues of inadequate funding and effective lack of management, there is also a question of the most appropriate techniques to be used for barangay road maintenance. The current program is predicated to a large degree upon the use of labor-intensive methods. One maintenance consultant, however, has strongly suggested that a proper all-weather surface cannot be maintained without a motor-grader. Substituting hand methods results in a very uneven surface, varying thicknesses of surface materials and a much higher cost if the results obtained with a motor grader are even approximated. Such differences may not be fully appreciated, since most district engineers cited the high cost of equipment and how much of the barangay road budget it could consume -- up to 70% was quoted by one assistant district engineer. Quite possibly, a middle course could be found, not only for this set of activities but also for others, if a research effort could be mounted. A longer cycle for grading with a motor grader might be supplemented with hand surface patching. One consultant mentioned that grading with a "drag"¹⁰ had proven possible in one instance. The Director of the Bureau of Maintenance, however, has noted a drag won't work in most cases because of the large sizes of aggregates used for surfacing. First, it is necessary to get crews to use aggregate sizes of 1" or less.

* * *

In summary, the maintenance of barangay roads appears to be a large gap waiting to be filled. Labor for the task is evidently available. What is needed are funds to better reimburse this labor and defray the cost of equipment to supplement its efforts; an organiza-

¹⁰ This consisted of a heavy timber with blades mounted on the bottom that was hauled by a carabao. Unfortunately, existing regulations provided no direct means for reimbursing a farmer for the use of his carabao.

tion suited to the needs of over 30,000 separate units that can establish appropriate standards of maintenance and effectively manage and control the program so that these standards are met; and a research and training effort specifically directed to barangay roads.

3.5 NATIONAL AND SELECTED MUNICIPAL PORTS -- AUTONOMOUS AGENCY OF THE GOVERNMENT

Division of Responsibility

Prior to 1974, ports in the Philippines were operated by the Bureau of Customs, while their development and maintenance were the responsibility of the then Ministry of Public Works. In July 1974, as part of an agreement with the IBRD for the Second Port Project, the Philippine Ports Authority (PPA) was chartered by P.D. No. 505 (which was later amended by PD No. 857 to provide a broader scope for the PPA). The objective of the PPA, as stated in P.D. No. 857, is "to integrate and coordinate port planning, development, control and operations at the national level, and at the same time promote the growth of regional port bodies responsive to the needs of their individual localities".

P.D. No. 867 establishes the PPA as an autonomous body with full powers to create and staff an organization; to enter into contracts of any kind; to acquire, purchase or lease port properties necessary to conduct its business; to levy dues or charges for the use of port facilities; to reclaim land with its domain and undertake dredging; to acquire any undertaking that may provide facilities for handling and storing goods and to exercise all the powers of a corporation under Corporation Law. Authority to provide security for cargos and regulate their movement was expressly given the PPA.

The primary task of the PPA is the operation of ports in the Philippines. In line with its charter, the PPA also plans port development, maintains public ports and monitors the flow of traffic through private ports -- which handle most of the bulk, homogeneous cargos (petroleum, ores, sugar).

P.D. No. 867 grants the Philippine Ports Authority to incur indebted-

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ness (with presidential approval), in order to fund port construction, expansion and improvement works. Authorized capital for the PPA is P5 billion. This figure includes the assessed value of the pre-existing assets that were transferred to the PPA and these have been augmented by later port improvements, so only P1 billion remained under the ceiling at the end of 1983. The National Transportation Planning Project noted, however, in its Final Report that, while "the country's main ports at the beginning of 1970's were unsuitable for modern cargo handling, ... construction of modern berths began in the mid-70's and by 1984 (now 1985) the eight main ports¹¹ will have good facilities. Emphasis is shifting to the secondary ports but investment requirements are low, as many have surplus capacity". A significant omission of the NTPP, however, is capital dredging -- which is needed at several ports, including Cebu.

It should be noted that P.D. 867 designates the Bureau of Public Works (now MPWH) as PPA's executive agency for detailed engineering and construction of port works, construction dredging and reclamation. In practice, the PPA undertakes the feasibility studies needed to secure the funds for port construction work but, once the funds are in hand, passes primary responsibility to MPWH.

The organizational structure of the PPA is influenced by the fact that the Philippines is an archipelago. This means that there must be a reasonable degree of local autonomy and human resources must be well-distributed throughout the islands. At the policy level, the PPA is governed by a board of 8 directors, with the Minister of Transportation and Communications as the Chairman. Policies established by the Board are carried out by the General Manager and Assistant Executive Officer through three line offices for Finance & Administration, Operations, and Planning & Administration. For actual port operations there are 19 Port Management Units (PMU's) throughout the country (Fig. 3-5) which report to the General Manager. Each PMU serves as the base port for supervision of public and private ports within its area of jurisdiction.

Current strength of the PPA is about 2,100 employees. This is a little more than 70% of the number authorized.

¹¹ Manila, Cagayan de Oro, Batangas, Cebu, Iloilo, Davao, Iligan and Zamboanga.

Through its PMU's, the PPA operates a total of 104 ports which are considered to be national ports. In addition, some 30 to 45 municipal ports (depending upon which reference is used) also come under the PPA's operational wing. Together, these ports account for 97% of the total traffic passing through public ports. There are, however, a total of over 500 municipal ports in the country, many of which are not much more than landings that cannot really be developed into proper ports. P.D. 847 refers specifically to ports "vested in, or belonging to" PPA and a list of national ports shows the dates they were taken over by the PPA. Nevertheless, there seems to be a gray area regarding any responsibilities the PPA may have for these municipal ports. The PPA has suggested in communications to the Cabinet that it be given total responsibility for a definite list of ports, including the responsibility and authority to engineer and construct new port facilities, and that the remaining ports should be operated by the municipalities and that they be granted the sole authority to impose and collect port charges (see the following sections of the report on municipal ports).

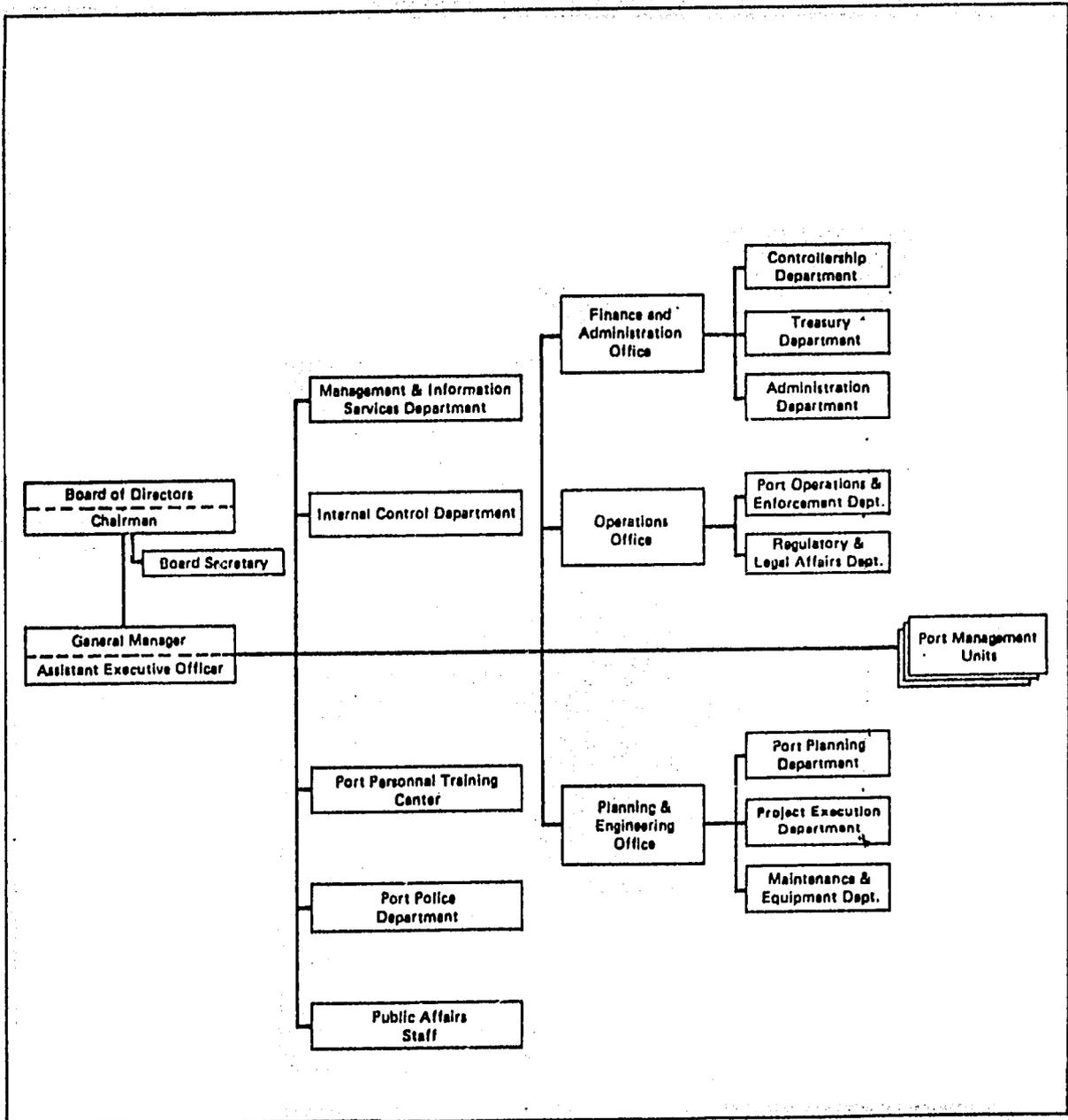
Sources of Funds

The sole sources of funds for the Philippine Ports Authority, outside of external borrowings, are the fees and charges for the use of port facilities and income from the management of surplus funds. The PPA's chief sources of revenue in 1983 were:

Berthing charges	6.4%
Wharfage dues	40.9%
Storage charges	8.0%
Arrastre income	19.7%
Port usage fee	5.1%
Other Income	11.3%
Funds Management	8.6%

Tables 3-3, 3-4 and 3-5 show the PPA's Operating Results, Cash Flow and Financial Position in the years from 1980-1984. (The last year is pro-forma) Covenants accompanying the recent loans for port improvements require that the PPA be operated on a commercial basis, with a 7% Return on Assets and a Debt Coverage Ratio of at least 1.75.

Figure 3-4



PORT MANAGEMENT
UNIT:

- MANILA
- CAGAYAN DE ORO
- BATANGAS
- CEBU
- ILOILO
- DAVAO
- ILIGAN
- ZAMBOANGA
- SURIGAO
- SAN FERNANDO
- TACLOBAN
- GEN. SANTOS
- DUMAGUETE
- LEGASPI
- MASAO
- PUERTO PRINCESA
- POLLOC
- IRENE
- JOLO

Table 3-3
 PHILIPPINE PORTS AUTHORITY
 Operating Results

	<u>1980</u>	<u>1981</u>	<u>1982</u>	<u>1983</u>	<u>1984</u>
Gross Revenue					
Port Revenue	223.15	279.52	341.69	391.24	434.06
Fund Mgt. Income	58.56	51.94	33.55	36.89	49.63
	<u> </u>				
T O T A L	<u>281.71</u>	<u>331.46</u>	<u>375.24</u>	<u>428.13</u>	<u>483.69</u>
Expenses					
Cash Operating Exp.	107.93	137.62	162.48	196.94	332.14
Non-cash Charges	85.10	94.93	132.83	122.36	104.73
	<u> </u>				
Net Income	<u>88.68</u>	<u>98.91</u>	<u>79.93</u>	<u>108.83</u>	<u>46.82</u>
	=====	=====	=====	=====	=====

Table 3-4
PHILIPPINE PORTS AUTHORITY
Cash Flow

	<u>1980</u>	<u>1981</u>	<u>1982</u>	<u>1983</u>	<u>1984</u>
Cash, Beginning	<u>396.05</u>	<u>366.95</u>	<u>350.63</u>	<u>406.28</u>	<u>519.74</u>
Cash Inflow:					
Port Revenue*	219.86	271.56	339.26	386.33	438.42
Fund Mgt. Income	58.56	51.94	33.55	36.89	49.63
Foreign Loan Avail.	36.44	314.17	168.54	233.13	787.00
TOTAL CASH INFLOW	<u>314.86</u>	<u>637.67</u>	<u>541.35</u>	<u>656.35</u>	<u>1275.05</u>
TOTAL CASH AVAILABLE	<u>710.91</u>	<u>1004.62</u>	<u>891.98</u>	<u>1062.63</u>	<u>1794.79</u>
Cash Outflow:					
Cash Operating Expenses**	94.46	115.88	107.04	115.92	157.88
Debt Service	30.95	35.90	43.88	82.62	200.24
Infrastructure Proj.	148.46	331.43	254.01	296.61	949.19
Dredging Projects	36.18	73.91	31.36	22.14	50.00
Equity Transfer to NDC	-	-	39.00	5.00	0.00
Payables & Others	33.91	96.83	10.41	20.59	160.36
TOTAL CASH OUTFLOW	<u>343.96</u>	<u>653.99</u>	<u>485.70</u>	<u>542.88</u>	<u>1517.67</u>
CASH, ENDING	<u>366.95</u> =====	<u>350.63</u> =====	<u>406.28</u> =====	<u>519.75</u> =====	<u>277.12</u> =====

* Source of minor discrepancy between these figures and those in Table 3-3 is not readily identifiable.

** Cash Operating Expenses in preceding table include Interest on Loans. In this table interest is included in debt service.

Table 3-5
PHILIPPINE PORTS AUTHORITY
 Financial Position

	<u>1980</u>	<u>1981</u>	<u>1982</u>	<u>1983</u>	<u>1984</u>
<u>A S S E T S</u>					
Current Assets	448.05	508.74	570.97	690.29	441.39
Net Fixed Assets	2278.42	2533.27	2830.33	3145.86	4028.05
Others	162.66	183.14	148.98	163.53	28.36
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Total Assets	2889.13	3225.15	3550.28	3999.68	4497.80
	<hr/>	<hr/>	<hr/>	<hr/>	<hr/>
<u>LIABILITIES</u>					
Current Liabilities	112.51	85.33	104.66	253.94	99.91
Long-Term Liabilities	186.37	486.68	645.95	854.91	1565.92
	<hr/>	<hr/>	<hr/>	<hr/>	<hr/>
Total Liabilities	298.88	572.01	750.61	1108.85	1665.83
	<hr/>	<hr/>	<hr/>	<hr/>	<hr/>
<u>NETWORTH</u>					
Paid-Up Capital	2349.88	2320.25	2395.75	2390.77	2390.77
Retained Earnings	240.37	332.89	403.92	500.06	441.20
	<hr/>	<hr/>	<hr/>	<hr/>	<hr/>
Total Networkth	2590.25	2653.14	2799.67	2890.83	2831.97
	<hr/>	<hr/>	<hr/>	<hr/>	<hr/>
TOT. LIAB & NETWORTH	2889.13	3225.15	3550.28	3999.68	4497.80
	<hr/>	<hr/>	<hr/>	<hr/>	<hr/>

In order to meet these requirements in coming years, the PPA has stated that it will be necessary to increase port charges significantly. Increases of 30% in April 1985 and another increases of 30% in October 1985 have already been approved. Further substantial increases will be needed in 1986 and 1987, according to PPA projections, unless some government equity is provided to the port body. To alleviate the situation the PPA has requested that the current practice of granting exemptions from port fees to various government and private entities be stopped. PPA has noted the need for more equitable port charges. As a result of a recent reclassification and simplification of port tariffs, foreign vessels and cargoes pay must higher charges than do domestic vessels and cargoes, so there is substantial cross-subsidization which needs to be reduced to avoid distortions.

Flow of Funds

As originally conceived, the Philippine Ports Authority was to be financially autonomous and was to be able to control its funds within the limits prescribed for all public corporations.

In 1977, however, two Presidential Decrees, Nos. 1177 and 1234, severely compromised the PPA's financial autonomy by requiring that it:

- remit all revenues to a special account in the National Treasury, from which it could only make withdrawals by obtaining CDC's from the Ministry of Budget,¹²
- remit to the same special account the balances of any income applied to reserves.
- subject all budgetary allocations by the PPA Board to review by the Ministry of the Budget.¹²

In the early years the effect of these decrees was not really felt but, in the years since 1980, the PPA has found that not only must the budget be reviewed but it can't get CDC's for more than a fraction of the amounts budgeted for operations and maintenance, or for that matter capital expenditures. For example, in 1983:

¹² Now the Office of Budget and Management.

Current Operating Expenses

Personal services	P 58,706,341
Maintenance, operations, equip.	100,736,074
Debt service	<u>82,683,379</u>
Total Required	P242,125,794
<u>CDC's Issued</u>	<u>185,100,000</u>
Shortfall	P 57,025,794

Since personal services, primarily staff salaries, and debt service are obligations that cannot, for the most part, be avoided, it is evident that maintenance and operations suffer.

As of mid-October, the situation in 1984 was even worse: for budgeted current operating expenses of P408 million, CDC's had been issued for only P206.2 million. The consequences of this can be seen in the case of dredging. The PPA has a reasonably modern fleet of six dredges, with a productive capacity roughly equal to the annual maintenance needs of about 6,000,000m³. Yet this fleet has been idle, or else has undertaken private contract work during much of the year, in spite of the fact that a backlog of 20,000,000m³ exists.

Maintenance Management -- Programming and Control

The programming of maintenance work is done by the engineering staffs of the individual Port Management Units, which prepare their programs on the basis of maintenance projects (rather than activities). Projects are listed in priority order and estimated costs are provided. These programs are sent to the General Manager in Manila, who passes them to the Maintenance Department for review and checking of prices. That department then makes recommendations to the General Manager on countrywide priorities and the technical aspects of the programs. Dredging activities are entirely under the control of Manila; the only role of the PMU's is to report on conditions and request dredging services when needed.

Insofar as funds are severely constrained as a result of P.D. 1234, priorities are important. The individual PMU Managers that were con-

tacted were unanimous in stating that maintenance affecting the safety of vessels, structures and personnel comes first. In one PMU only six of 13 maintenance projects were actually funded and all of these were for renewal of fender piles. Other projects, such as repaving open areas, etc. are deferred. It should be noted that, since maintenance works are programmed on the basis of projects, there seems to be no scheduling of routine maintenance activities, such as painting transit sheds, patching paved surfaces, etc., no norms have been developed for the costs of these activities and there is no full facility inventory.

For undertaking maintenance projects, the base port in each PMU has a maintenance crew but no equipment. Patching of a concrete deck is possible but maintaining bituminous pavements is more difficult; equipment can be rented from the private sector, or occasionally from MPWH regional services. Quite often, maintenance is done by contract -- in the case of fender pile replacement at Iligan, the piles were purchased from Davao and, when they were received, a contract was let for driving them.

Maintenance work at the sub-ports in each PMU appears not to be as routinely programmed and carried out. Typically, the sub-ports have no maintenance crews of their own and little, if any, regular maintenance is done. In emergencies, crews from the base ports are sent out to undertake necessary repairs.

The PMU's provide Manila with monthly progress reports, which list the maintenance projects underway, their estimated cost, physical accomplishments to date and expenditures to date. There is little uniformity in the way these reports are filled out (In one case, physical accomplishment was merely calculated by dividing expenditures to date by the total estimated cost) and the Maintenance Department has stated that it is not in a position to enforce standard reporting procedures, since the PMU's are responsible directly to the General Manager. Inquiries in the various PMU's revealed that inspection of completed maintenance projects by Manila are rather rare.

Specific Project Experience

Projects conceived since the creation of the Philippine Ports Authority are only now nearing completion. Others undertaken with assistance from the IBRD and KFW were completed a few years back but the feasibility studies were done prior to the advent of the PPA and no overall evaluations were available to those involved in their operation.

* * *

The overall impression gained from discussions with Philippine Ports Authority personnel and visits to various ports around the country was that of a reasonably competent organization that is operating the national ports in an efficient manner and is aware of most maintenance needs. There are some soft spots in the area of monitoring and control and, perhaps, in equipment -- though this seems not be a major problem. At the same time the organization is prevented from doing what it knows must be done by a decree that denies it access to its own funds. Greater attention to certain maintenance needs no doubt would be desirable, but next to the problem posed by the current denial of funds for maintenance it is almost a minor consideration.

3.6 MUNICIPAL PORTS -- LINE AGENCIES OF THE GOVERNMENT

Responsibilities

In the mid-1960's municipal ports proliferated, since funds from the national government were available and legislators strove to secure these funds for their home districts. There are now over 500 municipal commercial and fishing ports. Perhaps a third are important to their local economies, but a larger number have fallen into disrepair and many have never been completed. It is unlikely that more than a few in the last two groups can ever be developed into viable port facilities.

These ports were originally constructed by the old Department of Public Works and Communications (which later became the Ministry of Public Works) for the account of the individual municipalities. Maintenance of

these ports wasn't a concern of that Department and no money (outside of a nominal amount for dredge maintenance) was appropriated. Over the years as many municipalities found that they didn't have the resources to maintain their ports, which were deteriorating, local authorities looked to what had now become the MPWH, or to the newly-created PPA, to assume responsibility for the ports and to embark on a program of rehabilitation and repair.

The PPA, because of its commercial orientation and its loan covenants, has not felt that it can assume responsibility for any more than the 30-45 municipal ports that are financially viable and can be included in a nationally-managed system. The MPWH finally recognized that there was a need to assist municipalities maintaining a certain number of the remaining ports and, beginning in 1983, funds have been appropriated for the "maintenance and repair of portworks, lighthouses, shore protection works, channels and waterways". The current inventory of physical works in these categories that the MPWH deems to warrant maintenance includes not only some 294 municipal ports with an average length of 90 meters (whether this is berthing length or total length of causeway and structure isn't clear), but also 118 lighthouses, 68 kms. of shore protection works and 2,137 kms of channels and waterways (almost all of which are unrelated to any port access need).

Most recently, the MPWH has developed what it calls the tertiary ports program, covering 150 municipal ports. Under this program, MPWH has proposed to the municipalities that have been selected that it will undertake the rehabilitation and improvement of their ports, if the municipalities agree to maintain them and each local council passes a resolution to that effect. The rationale behind this program is that municipalities are not entirely without resources to maintain their ports, since they can levy fees for the use of such ports. (It should be noted, however, that added fees would have to be imposed, since the basic amounts are supposed to be remitted to the PPA. The effect, therefore, could be to divert traffic away from such ports.) The ADB and JICA were both approached for the funding of this program but have shown little enthusiasm because of the institutional problems involved.

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Source of Funds

The source of funds for the maintenance of municipal ports (as well as lighthouses, etc.) is the General Appropriations Act, Ministry of Public Works and Highways chapter. The Act allocates these funds by region; the total in 1984 was P10,129,000 and in 1985 this will be increased to P16,196,000. How much of these amounts are actually available for port works is not specified but the Bureau of Maintenance has indicated that it is a substantial share. At the district level, however, the amounts received are actually quite nominal -- on the order of P50,000 to 100,000.

These funds follow the same path as maintenance funds for national roads, with SAA's being issued by the Office of the Minister at the beginning of each quarter and subsequent releases to the districts made through the issuance of CDC's by the Office of Budget & Management.

Management of Maintenance

As in the case of national port maintenance, the programming of maintenance works for municipal ports is on the basis of projects, not activities. For each project in its maintenance program, a district submits a description of the work to be done and an estimate of the cost. Typically, the program is prepared in response to requests from mayors or other municipal officials, rather than routine inspections or a regular cycle of maintenance activities.

The amounts requested by the districts are well above the funds actually available, so that only a fraction of the desired maintenance projects are carried out. While the programs submitted by the individual districts have projects listed in priority order, informal discussions with district engineers indicated that the funding of a particular maintenance project is much more a matter of personal contacts by local officials and members of the Batasan.

District engineering offices have no regular staff for undertaking the maintenance of municipal ports, lighthouses and shore protection

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works. Therefore, such maintenance is normally done by contracts, which are within the District Engineer's contracting authority of P500,000. Supervision of these contracts is done by the area engineers, within the maintenance section.

* * *

In summary, municipal ports proliferated about two decades ago and only a fraction of these have proven to be economically useful. Maintenance has historically been poor and only recently has the MPWH, somewhat reluctantly, assumed responsibility for this maintenance, in order to halt the continuing deterioration of municipal ports.

There is, as yet no routine procedure for assessing maintenance needs and programming resources on a regular basis for each viable port. Until a common consensus is reached on which ports should be continued in operation and local revenue bases are expanded so that municipalities can contribute to the maintenance of their ports, it is unlikely that a full maintenance program can be established.

CHAPTER 4
 INSTITUTIONAL SETTING FOR
 WATER RESOURCES AND THE MAINTENANCE OF
 WATER RELATED INFRASTRUCTURE

4.1 ORGANIZATION OF THE SECTOR

This part of the evaluation deals with the following infrastructure sectors:

- . Water Supply & Sanitation
- . Irrigation
- . Drainage and Flood Control
- . Dams and Other Related Improvement Structures

The following main government agencies, entities and/or corporation are involved in water resources and water related infrastructure¹:

- 1) National Water Resources Council (NWRC)
- 2) Local Water Utilities Administration (LWUA)
- 3) Rural Waterworks Development Corporation (RWDC)
- 4) Barangay Water Program (BWP)
- 5) National Irrigation Administration (NIA)
- 6) Farm Systems Development Corporation (FSDC)
- 7) Line agencies of the Min. of Public Works & Highways (MPWH)
- 8) Ministry of Health (MOH)

The first, second, fifth and sixth of these agencies or corporations are attached to the Office of the Minister of Public Works and Highways. The third one, Rural Waterworks Development Corporation is attached to the office of the Minister of Human Settlements. The fourth, Barangay Water Program, operates within the framework of the Ministry of Local Government.

The Ministry of Health (MOH) provides inspections as well as technical assistance to the above government agencies on environmental related activities. The services provided by the MOH are further described in the Rural Sanitation Section of this report.

¹ In addition to the agencies listed, others are not discussed in this report since they are concerned primarily with Metropolitan Manila and are, therefore, outside the scope of this study. These other agencies are:

- 9) Metropolitan Waterworks and Sewerage System (MWSS)
- 10) Pasig River Development Council (PROC)
- 11) Metropolitan Manila Flood Control and Drainage Council (MMFCDC)

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4.2 NATIONAL WATER RESOURCES COUNCIL

Introduction and Organization Objectives

The National Water Resources Council (NWRC) is responsible for the coordination and integration of all water resources development and management in the Philippines in order to achieve a scientific and orderly development, and to meet present and future needs. It was created by Presidential Decree No. 424 dated March 28, 1974 as a permanent high level ex-officio body attached to the MPWH as a central coordinating agency.

Under the Water Code of the Philippines, which was enacted in 1976 (PD No. 1067), the power to control and regulate the utilization, exploitation, development, conservation and protection of the country's water resources is now vested with the Council. The Code further strengthens the coordinating role of the Council. Also, added to this are the functions pertaining to waterwork utilities regulations and supervision, which were transferred to the Council from the previous Bureau of Public Works (PD No. 1206) on March 6, 1977; and the hydrologic surveys and data collection functions of the Bureau of Public Works, which had earlier been transferred to the Council under Executive Order No. 546 dated July 1969.

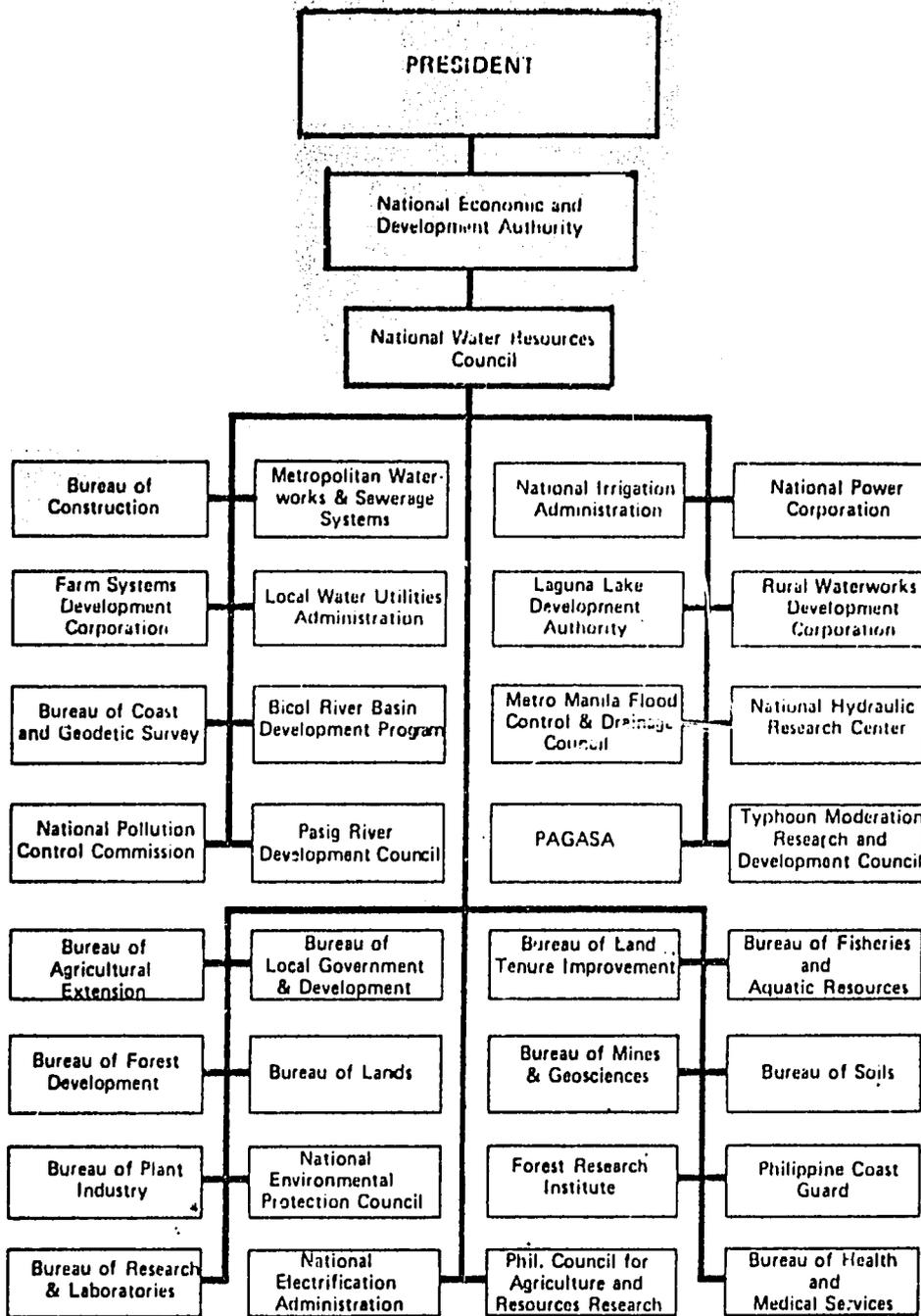
The Council acts as a collegial body and meets twice a month to resolve all issues and conflicts in water resources development and management; and to grant rights, waterworks franchises and rate adjustments.

Figure 4-1 shows the Water Resources Coordination Chart.

Organization and Staff of NWRC

The Council is composed of the heads of ministries and line agencies most concerned with water resources. At present, there are nine (9) members consisting of the following:

Figure 4-1
Water Resources Coordination Chart



- (1) The Minister of Public Works & Highways - Chairman
- (2) The Minister of Agriculture - Member
- (3) The Minister of Energy - Member
- (4) The Minister of Human Settlements - Member
- (5) The Minister of Natural Resources - Member
- (6) The Deputy Director - NEDA - Member
- (7) The General Manager - MWSS - Member
- (8) The General Manager - NPC - Member
- (9) The Administrator - NIA - Member

The Council is supported by a full time working staff composed of specialists in different aspects of water resources and administrative support personnel. The permanent staff, headed by the Executive Director, is composed of approximately 200 engineers, scientists, economists, legal specialists and support personnel in administration.

Powers and Functions

The general powers and functions of the NWRD are:

- (1) To regulate the utilization, development and protection of the nation's water resources.
- (2) To coordinate water resources development activities of the country within the context of national policies.
- (3) To formulate general criteria, methods and standards for project investigation and formulation, feasibility evaluation and design.
- (4) To undertake river basin surveys and appraisal of water and related resources, and to develop comprehensive plans to maximize the conservation and use of water in the basins.
- (5) To undertake hydrologic surveys, and to maintain observation station networks and a central repository for water resources data.
- (6) To conduct studies and research in coordination with others on related aspects of water resources development.
- (7) To provide a continuing program for training and manpower development in the area of water resources.

- (8) To administer and enforce the provisions of the Water Code of the Philippines (PD No. 1067), including the granting of water rights and waterworks franchises.
- (9) To review and approve rules and regulations that pertain to the utilization, development, control or protection of the nation's water resources.
- (10) To review and approve programs for water resources development and management.
- (11) To advise the National Economic Development Authority (NEDA) on matters pertaining to water resources development.

Typical of its functions, in 1983, the NWRC reviewed 623 applications for water permits and approved 344 -- permitting a total usage of 644 liters/sec. of water. Nine-seven percent of these covered surface water sources and only 3% were for groundwater. The purpose for which they were issued included:

irrigation	63%
domestic water	1%
power generation	34%
industrial use	1%
others	2%

One hundred eighty five permits to drill for water were separately issued. The NWRC also received 65 cases involving controversies over water rights and use. 19 have been settled, while the remainder were still under investigation at the end of the year. With respect to local water utility rates, some 82 hearings were conducted. Sixty-six involved applications for CPC's while 16 involved rate adjustments. Also, over 13,000 water meters were tested and sealed, for which a fee of four pesos per meter was collected. Ten new rules and regulations governing ground water pumping and spring development were approved by NWRC during the year.

The following multi-purpose projects were reviewed by the Council:

- (1) Lusaran Water Supply Project - capable of providing water amounting to 160,000 cu.m/day to meet the demand for water in metro-Cebu starting 1990.

- (b) Balong-Balog Multi-purpose Project, which is envisioned to provide water for year round irrigation of a net area of about 35,150 has. in the province of Tarlac and for power generation of about 100 kWh.
- (c) Kaliwa River Basin Project, which aims to provide long term water supply for Metro Manila and to generate electric power for the Luzon Grid.
- (d) Laoag River Basin Master Plan, envisioned as a concise planning document that considers the use of water and related land resources to be the principal forces for the development of the province of Ilocos Norte.

Sources of Funds

Table 4-1 shows the recent and current budgets of the NWRC. These amounts are appropriated in the General Appropriations Act, chapter on the Ministry of Public Works and Highways.

Observations on the National Water Resources Council

The National Water Resources Council (NWRC) regulates, coordinates, integrates and controls the development and utilization of the water resources of the country. It also administers and enforces the provisions of the Water Code of the Philippines, including the granting of water rights and franchises.

In view of the importance, for a country with the geographic features of the Philippines, of being able to have an orderly development and utilization of its water resources and taking into consideration the large number (over 10) of government agencies, entities and corporations involved in water resources, the NWRC serves a very useful and important purpose.

Table 4-1

BUDGETS OF THE NATIONAL WATER RESOURCES COUNCIL

	<u>Appropriation</u>	<u>Reserve</u>	<u>Allotment</u>
<u>1983 Budget</u>			
Current Operating Exp.			
. Maintenance & Operating Expense	P15,820,000	P3,281,500	P12,538,500
. Personnel	4,260,000	-	4,260,000
Subtotal	<u>P20,080,000</u>	<u>P3,281,500</u>	<u>P16,798,500</u>
Capital Outlay	<u>P 272,000</u>	<u>68,000</u>	<u>204,000</u>
Grand Total	<u>P20,352,000</u> =====	<u>P3,349,500</u> =====	<u>P17,002,500</u> =====
<u>1984 Budget</u>			
Current Operating Exp.			
. Maintenance & Operating Expense	P12,911,000	P2,963,500	P 9,947,500
. Personnel	4,197,000	1,039,109	3,157,891
Subtotal	<u>P17,108,000</u>	<u>P4,002,609</u>	<u>P13,105,391</u>
Capital Outlay	<u>P 204,000</u>	<u>102,000</u>	<u>P 102,000</u>
Grand Total	<u>P17,312,000</u> =====	<u>P4,104,609</u> =====	<u>P13,207,391</u> =====
<u>1985 Budget</u>			
Current Operating Exp.			
. Maintenance & Operating Exp.	P12,086,000		
. Personnel	4,851,000		
Subtotal	<u>P16,937,000</u>		
Capital Outlay	<u>P 204,000</u>		
Grand Total	<u>P17,141,000</u> =====		

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4.3 LOCAL WATER UTILITIES ADMINISTRATION

Introduction and Organizational Objectives

The Local Water Utilities Administration (LWUA) was created by P.D. No. 198 dated May 25, 1973, as amended by P.D. No. 768 dated May 15, 1975, to locally control and manage local water utilities, as well as to have national level support in the area of technical advisory service and financing.

The LWUA is a specialized lending institution to promote, develop and finance local water utilities. LWUA is attached to the MPWH for policy coordination purposes.

Organization and Staff

The Board of Trustees of the Administration is composed of a Chairman and four other members for a total of five, including:

- one trustee with at least ten (10) years of experience in banking, finance or business.
- one trustee with experience and background in the field of economics.
- one trustee with experience in management or systems operation.
- two trustees who are either civil or sanitary engineers with experience in water supply or waste operations.

Not more than one trustee may represent a private, investor-owned utility. No elected official shall be entitled to act as a trustee and at least three of the trustees must be employees of the National Government. The General Manager is an ex-officio member.

The LWUA workforce has about 700 employees. Figure 4-2 shows the LWUA Organizational Chart.

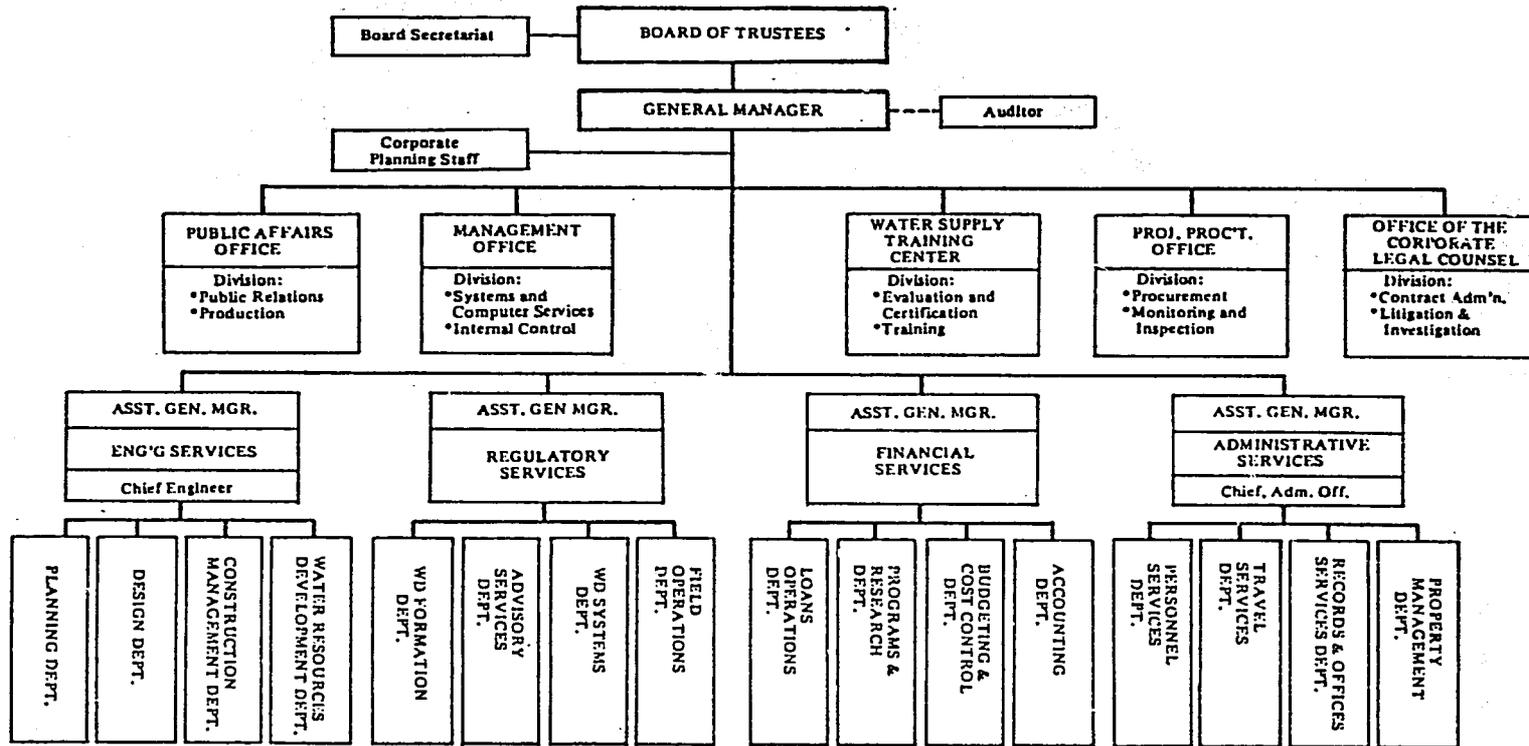
Powers and Functions of LWUA

- (1) Borrow funds from domestic and foreign loan sources and issues security for loans made to local water utilities, or districts.
- (2) Makes loans from its Revolving Loan Funds to qualified local water utilities.
- (3) Establishes standards for local water utilities, adopts rules and regulations for their enforcement and issues Certificates of Conformance to water utilities upon finding that standards are met. Standards include the following:
 - Water Quality.
 - Design and construction criteria for facilities for water supply, treatment and distribution, and for waste water collection, treatment and disposal.
 - Equipment, materials and supplies.
 - Personnel who will operate or manage local water utilities.
 - Organizational and institutional criteria to assure independent operation and funding of local water utilities.
 - A uniform accounting system with stipulated levels of internal reporting to local water utility management.
- (4) Provides technical assistance to local water utilities, in order to aid in meeting the criteria of the Administration, and encourage upgrading of the operations and management.
- (5) Establishes training programs and seminars for personnel of local water utility.
- (6) Reviews rates and charges established by local districts.
- (7) Monitors and evaluates local water standards.
- (8) Effects the integration of systems, joint investment and operations, district annexation and deannexation whenever economically warranted.

The LWUA has also created the Water Supply Training Center (WSTC) to train and develop specialized personnel to run the country's numerous water districts. The WSTC offers courses covering water utility management and detailed operation and maintenance work.

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**Figure 4-2
LOCAL WATER UTILITIES ADMINISTRATION
Organization Chart**



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The Agency has set up six Regional Training Centers to speed up training of water district personnel. These Centers are based in selected water districts², which maintain and operate the training centers and supervise the implementation of training programs designed by the WSTC.

Table 4-2
TRAINING CONDUCTED IN 1980 AND 1983

<u>Courses</u>	<u>Number</u>		<u>No. of Participants</u>		<u>Total No. of Manhours</u>	
	<u>1980</u>	<u>1983</u>	<u>1980</u>	<u>1983</u>	<u>1980</u>	<u>1983</u>
Management	6	46	317	276	13,744	10,656
Technical	26	19	1,415	98	34,248	4,304
Special Programs	-	21	-	998	-	26,082
Regional Centers	<u>20</u>	<u>37</u>	<u>271</u>	<u>883</u>	<u>19,720</u>	<u>23,955</u>
T o t a l	52	83	2,003	2,255	67,712	64,997

Source: LWUA Annual Reports 1980 & 1983

Operation & Maintenance Studies

LWUA has recently started a 12-month study financed by the IBRD including foreign consulting assistance, of operation and maintenance practices and procedures. The study will also provide guidelines on how to lower unaccounted water consumption in Water Districts.

The following typical Water Districts were selected for the study:

- Large Size : Baguio and Olongapo
- Small Size : Hagonoy and Morong

Current Status of Water Supply Development

After ten years of LWUA's operation, 289 water districts have been formed throughout the country, and through these water districts, LWUA

² Baguio, Zamboanga City, Cagayan de Oro, Metro Cebu, Davao City and San Pablo City (Luzon).

serves about 16.1 million people. LWUA provides technical and financial assistance to independent water districts in cities or municipalities with 20,000 population and above.

Region IV has the greatest number of established water districts (43); Region III is ranked second with 40 water districts. Region IX has the least number of water districts.

Loans committed and utilized within Region IV accounted for about 14.6 percent and 15.3 percent of the national total, respectively; among all the regions, Region IV obtained the largest share. The following table summarizes LWUA's accomplishments in providing water supply to the population through the water districts (WDs), as of June 1984:

	<u>Target</u>	<u>Accomplishr</u>	<u>%</u>
WD Formation	665 WDs	289	43
WD Viability	665 WDs	14	2
Facilities Improvement	665 WDs	106	16
Population Coverage	30 Million	16 Million	53
LWUA Collection Efficiency	85%	80%	94

Figure 4-3 shows the number of water districts and population served per region of the country, as well as the loan commitments. Table 4-3 shows highlights of LWUA's operations through June 1984.

Sources of Funds

LWUA's authorized capital stock is P2.5 billion representing 12.5 million shares of stock, with par value of P200.00 per share. As of December 31, 1983, the total government's contribution to LWUA's capitalization amounted to P692.2 million. It is noted that the Government's subscription of equity capital, which comes from the Corporate Equity Investments chapter of the General Appropriations Act, was increased by only P48 million, or 7% during 1983.

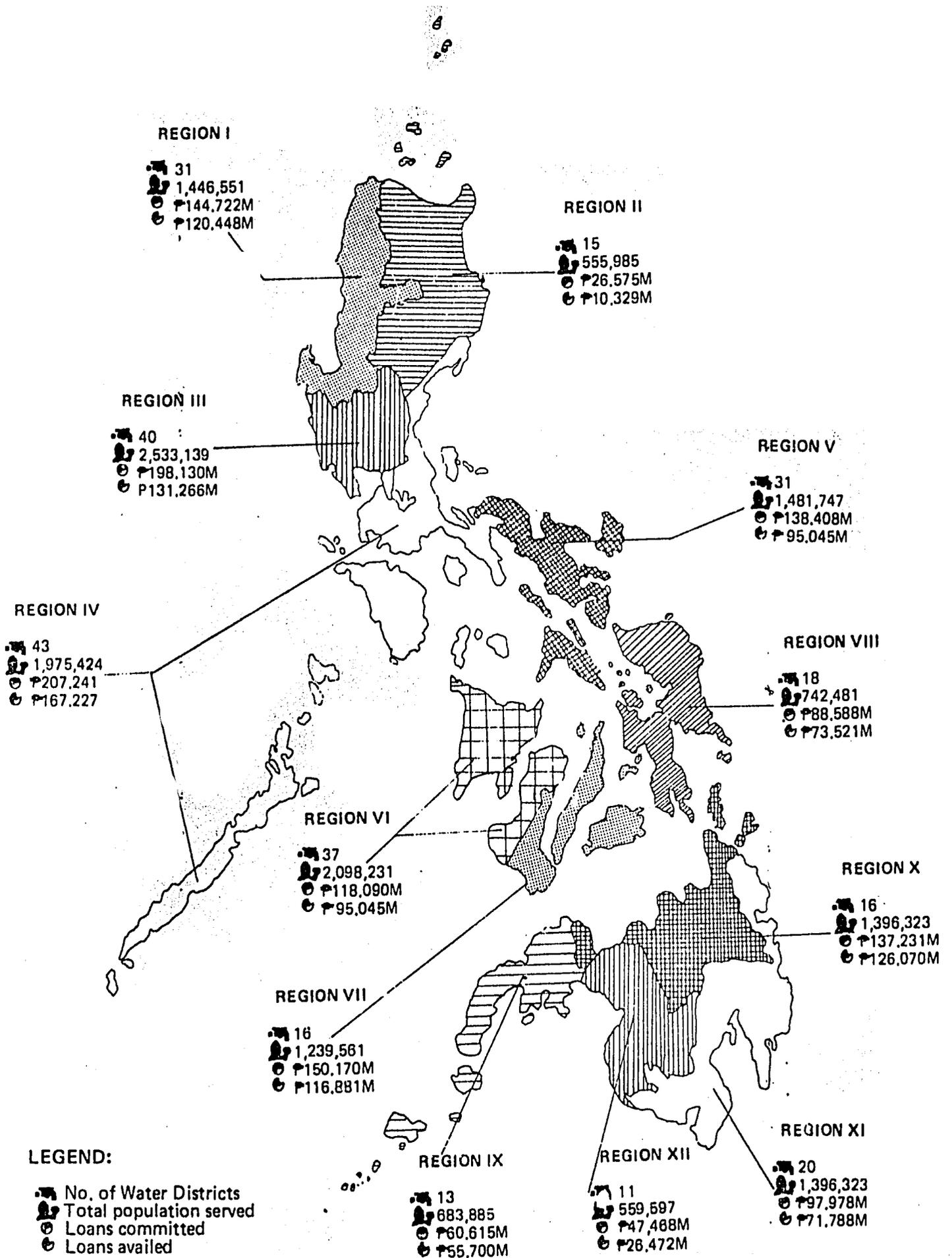


Figure 4-3

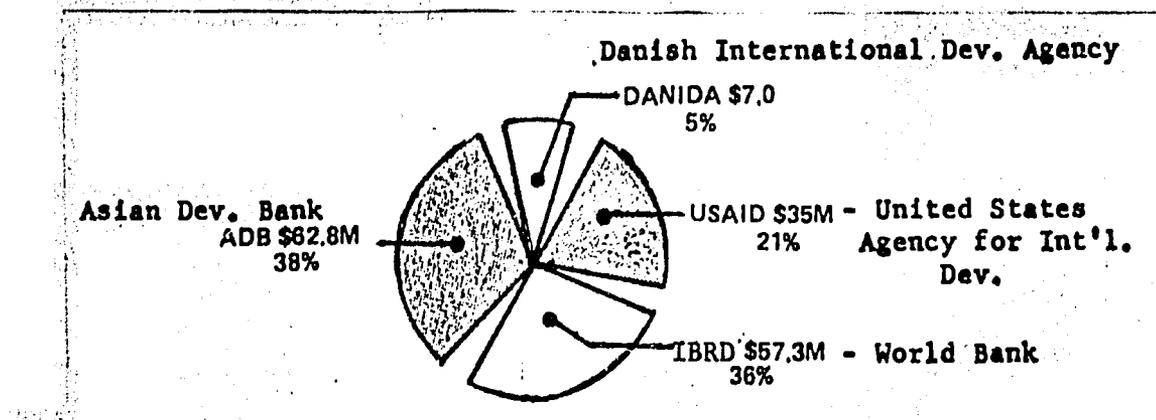
Table 4-3
OPERATIONAL HIGHLIGHTS
As of June 30, 1984

Corporate Key Activities	Measure	ACCOMPLISHMENTS		
		1973- 1983	January- June, 1984	Cumulative Total
A. <u>Institutional Development</u>				
1. Formation of WDs	No. of WDs Formed	289	(Deferred)	289
2. Management Advisory Svces	No. of WDs	241	9	250
3. Installation of Commercial Prac- tices System	No. of WDs	284	10	289
4. WD Training Assistance	No. of Courses (No. of Man-hrs)(513,995)	458	32	480
5. WD Public Rela- tions/Informa- tion Campaign Assistance	No. of WDs	210	(18,436) 4	(532,431) 214
B. <u>Facilities Improve- ment</u>				
1. Early Action Works	Completed On-Going	230	15 15	245 15
2. Pre-Feasibility Studies	Completed	413	5	418
3. Feasibility Studies	Completed On-Going	178	12 39	190 39
4. Design	Completed On-Going	131	2 26	133 26
5. Construction Management	Completed On-Going	86	3 11	89 11
6. Well Drilling	Completed On-Going	235	18 19	253 19

Foreign assistance funds have played a major role in the funding of water supply projects undertaken through the aegis of LWUA. In recent years some 56 projects were completed with USAID assistance (another 5 are under construction), 15 were completed with IBRD loans (another 8 are under construction), 10 have been finished with ADB loans (another 13 are under construction) and 7 have been done with funding from DANIDA (Denmark).

The foreign sources from which LWUA has secured loans are shown in Figure 4-3.

Figure 4-4
FUND SOURCES, FOREIGN
1984



Source: LWUA Annual Report 1983.

The following tabulation presents a summary of foreign-assisted project loan packages yet to be completed by LWUA.

<u>Type of Project Loan</u>	<u>No. of Projects</u>	<u>Completion Date</u>
A. Existing		
1. IBRD 1710 & IDA 920	17	1987-1988
2. ADB 545	44	Beyond 1988
3. DANIDA	15	Beyond 1988
B. Proposed		
1. JICA	25	Beyond 1988

Of the foreign loans secured through mid-1984, approximately \$82 million has already been drawn, leaving a balance of roughly \$80 million for further leading to local utilities.

LWUA's operating funds, which consist largely of salaries, interest charges and miscellaneous expenditures, come from ongoing loan operations. (Note that these do not include the operation of the actual systems -- those operations are on the account of the local utilities themselves and would be reflected in their individual operating statements.)

Water rates are established by the individual districts on the basis of full cost recovery and may vary widely depending upon the debt structure and other variables. For example, in Iloilo City the minimum charge per month for residential use with a $\frac{1}{2}$ " service is from P14.4 to P18; in Bacolod, it is P41.85. In both cities a stepped rate, rising with increasing consumption, is used. In Iloilo City this varies from P0.60/m³ (11-20 m³/mo) to P2.50/m³ (over 35 m³/mo); in Bacolod it varies from P1.70/m³ (11-20 m³/mo) through P2.10/m³ (31-50 m³/mo) to P3.25/m³ (over 100 m³/mo). In both cities, government is charged the residential rate, while commercial and industrial users are charged twice the residential rate. The most recent adjustment in water rates in Iloilo City became effective July 1 of this year; in Bacolod the current rates went into effect on Oct 1.

Financial Highlights

Table 4-4 shows financial highlights for LWUA's operations through June 1984. The following points might also be noted, as of the end of 1983.

a) Assets

Total assets increased by 138 percent from P0.640 billion in 1979 to P1.525 billion in 1983.

Total loans granted to water districts reached P1.082 billion in 1983 from P0.710 billion in 1979. Likewise, principal repay-

Table 4-4
FINANCIAL HIGHLIGHTS

Corporate Key Activities	Measure	ACCOMPLISHMENTS		
		1973- 1983	January- June, 1984	Cumulative Total
1. Total Capitalization				
a) Gov't Equity	Mill. P	692	-	692
b) Foreign Borrowings	Mill. P	1,019	21	1,040
2. Loans Committed	Mill. P	1,415,216	43,277	1,458,493
3. Loans Availed	Mill. P	1,082,032	38,307	1,120,339
4. Billings				
a) Gross Interest	Mill. P	334,10	60.51M	394.61
Capitalized Interest		111,15	8.61M	119.76
Net Interest		222,95	51.90	274.85
b) Principal		36,19	6.27	42,46
5. Collections				
Interest	Mill. P	190,19	31,48	221,67
Principal		27,60	3,98	31,58
6. Collection Efficiency	%	84%	61%	60%

LWUA Ten-Year Loan Operation, 1973-1983
(In Million Pesos)

Loan Type	Granted	Availed	Balance	Percent Availed
Comprehensive	P834.750	P730.459	P104.291	88
Interim Improvement	518.127	306.289	211.838	59
Early Action/Mini	47.832	34.260	13.572	72
Service Connections	13.216	10.227	2.989	77
Special Projects	1.291	0.797	0.494	62
T o t a l	P1,415,216	P1,082,032	P333.184	76

Source: LWUA Annual Report, 1983.

ments increased from P1.0 million in 1979 to P7.7 million in 1983.

b) Liabilities

At year-end 1983, a total of P601.2 million had been made available to local water districts as a result of foreign borrowings. Total loans received from foreign lending institutions - USAID, DANIDA, ADB and IBRD -- amounted to \$158.9 million as of December 31, 1983. (\$162.1 by mid-1984)

c) Revenues

Total revenues for 1983 reached a total of P99.3 million in 1982. About 92 percent of this total revenues represents interest earned from loan operations amounting to P91.2 million in 1983 which is 185 percent more than that of 1979.

d) Loans to Water Districts

Total loans outstanding amounted to P1.082 billion as of December 31, 1983. Long-term loans carried a 9 percent interest and a 30-year repayment period. Short-term loans carried a 9 percent interest with five to fifteen years repayment period.

Looking to the future, LWUA has submitted the following investment program to the Office of Budget & Management in October 1984.

<u>Year</u>	<u>Local Funds (Million P)</u>	<u>Foreign Loan Proceeds (Million P)</u>	<u>Total (Million P)</u>
1984 Program	73.615	55.785	129.400
1985 Program	78.593	143.761	222.354
1986 Program	145.920	284.950	430.870
1987 Program	179.040	269.520	448.560
T o t a l	477.168	754.016	1,231.184

Of LWUA's capital requirement, or investment level, for 1984 about forty-three percent will have come from foreign sources, while the remainder must come from the Corporate Equity Chapter of the National Budget and loan repayments (less amounts due foreign lenders). In 1984 very little was available from this source and it is anticipated that

this will continue to be the case in the near future. External funds are available from the unused balances of committed loans but finding local funds to match these amounts is foreseen as a major constraint.

Observations on the Local Water Utilities Administration

The Local Water Utilities Administration appears to be a well-organized and properly managed institution. Its primary objective is to promote, develop and finance local water utilities (Water Districts). At present, however, because of budgetary restraints on local funds (pesos), LWUA is unable to underwrite any new construction or expansion programs, or even to finance Water Districts that have already been formed but have not yet started construction work. Because of this situation LWUA has had to defer disbursement of foreign loan funds that are currently available from international lending institutions.

The current dilemma is reflected in the fact that some cities have obtained financing for their systems through other sources. In the case of Iligan City, the original system, which draws water from a nearby source, was financed through private channels. Now the city would like to expand the system and cannot obtain financing from LWUA, so it is negotiating a 10-year loan at 24% annual interest with local banks.

It might be mentioned that LWUA's Corporate Plan for the 1984-1987 period has as its target the formation of a total of 665 water districts. As of June 1984, 289 districts had been formed. Only 230 are operating, however, while 59 others are awaiting funding. Consequently, at present LWUA is not encouraging the formation of new water districts.

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4.4 RURAL WATERWORKS DEVELOPMENT CORPORATION

Objectives of the Organization

The Rural Waterworks Development Corporation (RWDC) was created by Executive Order No. 577, dated January 12, 1980, to form Rural Waterworks Associations-RWA's (later renamed Rural Waterworks and Sanitation Association - RWSA's) that will construct, operate and maintain water supply systems in the rural areas; and to provide technical, institutional and financial assistance to RWSA's. The RWDC operates under the umbrella of the Ministry of Human Settlements and is intended to serve areas not serviced by MWSS and LWUA, chiefly areas with less than 20,000 population.

The functions of the RWDC, under its corporate charter, are to:

- (a) Prepare feasibility studies and development plans for water systems, including the procurement of necessary facilities and accessory equipment.
- (b) Cooperate with and exchange information, studies and reports with other agencies of the National Government.
- (c) Provide managerial or administrative expertise, including the rendering of training services to develop the staff and employees of RWSA's.
- (d) Certify the RWSA's articles of incorporation, by-laws and amendments; approve any consolidation, merger or dissolution of RWSA's; and review annual financial statements, annual elections and other related documents.
- (e) Make loans to RWSA's (and local governments) for the construction and acquisition of facilities, property and equipment for supplying water services and for the restoration, improvement or expansion of such facilities.
- (f) Provide or arrange grants to RWSA's for point water source development.
- (g) Approve any requests from RWSA's which at the time are borrowers of the Corporation for permission to obtain loans from other lenders.

The RWDC must report annually to the President on the status of its operations, including a full report of loans extended, areas serviced as a

result of these loans and other activities.

Organization and Staff

All powers of the Corporation are vested and exercised by the Board of Directors. The Board is composed of seven (7) members consisting of the Minister of Human Settlements as Chairman, the Ministers of Public Works and Highways, Local Government and Health as members, the Executive Director of NWRC and the General Manager of LWUA also as members, and the General Manager of RWDC as ex-officio member.

The Corporation has approximately 120 personnel (as of November 1984) organized into three divisions -- Administration, Operations and Engineering.

The RWDC is not authorized to set up local offices. Instead, it must make full use of existing governmental bodies and agencies. The Corporation, therefore, collaborates with local government units that serve as the implementing arms. With this arrangement, Waterworks Committees and Waterworks Development Task Forces, manned by local personnel are organized at the provincial, city and municipal levels for the express purpose of planning and implementing their respective water programs.

Each provincial Waterworks Committee is headed by the Governor, while the city and municipal committees are headed by the Mayors.

As of December 1983, the Waterworks Committees and Waterworks Task Forces shown in Table 4-5 were organized at the local government level.

Table 4-5
**NUMBER OF ORGANIZED WATERWORKS COMMITTEES
 AND WATERWORKS DEVELOPMENT TASK FORCES
 1983**

	<u>Number</u>
A. Waterworks Committees (Policy Formulating Committee)	
1. Province	75
2. City	27
3. Municipality	904
B. Waterworks Task Forces (Implementing Arm)	
1. Province	67
2. City	13
3. Municipality	596

Source: RWDC Annual Report, 1983.

Functioning of the Rural Water Supply Program

Project Generation

The would-be beneficiaries of a project submit their proposal to the Municipal Waterworks Committee. Based on their priority list and its program, the Committee endorses the project to the Provincial (Waterworks) Committee.

Level I projects, consisting of point sources (springs or deep and shallow wells with hand pumps) are the responsibility of the Municipal Committee. The Municipal Waterworks Task Force then undertake studies and technical designs. Project construction is a joint activity of the RWSA, which has been formed in the meantime, and the Task Force. For material requirements, the Municipal Waterworks Officer approves requisitions and issues vouchers, as prepared by the RWSA president. Once construction is finished, the Municipal Waterworks Officer receives a certificate of completion from the RWSA President, which certificate is then forwarded to RWDC through the Provincial Waterworks Committee.

At this level, the Provincial Committee endorses the Level I project to the RWDC for registration.

For Level II and III project proposals (Level II covers piped community systems with public faucets and Level III covers piped systems with some house connections), the Provincial Committee decides whether the request can be accommodated on the basis of the provincial priority list and the program it has adopted beforehand. If the Provincial Committee grants the request, the Provincial Task Force prepares the feasibility studies and system design. Once these are approved by the Provincial Committee, the Provincial Task Force is able to initiate and spearhead the organization of an RWSA. Once the RWSA is organized, the Provincial Committee sends the organizational documents, such as Articles of Incorporation, By-Laws, etc. and the feasibility studies and system design to the RWDC.

The RWDC registers the RWSA, approves the project and executes a loan contract with the RWSA.

For the material and financial requirements of the project the Provincial Waterworks Officer confirms a budget request prepared by the RWSA president, who presents it also to the electric cooperative in the area.

Project construction is a joint activity of the RWSA and the Provincial Water Task Force, with the assistance of MPWH and other government agencies. Construction may also be undertaken by contract with private construction outfits. Before any construction commences, the RWSA president must first secure a water rights permit from the local offices of either the MPWH or the National Irrigation Administration.

During or after development of the water source, the local representative of the Ministry of Health certifies as to the potability of water.

After construction, the Provincial Water Officer affirms a certi-

ificate of completion, as executed by the RWSA president. The Provincial Water Committee chairman issues a certificate of turn-over and RWDC receives copies of both certificates.

Material Storage and Releases

RWDC stores construction materials at designated warehouses in the province, either at the Office of the Governor or at the electric cooperative. For the financial requirements of the projects, the amount is released to the RWSA's on an as-needed basis, through the electric cooperatives.

Warehouses issue materials against duly approved requisition and issue vouchers for Level I projects and against budget requests for Level II and III projects. Cash requirements of the projects may be requested from electric cooperatives through these budget requests. However, a warehouse may reject the vouchers for a Level I project, if the records show that the allocation for the municipality is already exceeded by withdrawals. Warehouses are furnished copies of the project allocation, per municipality, and a list showing which municipalities are qualified to withdraw materials from which warehouse.

Project Construction

The Waterworks Development Task Forces extend assistance in the construction.

Municipal Task Forces are responsible for Level I projects while Provincial Task Forces are responsible for Level II and III projects. Both bodies have to coordinate resources of other government agencies to construct their projects.

For construction, RWDC defrays expenses on a grant basis for Level I projects and on a loan basis for Level II and III projects, as long as the total outlay from RWDC shall not exceed 90% of the total project cost.

Loan funds are disbursed to the RWSA's by the electric cooperatives; which also act as collection agencies for the RWDC.

Formation of Rural Waterworks and Sanitation Associations

To qualify for the financial, technical and institutional assistance RWDC extends, a community is required to form a Rural Waterworks and Sanitation Association (RWSA). The scheme intends to inculcate a sense of ownership and responsibility for a water supply project and thus ensure the optimum utility of the system.

RWDC also requires the beneficiaries to contribute at least 10% of the total project cost as local equities.

In 1983, 5,090 Level I RWSA, 327 Level II RWSAs and 13 Level III RWSAs were organized bringing the total number of organized RWSAs to 16,277 for Level I, 690 for Level II and 21 for Level III as of December 31, 1983.

A. RWSAs Organized	As of Dec.		As of Dec. 1983
	1982	1983	
1. Level I	11,319	5,090	16,409
2. Level II	363	327*	690
3. Level III	8	13*	11
B. RWSAs Registered			
1. Level I	9,728	5,420	15,148
2. Level II	457	204	661*
3. Level III	10	10	20*

* NOTE: Includes RWSAs organized by other government units.

Level I - Point source-shallow or deep wells

Level II - Communal system (Piped with public faucets)

Level III - Improvement of Level II to serve individual households.

Source: RWDC Annual Report, 1983.

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Studies and Designs Completed

Focus of RWDC's attention in 1983 were Level II systems. Some 148 feasibility studies and designs were completed during the period, bringing the total number to 459 for both the RWSAs and Bagong Lipunan Community Associations (another instrumentality of the Min. of Local Government).

Feasibility Studies and Designs Completed	<u>As of Dec.</u> <u>1982</u>	<u>1983</u>	<u>As of Dec.</u> <u>1983</u>
1. RWSA's			
a. Level II	194	148	342
b. Level III	7	7	14
2. BLCA's			
a. Level II	115	2	117

Procurement of Materials and Equipment

The following tabulation shows the total material procurement of RWDC as of December 1983.

For the well drilling capability necessary to install Level I Projects RWDC, in 1983, delivered 48 drilling rigs to the province and cities. This brought to 155 the number of drilling rigs delivered.

	<u>As of</u> <u>Dec. 1982</u>	<u>Additions</u> <u>in 1983</u>	<u>As of</u> <u>Dec. 1983</u>
A. Procured			
1. Level I			
a. Shallow Wells	27,316	5,000	32,316
b. Deep Wells	2,305	-	2,305
c. Rehab (DW)	501	-	501
2. Level II	307	600	907
3. Level III	2	-	2
4. Balrig II Drilling rigs	214	-	214
B. Shipped			
1. Level I			
a. Shallow Wells	25,	5,931	31,638
b. Deep Wells	2,	61	2,226
c. Rehab (DW)		22	252

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	<u>As of</u> <u>Dec. 1982</u>	<u>Additions</u> <u>in 1983</u>	<u>As of</u> <u>Dec. 1983</u>
2. Level II	76	65	141
3. Level III	2	2	4
4. Balrig II Drilling rigs	107	48	155

Systems Completed to Date

During 1983, the first two Level III systems under the program to serve poblaciones were completed in Bukidnon and Aklan Provinces. The system in Bukidnon was built at a cost of P700,000. It has 280 households in the RWSA, each paying P12 per month. The waterworks system in Aklan was built at a cost of P290,000. It serves 126 households each paying a monthly water fee of P17.00.

The construction of these two Level III systems, together with 22 piped communal systems (Level II) and 5,844 communal handpumps (Level I), brought water supply services to 134,892 more rural households in 1983. This brings to almost 450,000 the aggregate number of households benefiting from the RWDC program all over the country.

Table 4-6 and 4-7 show completed Level I and Level II systems by region, as of the end of 1983. From these tables it can be seen that Level I systems, to date have been far more important than Level II -- serving over 30 times as many households. Level III systems, so far, are relatively unimportant -- only 8, including the 2 mentioned above have been completed so far. The other 6 were done through the Bagong Lipunan Community Associations.

Human Resource Development

The RWDC conducts training activities geared towards the enhancement of technical, institutional and management skills of its local implementing units. RWDC also encourages its own personnel to participate in local, as well as foreign training. As of December 1983, it had sent 12 personnel to various training activities abroad while another 101 received local training grants.

Table 4-6
LEVEL I - PROJECTS COMPLETED

Region	As of Dec. 1982		Additions in 1983		As of Dec. 1983	
	No.	Households	No.	Households	No.	Households
I	1,300	28,770	518	15,494	1,818	44,264
II	1,096	15,344	308	8,546	1,404	23,890
III	1,826	32,688	734	18,270	2,560	50,958
IV	2,712	56,460	1,227	29,925	3,939	86,385
V	1,457	20,983	828	11,847	2,285	32,830
VI	1,122	17,850	195	6,155	1,317	24,005
VII	1,834	20,000	389	8,871	1,223	28,871
VIII	2,202	44,011	312	6,684	2,514	50,695
IX	798	14,357	365	5,750	1,163	20,107
X	1,457	21,426	406	10,233	1,863	31,659
XI	1,563	23,715	255	5,854	1,818	29,569
XII	662	6,453	307	3,120	969	9,573
Grand Total	18,029	302,117	5,844	130,749	23,873	432,866
Bagong Lipunan Comm. Assoc.	32	575 Est	6	125	38	700
	18,061	~302,700	5,850	~130,900	23,911	~433,600

Source: RWDC Annual Report, 1983.

Table 4-7
LEVEL II SYSTEMS - PROJECTS COMPLETED

Region	As Dec. 1982		Additions in 1983		As of Dec. 1983	
	No.	Households	No.	Households	No.	Households
I	4	370	1	64	5	434
II	-	-	-	-	-	-
III	6	818	-	-	6	818
IV	8	1,760	7	1,376	15	3,136
V	4	520	-	-	4	520
VI	1	226	3	307	4	533
VII	2	340	1	85	3	425
VIII	-	-	-	-	-	-
IX	4	738	6	1,402	10	2,140
X	1	71	3	269	4	340
XI	5	461	1	244	6	705
XII	-	-	-	-	-	-
Grand Total	35	5,304	22	3,747	57	9,051
Bagong Lipunan Comm. Assoc.	30	4,800 Est	1	160 Est.	31	4,960 Est
	65	~10,100	23	~3,900	88	~14,000

Source: RWDC Annual Report, 1983.

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A total of 1,892 local committee, task force and RWSA members have also been recipients of in-service, field and technical training conducted by RWDC. During 1983 training in 14 different areas was provided.

Financial Information

The authorized capital stock of the Corporation is one billion pesos, divided into ten million shares with a part value of P100 per share, which is to be wholly subscribed by the National Government and is to be appropriated, programmed and released upon consultation with the Office of Budget and Management, and in accordance with Presidential Decree No. 1177.

A standing annual sum of P20 million is also authorized to be appropriated out of any funds in the National Treasury, not otherwise appropriated, to cover grants, institutional development, manpower development training and technical assistance by the Corporation, in accordance with Executive Order No. 577, which created the RWDC.

For CY 1983, RWDC was allocated a budget of P70 million. The following table reflects RWDC's allocation in 1982 and 1983 and actual expenditures.

	<u>1982</u>	<u>1983</u>
1. Approved Appropriation	P80.0 Million	P70.0 Million
2. Amounts actually released by CDCs issued	<u>23.6</u>	<u>33.4</u>
a. Equity contribution	16.0	26.9
1. Administration	3.8	9.2
2. Projects	<u>12.2</u>	<u>17.8</u>
b. Grant	7.6	6.4
3. Loans (from RWDC)	<u>As of Dec. 1982</u>	<u>As of Dec. 1983</u>
1. Loans approved		
a. Level II	P22.0 Million	P38.1 Million
b. Level III	6.8	9.7
c. Balrig II drilling rigs	0.9	5.7
2. Loans released		
a. Level II	6.6 Million	15.7 Million
b. Level III	1.3	2.6
c. Balrig II drilling rigs	3.2	5.2

Source: RWDC Annual Report, 1983.

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Observations on the Rural Water Development Corporation

The Rural Water Development Corporation undertakes a program of rural water supply by encouraging the formation of Local Rural Water and Sanitary Associations, then supporting these associations with technical assistance, equipment, materials and financing -- grants for Level I projects and loans for Level II and III projects. The overall impression of the RWDC is that it utilizes a flexible approach to the provision of good water in rural areas. Sources of funds appear to be there, albeit the approach on funding seems rather unorthodox. The use of the electric cooperatives as disbursing and collecting agencies is also an interesting approach, though there has been no opportunity to review its effectiveness. A reading of the annual reports of the RWDC indicates that the agency has been reasonably successful in its mission of providing water supplies to smaller communities.

At the same time, it is necessary to point out that much the same task is also being undertaken by two other agencies -- one is the Barangay Water Program unit within the Ministry of Local Government and the other is the Project Management Office for Rural Water Supply in the Ministry of Public Works and Highways, as described in Sections 4.5 and 4.8. Each of these agencies has its own source of funds and each has its own difficulties in securing funds, though some are more successful than others. It must also be noted that all these agencies work through essentially the same set of committees and task forces at the provincial and municipal level. It could be very confusing for those working at the lower levels of government. This apparent confusion may be further compounded by the fact that water sampling for quality control is performed by yet another body, the Ministry of Health at its regional laboratories. In some instances it was pointed out by the RWSA's that results of the tests were never made known to the RWSA's.

While specific roles were established in 1980 (See Section 4.8), it seems that a greater degree of coordination among the three agencies, plus some pooling of funds could make an essential program more effective. Ultimately, a merging of two or more of the agencies might prove to be reasonable.

Organization and Staff

The program is headed by the Project Manager, supported by a staff of over 50 personnel divided into three divisions namely: Engineering and Review Supervision Division; Training and Organization Division; and Monitoring and Evaluation Division.

Each province or city must have Water Resource Analyst, a Training Officer, a Waterworks Engineer, two Provincial/City Waterworks Technicians and Provincial/City Evaluation Teams.

Also, as in the case of RWDC projects, a Water Resource Development Task Force is appointed by either the Provincial Governor or the City Mayor, as the case may be, and is composed of the following members or their representatives:

- Provincial/City Engineer
- Provincial/City Development Coordinator
- Public Works District Engineer
- Provincial/City Development Officer
- Provincial Health Officer/City Counterpart
- Provincial/City Auditor
- Provincial/City Treasurer
- Manager of the Local Water District
- Senior Member of Sangguniang Panlalawigan/Sangguniang Panlungsod
- Others deemed necessary, such as a representative from MOH

Water Supply Facilities and Community Organizations

Three (3) types of water supply facilities are financially supported by the Program: Levels I; II and IIIA. Level I is a point-source development such as a spring or a well with a handpump. Level II is a piped community system with public faucets; and Level IIIA is piped system with household connections but the water flow is restricted to a relatively low rate.

From 1977 to 1981, completed water supply facilities totalled 536. In 1981 alone, in 38 different local government units, 291 water supply projects were installed under this program.

national and local government capacity to plan, design, and implement small-scale domestic water systems. Subsequent management, operation and maintenance of the systems should be by the local Rural Water Associations. A longer-range objective is the proliferation of water systems and facilities in small rural communities across the country.

The beneficiaries of this program are the small rural farming and fishing communities ranging in size up to 5,000 people. Beginning in 1981, under the second loan¹, the program increased its offering to communities of up to 10,000 population, hence closing the gap with LWUA which serves larger centers. Moreover, the beneficiaries fall largely in the lowest 60 percent of the nation's income groups.

Program Functions

(1) The Barangay Water Programs trains:

- provincial and city government decision and policy makers.
- provincial and city development planners and waterworks engineers.
- community leaders and outreach workers
- rural residents and operators of water supply projects
- barangay and purok organizers and entrepreneurs

(2) The Barangay Water Program provides:

- technical assistance in the identification, planning, designing and installation of projects.
- technical assistance in local development planning.
- financial assistance in the organization of communities and Rural Water Associations.
- commodities to support management and maintenance of water supply projects.

(3) The Barangay Water Program monitors:

- the operations and administration of the national program.
- the implementation of projects by the local governments.
- the development of local governments in the field of planning, financing and construction.
- the development and revision of procedures and strategies for pursuing the water resource development program.

¹ Rural Water II Project, Loan and Grant Agreement; Loan No. 492-U-059, Project No. 492-0333.

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From 1977 to 1981, completed water supply facilities totalled 536. In 1981 alone, in 38 different local government units, 291 water supply projects were installed under this program.

The program is intended as a nationwide program. It is systematically expanding to cover the entire country in an orderly manner. As of 1981, 40 provinces and 18 cities were participants of the program³.

A Local Government Unit can participate in the program provided that it has the following:

- (1) a functioning Provincial/City Development Staff to plan and coordinate development efforts within the local government. The development staff is presumed to have a training officer; if the province or city has none, one must be hired to handle organizational and training activities.
- (2) a functioning Provincial/City Engineers Office with an adequate number of engineers and other personnel capable to design and implement development projects.
- (3) a current Capital Improvement Plan or Local Development Investment Plan.
- (4) a current annual budget.

³ Abra La Union Mountain Province Pangasinan Kalinga Apayao Dagupan City Cagayan Bataan Bulacan Nueva Ecija T a r l a c Olongapo Pampanga Zambales Angeles City San Jose City Batangas Cavite Mindoro Occidental Mindoro Oriental	Palawan Quezon Batangas City Puerto Princisa City Lucena City A l b a y Camarines Sur Sorsogon Legaspi City Naga City Catanduanes Iriga City A k l a n C a p i z Antique I l o i l o Negros Oriental Roxas City C e b u	Samar Zamboanga City Agusan del Norte Agusan del Sur Misamis Oriental Bukidnon Surigao del Norte Butuan City Gingoog City Cagayan de Oro City Tangub City Davao del Norte Davao del Sur South Cotabato Surigao del Sur Davao City General Santos City North Cotabato Sulta Kudarat
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Provinces or cities that qualify for participation in the Program also have to comply with a set of conditions and requirements. One is the Permanent Condition and the other is the Memorandum of Agreement. The Memorandum of Agreement, executed by the Ministry of Local Government and the eligible local government unit, incorporates the commitment by the Ministry and the local government to cooperate in promoting the social and economic development of rural areas in the country by developing the capabilities of local government in planning, financing, organizing and implementing barangay cooperative water systems.

A participating province or city forms the Water Resource Development Task Force, to promote cooperation and coordination among local agencies engaged in development by facilitating the exchange of information and the provision of technical assistance, as required for the preparation of a water resource inventory, the Five-Year Water Resource Development Plan and related plans.

Since the concept of the Program involves both institutions and infrastructure, beneficiaries of facilities are always trained and organized into groups. For Level I, a water service committee is formed to maintain the handpump. For Levels II and IIIA cooperative associations (RWSA's) are formed and registered as corporation to administer and control the water supply projects.

Project Selection and Implementation

From the water resource inventory, local planners select projects that meet the preliminary selection criteria. These are then reviewed and ranked on the basis of immediateness of need for the system and system's cost.

With priorities established, projects are then programmed for implementation in a local Five-Year Water Resource Development Plan.

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From this document, decision makers select the projects that would be implemented within a particular year. These are then subjected to a detailed technical and financial analyses.

The implementation flow chart is shown in Figure 4-5.

Human Resource Development

Training is an essential element of the Program. It is offered to personnel of participating provinces or cities and to the barangay associations.

- (1) Training activities for local government personnel include following:
 - Orientation Training - to acquaint local government policy and design makers on the procedures and policies of the Barangay Water Program.
 - Water Resources Development Planning - covering water resource inventories and Five-Year Development Plans for Water Supply.
 - Feasibility Study Methodology - covering measures of economic value, other benefits, discounting, etc.
 - Design and Construction Workshop - local engineers engaged in water supply projects are acquainted with the technical approaches, policies, and standards of the Program.
 - Training of Trainers - the strategies and manner of training and organizing a community into a Rural Waterworks and Sanitary Association are discussed in trainers training activity.
 - Technicians' Training - techniques on care and maintenance of the different components of a water supply project are discussed and demonstrated.
 - In-House Evaluation - the objective of this training for the Barangay Water Program staff, is to review all aspects of the Program including training, infrastructure and monitoring schemes.
- (2) Training for the RWSA Members
 - Pre-membership Course - to learn concepts of cooperatives and the operation of a waterworks project.

Pre-Operation Training - one or two weeks before an RWSA assume administration of the water system, its officers and management staff undergo pre-operation training. During this training the RWA board adopts a billing and collection plan, and the management staff learns to maintain records, keep books and manage funds.

Post-Completion Training - when RWSA is already operating its waterworks project, or immediately after turn-over of the facility, on-the-job training is conducted by the provincial or city training staff to drill the management of the RWSA in the diverse chores related to running a water system.

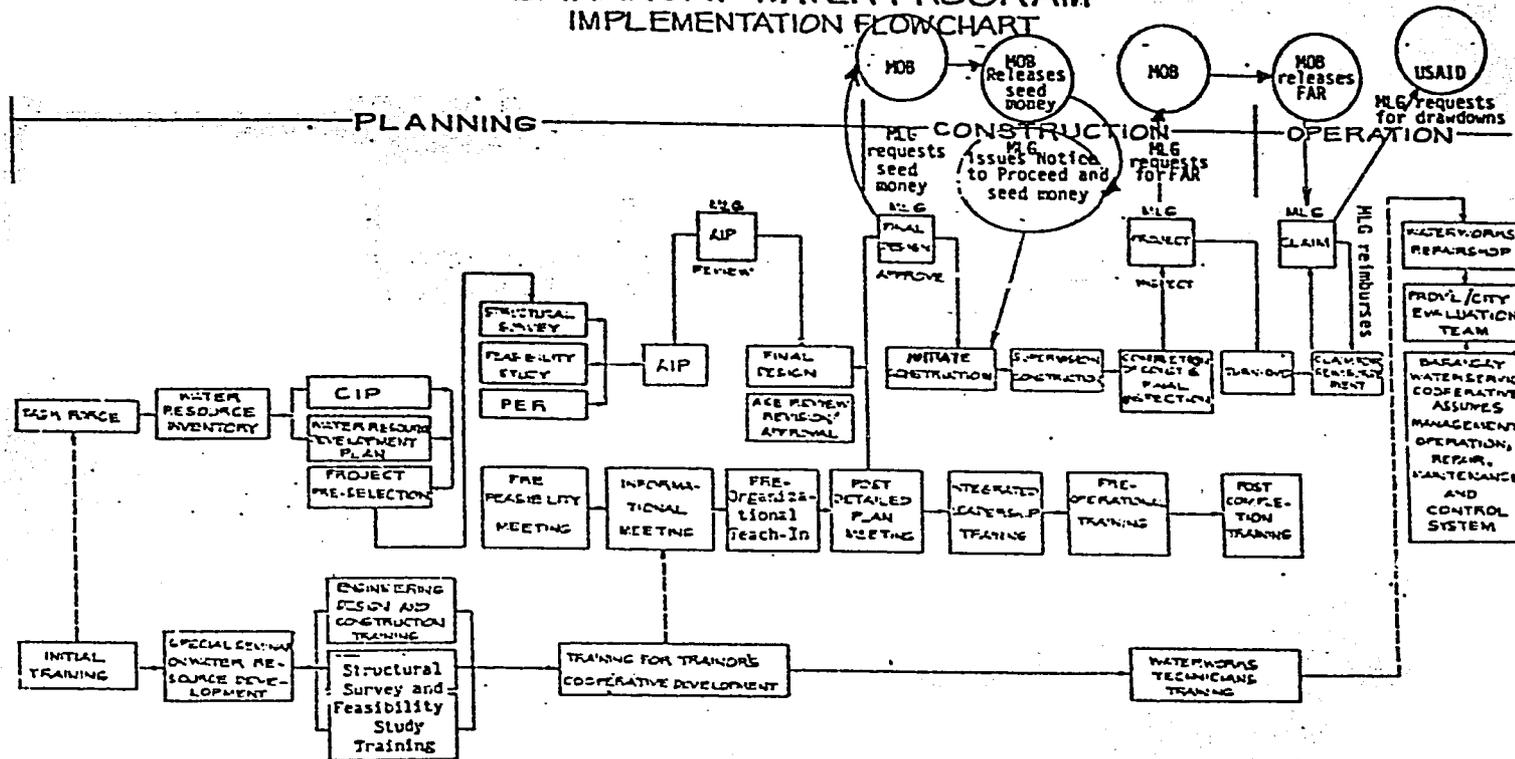
In addition to other activities, the Barangay Water Program has also engaged in some research efforts, having commissioned a study that investigates the feasibility and means of treating springs chemically to make the water biologically safe.⁴ The investigation covered two demonstration sub-projects in two provinces in Mindanao.

The recommendations of the study include, among others, the following:

- (1) Chemical treatment, more specifically chlorination, of local spring waters is a valid concept.
- (2) Chlorinators can be constructed for spring sources if appropriate modifications are made to earlier designs.
- (3) For each spring source project in the Program, the chlorination facilities should be demonstrated as operable, and approved by the Barangay Water Program Unit and USAID prior to project turnover.
- (4) After the turnover, the RWSA, with assistance from the provincial engineer and provincial health officer, can chlorinate the water supply on an as-needed basis to correct incidence of water related diseases in the barangays.

⁴ "Assessing the Requirements for Chemical Treatment of Underground Springs Providing Water for BWP Projects", by Sheladia Associates, Inc., dated June 8, 1984.

Figure 4-5
**BARANGAY WATER PROGRAM
 IMPLEMENTATION FLOWCHART**



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Program Results

Table 4-8 presents a summary of the Barangay Water Program through the end of 1983.

Table 4-8
SUMMARY OF BARANGAY WATER PROGRAM
PROJECTS

<u>Year</u>	<u>Level I No.</u>	<u>Level II No.</u>	<u>Level III No.</u>	<u>Households Benefitting</u>
1977	-	-	-	1,600
1978	-	-	-	3,700
1979	66	-	3	19,000
1980	111	-	3	34,600
1981	187	-	-	33,900
1982	20	-	1	16,300
1983	178	-	-	41,600
TOTAL	562	-	7	150,700*

* Estimated on the basis of 6 persons per household in order to have comparability with Tables 4-6 and 4-7.

Information on activities in 1984, indicates that projects still active as of March 1984 would add 105 Level I and 45 Level II systems serving another 15,000 households.

The figures on beneficiary households in Table 4-8 must be taken with caution. Unfortunately only total beneficiary households are available for the program summary, but more detailed data for 1984 covering Level I and Level II separately, was compared with the information from the RWDC on the average number of households served by each level of system and reasonable agreement was found. When these figures are applied to the total given in Table 4-8, though, the number of households benefitting from the Barangay Water Program, in the years 1979, 1980 and 1981 in particular, seem to be much too high.

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Sources of Funds

To assist the Philippine Government in implementing the program, AID authorized in 1978, a \$3 million loan, which provides funds for the construction of water systems on a Fixed Amount Reimbursable basis. When the program was extended in 1981 under the Barangay Water Program II a \$7.5 million loan was provided for the construction of Waterworks Systems in addition to a grant amounting to \$0.887 million for technical assistance and participant training.

Through the General Appropriations Act, the Philippine government also appropriated, between 1981 and 1984 a total amount of P30,366,000 for administration services (Min. of Local Government) and a total of at least P12,705,000 as a subsidy to provinces participating in the Program. (This is separate from the amounts reimbursed to the provinces or cities, which come from the proceeds of the USAID loans.) The annual amounts of these appropriations are as follows:

	<u>Admin. Services</u>	<u>Subsidy to Provinces</u>
1981	P 8,788,000	(Under PDAP)
1982	6,024,000	383,000
1983	3,777,000	4,382,000
1984	<u>11,777,000</u>	<u>7,940,000</u>
Total	P30,366,000 =====	12,705,000 =====

For the local government units, the budget is divided into two parts:

- General funds for training and staff development -- P30,000.
- Capital Outlay: equal to a tentative allocation for reimbursement + 5% for administration and contingencies.

During the annual Joint Work Planning Conference, the Barangay Water Program unit advises the local governments of the amount of money tentatively reserved as the fixed-amount reimbursement for the following calendar year. The preliminary fund allocation is automatically terminated if the local government unit is not certified by the Ministry of Local Government. Five percent is added to the tentative allocation

for administration and contingencies. This budget requirement is reflected in the annual budget of the local government unit, a copy of which is submitted to the Barangay Water Program unit.

Observations of the Barangay Water Program

Originally, Barangay Water Program II, which started in 1981, had the target of 600 rural water supply systems (primarily Level I). As of October 1984, however, only about 350 of these systems had been built (34 or 35 in 1982, 226 in 1983 and the balance in 1984). The current USAID loan agreement expires in 1985 and there is a good chance that close of \$9 million may be deobligated because of low disbursement levels. The primary reason for this situation, cited by provincial officials and the MLG Project Manager, is the tight fiscal situation of both the national government and the provinces. Individual provinces, particularly the poorer ones find it difficult to put up the initial investment in the water systems, even though they are later reimbursed for 90% of the cost and have received a modest subsidy from the national government.

As noted in the previous section on the Rural Water Supply Corporation, the same task is being undertaken by three separate agencies in three separate ministries (MHS, MLG and MPWH) even though their approaches are similar and they work through much the same set of committees and task forces at the local government level.

Once more, a greater degree of coordination among the three agencies and, possibly, some pooling of local funds could make the overall program more effective. Since the Barangay Water Program has a fixed life span, the merging of its remaining assets and commitments with one of the other agencies may, in the future, be a reasonable step. In Section 4.8 there is a more complete description of the integrated program set forth in the "Rural Water Supply and Sanitation Master Plan, 1982-2000".

4.6 NATIONAL IRRIGATION ADMINISTRATION (NIA)

Introduction and Organizational Objectives

The National Irrigation Administration (NIA) was created by Republic Act No. 3601 entitled "An Act Creating the National Irrigation Administration" dated June 22, 1963 and was amended by Presidential Decree No. 552 on September 11, 1974. NIA is attached to Ministry of Public Works and Highways (MPWH) for policy matters and it aims to provide adequate and timely water resources for irrigation, plus associated physical and technical services to farmers, in support of the agricultural development program of the country.

The general powers and functions of NIA are:

- (1) To investigate and study available and possible water resources in the country for irrigation purposes.
- (2) To plan, design and construct irrigation projects and appurtenant structures. This includes diversion dams for irrigation projects.
- (3) To operate, maintain and administer national irrigation systems, including irrigation and drainage canals and various structures (including diversion dams, etc.)
- (4) To supervise the operation, maintenance and repair of all communal and pump irrigation systems constructed, improved or repaired with government funds.
- (5) To delegate the management of national irrigation systems to duly organized cooperatives or associations.
- (6) To collect irrigation and drainage fees, or administration charges, from beneficiaries of systems administered by NIA.
- (7) To construct, operate and maintain multipurpose water resource projects when such projects are designed primarily for irrigation and secondarily for power and other uses such as flood control, drainage, land reclamation, water supply and reforestation.
- (8) To acquire properties, and all appurtenant rights, easements, etc. in connection with the development of projects.

The NIA may also impose an administrative and engineering overhead charge equal to 5% of the total cost of projects it undertakes.

Organization and Staff of NIA

The composition of the Board of Directors, the agency's policy-making body, consists of the following:

- (1) Minister of Public Works and Highways - Chairman
- (2) Administrator of NIA - Vice Chairman
- (3) Director General of NEDA - Member
- (4) Minister of Agriculture - Member
- (5) General Manager of NPC - Member
- (6) One member approved by the President of the Philippines on recommendation of any national rice and corn organization of good standing.

The management of NIA is vested in the Administrator appointed by the President. He directs the affairs and business of the agency in behalf of the Board of Directors and with the approval of the Board, determines the staffing pattern and number of personnel, fixes their salaries and defines their powers and duties. Currently, the National Irrigation Administration has close to 20,000 employees.

The Administrator is presently assisted by four Assistant Administrators for Project Development and Implementation; Operation and Equipment Management; Finance and Management; and Administrative Services.

The Organizational Chart of NIA is shown in Figure 4-6. Headquartered in Quezon City, Metro Manila, the NIA also has 11 Regional Irrigation Offices and 70 Provincial Irrigation Engineer's offices in the following locations:

<u>Region</u>	<u>Office Location</u>	<u>Provincial Irrigation Engineers</u>
I	Urduyeta, Pangasinan	in 7 Provinces
II	Cauayan, Isabela	in 6 Provinces
III	San Rafael, Bulacan	in 6 Provinces
IV	Pila, Laguna	in 11 Provinces
V	Naga City, Camarines Sur	in 6 Provinces
VI	Iloilo City, Iloilo	in 5 Provinces
VII & VIII	Tacloban City, Leyte	in 8 Provinces
IX	Zamboanga City, Zamboanga del Sur	in 5 Provinces
X	Cagayan de Oro City, MO	in 6 Provinces
XI	Davao City, Davao del Sur	in 5 Provinces
XII	Midsayap, N. Cotabato	in 5 Provinces

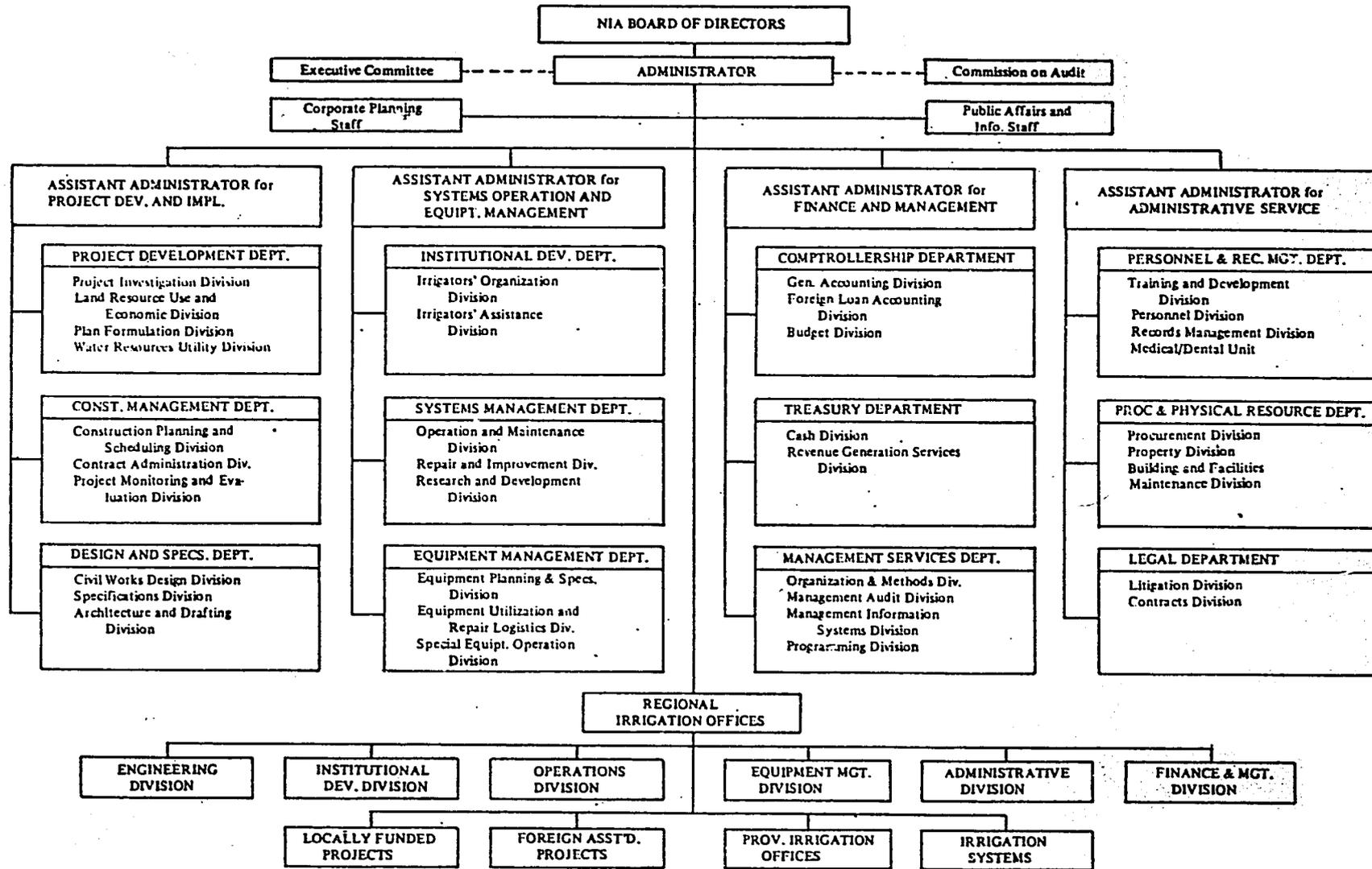
The main functions of the Regional Irrigation Offices are to implement NIA policies and programs in the region. Specific tasks include:

- Directing and supervising activities relative to:
 - survey and inventory of land and water resources for irrigation and development and other data-gathering activities in the region.
 - planning and design of communal systems;
 - preliminary planning of national systems and design of canals and structures for these systems.
- Supervising the implementation of all irrigation projects within the region and, as assigned, directing the construction of irrigation projects.
- Directing operation and maintenance activities, including the repair, restoration, rehabilitation and improvement of irrigation systems, as well as the installation of irrigation pumps; plus monitoring the operation and maintenance of communal irrigation systems and pumps.
- Coordinating research to improve irrigation service; organize irrigators' associations and cooperatives; and to train irrigators.
- Directing the utilization, preventive maintenance and repair of equipment.
- Supervising drilling personnel operating in the region.
- Directing the administrative and financial activities of the region.
- Taking steps to improve billing and collection.
- Identifying possible irrigation projects.
- Liaison with other national and local government officials on irrigation services.

In addition, the National Irrigation Administration has the following facilities and training programs:

- 1) NIACONSULT, established in 1980 as a subsidiary of NIA, offers consulting services in the field of water resources development, particularly irrigation.

Figure 4-6
 NATIONAL IRRIGATION ADMINISTRATION
 Organization Chart



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- ii) Training Centers, where farmer leaders and officers of Irrigation Associations, undergo training in the proper operation and maintenance of systems and application of improved farming techniques. Recent attendance at these training programs were as follows:

COURSE CATEGORIES	CY 1982	CY 1983
Orientation	2,723	1,267
Employee Development	1,663	195
Professional, Technical,		
Scientific Development	5,168	6,649
Supervisory Development	478	67
Farmers' techniques	13,427	13,849

Other training activities have included executive development, overseas courses, training/study tours for foreign officials and student apprenticeships.

- iii) Seminars and workshops for middle managers and technical personnel are also held regularly, under NIA's manpower development program.

Existing Irrigation Systems

NIA provides technical and economic assistance for, and as further described below, operates and maintains the following irrigation systems:

i) National Systems

National systems are irrigation systems operated and maintained by NIA, and constructed either with foreign loan assistance or purely locally funded. These include the irrigation aspects of large multipurpose projects, which may also provide power, water supply and flood control capacity. As of the end of 1983, there was a total of 549,118 has. of irrigated land, under the National System (See Figure 4-7: National Irrigation Systems in 1983).

ii) Communal Systems

Generally, these are small irrigation projects constructed by NIA with either foreign loan assistance or out of funds appropriated from existing Acts or Presidential Decrees appropriating sums for public work projects. After completion, these systems are turned over to irrigators' associations for operation and maintenance. Under present policies, the associations repay the construction

cost for gravity systems over a period not more than 5 years. No interest is charged. Repayments accrue to the funds for further irrigation development. In 1983, there was a total of 684,694 has. or irrigated land, under the Communal Systems.

iii) Pump Systems

Under the agency's regular pump irrigation program, pump sets with sizes ranging from 4" to 6" diameter are distributed to interested irrigation users. The cost of the pump sets is to be repaid by them, generally within 10 years. In 1983, there was a total of 152,128 has. of irrigated land, under the Pump Systems.

New Irrigation Systems

As of the beginning of this year, NIA had another 11 locally-funded national systems, covering about 45,500 has. underway in Regions I, II, III, IV and XII. The estimated cost of these systems is about P385 million. Table A-1 of the Appendix lists these ongoing projects. In addition, another 17 projects were proceeding in early 1984, which have been financed in part by the World Bank, Asian Development Bank, Overseas Economic Cooperation Fund, and U.S. Agency for International Development. These national irrigation systems located in Regions I, II, III, IV, V, VII, X, XI and XII will serve close to 265,000 has. Their aggregate cost was estimated in 1983 to be P10.24 billion, with a foreign exchange component of \$535 million, though this figure includes the Magat River dam which is a multi-purpose project with other uses beside irrigation. These projects are listed in Table A-2 of the Appendix.

Further projects are being studied and a list of foreign-assisted and locally-funded feasibility studies is given in Table A-3.

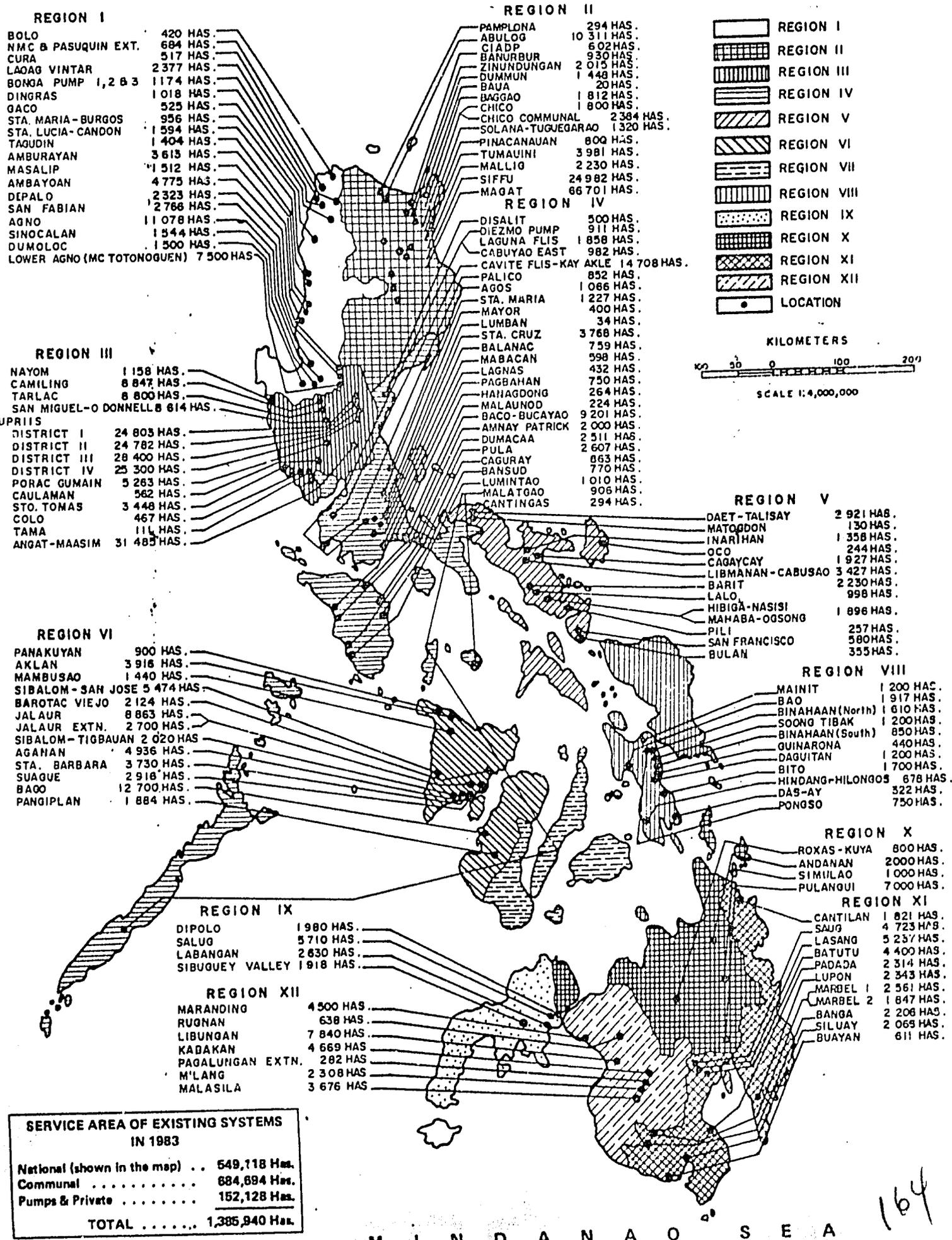
National Irrigation Systems Improvements

The National Irrigation Systems Improvement Project I (NISIP I) involves upgrading of 24 existing irrigation systems and extension of irrigation services to rainfed ricelands in Regions I, II, and VIII with support of an IBRD loan approved in 1977. It involves construction or rehabilitation of diversion works, canal networks, structures,

Figure 4-7

NATIONAL IRRIGATION SYSTEMS IN 1983

S O U T H I N A S E A M I N D A N A O S E A



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service roads, drainage and on-farm facilities. A total of 49,000 has. are to be served. By the end of 1983, systems had been rehabilitated and irrigation was extended to another 6,310 has. The estimated cost of this project is P429 million, plus \$50 million. Approximately 64 percent of the total had been spent by the end of 1983.

NISIP II is also supported by an IBRD loan, approved in 1978, and includes rehabilitation and expansion of 26 irrigation systems in Regions IV, V, VI, IX, X, XI and XII. The works consist of the construction or rehabilitation of diversion works, canal networks, structures, service roads, drainage and on-farm facilities, covering a total of 80,900 has. As of the end of 1983, systems serving about 52,500 has. had been rehabilitated, while irrigation was also extended to another 5,600 has. Total cost has been estimated at P555 million, plus \$65 million in external funds. By the end of 1983, only 48% of the total had actually been spent.

Other project components of NISIP I and II are:

1. Strengthening of regional operation and maintenance capabilities.
2. Studies of on-farm facilities in highly fragmented irrigated areas.
3. Input-Output monitoring program.
4. Schistosomiasis control program, in collaboration with the Ministry of Health in endemic areas in Leyte and four NIA systems in Mindanao.

Communal Irrigation Program

The Communal Irrigation Program is being implemented by NIA to develop not only the physical, but also the institutional aspects of the program.

- (1) The main physical activities undertaken under the Communal Irrigation Program during 1983, were:
 - i) A total of 351 projects were investigated for possible implementation in 1986 and 1987.

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- ii) Institutional profiles of 186 projects to be implemented in 1985 were evaluated to see if they are institutionally feasible.
 - iii) A survey of 189 projects, with a total area of 21,705 has., was undertaken for design and plan preparation.
 - iv) A total of 305 projects, including carry-over projects, were implemented in 1983. Out of this, 152 were completed, serving a new area of 11,674 has. and restoring systems covering another 16,501 has.
 - v) Aside from locally-funded projects, the Communal Irrigation Program is also doing two World Bank-assisted projects in Northern and Western Samar provinces.
 - vi) Also, three of four projects, with a programmed area of 3,275 Has. in the provinces of Nueva Ecija, Cebu and Camarines Sur, were completed.
 - vii) The Tubigon Small Water Impounding Project in Tubigon, Bohol was inaugurated and turned-over to the Farmers Irrigators' Association. It has a 22 m. high dam and a storage capacity of 850,000 cu.m. and irrigates a total area of 150 Has.
- (2) The main institutional activities conducted during the same year included:
- i) Various institutional activities by 227 Irrigation Community Organizers. Forty-nine were deployed in pre-construction projects; 119 in construction projects and 59 in operation and maintenance projects.
 - ii) Organization of 247 Irrigators Associations.
 - iii) Obtaining water permits from NWRC for 100 Irrigators' Associations.
 - iv) 4,520 rights-of-way negotiated from landowners.
 - v) Cost reconciliations between the NIA and Irrigators' Associations, which facilitated the turn-over of 92 projects to Irrigators' Associations.

Research and Development Activities

NIA is presently engaged in, or has conducted the following research and development activities:

- (1) Soils and Water Laboratory Services - Over 20,000 tests were undertaken and completed during 1983. These included specialized analyses, screening tests, fertility tests, water quality analyses and sediment analyses. These tests, for various projects of NIA, resulted in earnings for the agency of about P175,000.

- (2) Research and Demonstration Farm - Six research and demonstration farms (NIA Regions II, III, V, VI, X and XII) with a total area of about 20.5 Has. generated a total net income of P45,000.
- (3) On-Farm Facilities Study (OFFS) - A joint NIA-IRRI research project was undertaken to study different intensity levels of on-farm irrigation development and different water distribution techniques.
- (4) Extent of Water Pollution and Effectiveness of Its Control in National and Communal Irrigation Systems - A joint project of NIA and PCARRD, the study was undertaken to identify the sources and causes of water pollution as related to mine tailings, agricultural chemicals, industrial and agricultural effluents, agricultural wastes (animal), erosion and sedimentation; and to evaluate the degree of water pollution and its effect on irrigation systems' end-users.
- (5) Irrigation Water Management Project in the Porac-Gumain Rivers Irrigation Systems - This collaborative research project between the NIA and the Hydraulic Research Station of the United Kingdom is being conducted in Floridablanca, Pampanga. The study is aimed at determining the allocation and distribution of irrigation water in the system for wet and dry seasons by measuring the quantities of water diverted and developing a mathematical model of the main distribution network.
- (6) Retrospective Study of Communal Irrigation Systems - This NIA-Ford Foundation study was conducted to identify the various problems encountered and recommend solutions for future planning and improvement of Communal Irrigation Systems.

Operation and Maintenance of National Irrigation Systems

During calendar year 1983, NIA managed the operation and maintenance of 127 national irrigation systems with a total service area of 549,118 hectares. These systems consist of old ones, newly completed projects and currently ongoing projects that are partially operational. One ongoing project is Magat River Multi-purpose Project, a major scheme in Region II that is funded in part by the ADB.

In line with the objectives and programs of NIA, operation and maintenance of lateral canal sections are turned over to Irrigators' Associations to promote more active participation and to increase irrigation service fee collection. Thus, during 1983, 145 active Irrigators' Associations all over the country entered into contracts with the NIA

for the operation and maintenance of lateral canal sections. In a more ambitious turnover scheme, five projects, covering an aggregate area of 720 hectares were handed over for operation and maintenance by Irrigators' Associations and are now categorized as communal systems.

Operations and Maintenance Study

During the latter part of 1981, NIA contracted with foreign and local consultants for the preparation of a study on operation and maintenance problems and needs of irrigation projects in the Philippines. The IBRD (World Bank) provided financial support for the study, pursuant to Loan Agreement No. 1809 PH, dated March 28, 1980.

The following were the objectives of the O & M study:

- (1) To assess present O and M procedures and recommend improvements in these procedures;
- (2) To estimate the annual costs of O and M when improved procedures are implemented;
- (3) To review O and M staffing at national, regional, and local levels, with recommendations for improvements; and
- (4) To develop an overall national action plan for implementation at all NIA systems in all regions, incorporating all the recommendations for improvements and changes.

The O and M study was divided into two phases. In Phase I, the study focused attention on problems and needs of the Upper Pampanga River Integrated Irrigation Systems (UPRIIS) and at five additional NIA systems with a wide range of sizes, climatic conditions, susceptibility to typhoon damage and size of individual farms. These other systems which made up the "Selected Region" for the study were also located in Luzon:

- (1) Cavite Friar Land
- (2) Sta. Maria
- (3) Lagag-Vintar (Ilocos Norte)
- (4) Daet-Talisay
- (5) Angat-Maasin

In Phase I, the study assessed UPRIIS and the other sample systems with respect to (1) present operating practices for diversion dams and all gated structures from the main canal headworks to the end turnouts and (2) water delivery schedules in relation to cropping patterns and river discharges, and on the basis of this assessment formulated plans for needed improvements.

Phase II of the study consisted of the preparation of an action plan to apply the improved O and M procedures recommended for UPRIIS and the five sample systems to all NIA-operated irrigation systems, insofar as the changes suggested for them would have general applicability to all systems. The results of the study are presented in a Final Report, dated January 1983.

The ongoing Phase II of the study, which is to be completed by March 1985, consists of an appraisal of NIA's 127 National Irrigation Systems, focusing on 65 systems. Out of the 65, twelve (12) systems will be selected as the basis for a loan request to the IBRD in order to implement a future O & M pilot program.

Irrigation Service Fees

The Government's policy on irrigation fees seeks to ensure a high degree of farmers' participation in the development and operation of irrigation systems, commensurate with their financial capacity. The policy states that irrigation fees should be established at levels that will: (i) provide total reimbursement of public investments on irrigation facilities within a maximum period of 50 years, excluding interest costs which the Government will subsidize; (ii) provide total coverage of recurrent expenses for the operation and maintenance of the irrigation systems; (iii) provide adequate incentives to farmers to avail themselves of the benefits of irrigation; and (iv) be within the farmers' capacity to pay. Water service fees may be collected in kind or in cash, and are standard throughout the country, except in the Upper Pampange River Integrated Irrigation System.

NIA has announced the introduction of variable irrigation fees, with fees for crops other than rice, sugar and bananas being set at 60 per cent of that for irrigated rice production. The following fees are currently in force:

i) National Systems (1 cavan = 50 kg of palay)

- During Wet Season: 2 cavans/ha./crop
- During Dry Season: 3 cavans/ha./crop
- For third crop : 3 cavans/ha./crop

Upper Pampanga System: 2½ and 3½ cavans/ha./crop, respectively.

The National Food Authority (NFA), the grain marketing arm of the government, increased the support price of palay last October from P2.65 to P2.90 per kilo. Additional incentives of P0.19 per kilo brought NFA's buying price to P3.09 per kilo, whereas private rice traders are buying palay from farmers P3.10 to P3.20 per kilo.

ii) Communal Systems (1 cavan = 50 kg of palay)

NIA charges the Farmer-Irrigators Associations a yearly fee (1.5 cavan/ha./yr) to amortize the construction of the facilities, over a 10 to 50 year period, depending on Associations' ability to repay.

iii) Pump Systems

Amortization costs of pump irrigation systems are determined on a case by case basis. These systems are afflicted by the high cost of power and fuel (diesel).

In the case of the Central Luzon Ground Water Irrigation System, NIA has proposed turning over the pumping equipment to the Farmer-Irrigators Association for a flat payment of P60,000 per well.

Revenue Collection

In an effort to achieve the desired level of collection efficiency, NIA has adopted various collection strategies which include, setting up collection targets for irrigation service fees by irrigation systems; monitoring collection trends by requiring the regular submission of up-to-date reports; and granting incentives by providing collection expense funds and incentive bonuses to NIA bill collectors, as well as to Farmer-Irrigators Associations (FIAs).

(1) Collection Incentives - NIA Collectors

- 10% bonus on that portion of the total collection of irrigation service fees in excess of 70%, but not more than 80%, of the principal base, plus a 15% bonus on that portion of the total collection in excess of 80% of the principal base.
- Viability Incentive Grant - 10% of the net income of the irrigation system, provided that the physical accomplishment ratio is also attained.

(?) Collection incentives - Farmer-Irrigators Associations

- Below 70% collection: Difference is split between NIA and the Associations on a 60/40 basis.
- Above 70% collection: The split is on a 40/60 basis.
- Payments in arrears : 25% to the Associations.

These present national average collection rate is only about 60%.

Financial Information

Sources of Funds

The authorized capital stock of the National Irrigation Administration, as amended by P.D. No. 1702 of July 18, 1980, is P10-billion. Sources of capital funds are the National Budget, through the Corporate Equity Chapter of the General Appropriations Act and the Communal Irrigation Program; foreign and domestic loans and NIA operating income.

The main sources of NIA's operating income are:

- i) Irrigation Fees
- ii) Drainage Fees

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- iii) Administration and Engineering overhead charges
(5% of the total cost of projects undertaken)
- iv) Equipment rentals
- v) Miscellaneous Income from other sources

Table 4-9 shows the NIA's capital and operating budget for 1983. In 1984, the budget for operation and maintenance of National Irrigation Systems totals P105,000,000 and the budget for maintenance of Communal Irrigation Systems (from the General Appropriations Act) is P100,000,000. These amounts represent a decline of about 18% from the 1983 amounts. A regional breakdown of the budget for operating and maintaining the National Systems is as follows:

<u>Region</u>	<u>Budget (1984)</u>	<u>Annual O & M Cos (P/ha.)</u>
I	P 10,006,267	P212
II	16,303,769	140
III	36,344,113	211
IV	8,839,736	205
V	5,492,544	336
VI	9,032,845	169
VII)	3,614,133	305
VIII)		
IX	2,126,183	174
X	183,659	230
XI	5,271,109	175
XII	3,309,944	176
Sub-Total	P100,524,302	
Contingency	4,475,698	
	<u><u>P105,000,000</u></u>	

Table A-4 of the Appendix provides the NIA's latest available balance sheet, which shows the agency's status, as of mid-1983.

Observations on Installations of the National Irrigation Administration

The National Irrigation Administration currently operates and maintains 127 National Irrigation Systems, which serve approximately 550,000 has. of irrigated lands, in addition to providing assistance to a large numbered communal systems covering 685,000 has., and pumped systems serving 152,000 has. Several of these national systems have been rehab-

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Table 4-9
BUDGET OF NIA FOR CY 1983
(In Thousand Pesos)

CY 1983

I. CURRENT OPERATING EXPENDITURES

1. Personal Services	P193,875
2. Maintenance & Other Operating Expenses	62,125

Total Current Operating Expenditures

P 256,000

II. CAPITAL OUTLAYS

A. Foreign Loan/Assisted Projects:

1. Feasibility Studies	11,089
2. Construction of Irrigation Projects	1,247,244
3. Rehabilitation & Improvement of Existing Irrigation Systems	285,403
4. Soil Erosion & Watershed Management	82,880
5. Flood Forecasting & Warning System	3,000

1,625,616

B. Locally Funded Projects:

1. Investigation & Survey (Including Feasibility Studies)	17,120
2. Construction of Irrigation Projects	50,843
3. Communal Irrigation Program	122,500
4. Rehabilitation & Agri Institutional Development Projects	11,860

202,303

Total Capital Outlay

1,827,939

GRAND TOTAL

P2,083,939

SOURCES:

I. General Appropriations Act - Batas Pambansa Blg. 230

a. Corporate Equity	760,000
b. Communal Irrigation Program	122,500

II. NIA Operating Income	257,000
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III. Foreign Loans

a. Cash	793,128
b. Non-Cash	151,311

GRAND TOTAL

P 2,083,939

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ilitated recently, with financial assistance from the IBRD.

No single unit in the NIA, however, is responsible for preparing and carrying out a maintenance program for these various systems. This responsibility is now divided between the Operation and Maintenance Division and the Repair and Improvement Division. Furthermore the resources devoted to maintenance work are estimated to be only 25 to 30% of what they should be. The explanation given by NIA personnel in the regional offices and the headquarters in Manila is that current water fees are about as high as farmers can afford, with depressed prices for agricultural products; to raise them further would further jeopardize an already low collection rate. The amounts collected are sufficient only to cover the present level of maintenance.

The present national average collection rate is about 60%. The collection efficiency in Region XII systems is stated to be as high as 90%, while in Region III (Upper Pampanga River) it is as low as 30%. The Government is concerned about these low rates and existing legislation allows the NIA to confiscate the land of defaulters, but this is a cumbersome and impractical solution. The Government's strategy is to make up for low collection rates by increasing farmers' involvement in operation and maintenance; handing over to the Farmer-Irrigator Associations complete O&M responsibility in the case of smaller schemes and on a modular basis in the case of larger schemes, under which NIA maintains and operates only the main systems and the farmers look after the secondary and tertiary systems.

Evidence of inadequate maintenance, for whatever cause, could be seen in various systems that were visited. Other problems have stemmed from recent typhoons and, in the case of pumped systems, from high energy costs. In the Bago River Irrigation System (Negros Occidental) the service roads are in rather poor condition, because of recent heavy rainfall, coupled with the traffic of heavily loaded sugar cane trucks. Since the roads are also being used for other purposes, besides operation of the irrigation systems, NIA has requested the MPWH to take over the maintenance of certain roads in the Murcia-Bago area. So far, however, neither agency has

fully addressed the problem. It was also noted at the site of the diversion dam that the motors and gear trains that actuate the sluice gates need repairs and overhaul; they are inoperable at present. A similar situation was found in Iloilo Province at the site of the water intake structure for the Tigum River Irrigation System. Once again, the motors and gears for the sluice gates are inoperable.

The Central Luzon Groundwater Irrigation Project, started in 1976 with assistance from the OECF (Japan) is suffering from high power costs, and low pumping efficiencies. The initial project provided for the installation of 240 deep well pumps to irrigate a total of 12,000 hectares. In March 1982, the project was revised to provide for installation of only 90 pumps, and at present there are 60 pumps in operation. NIA is now embarking on a program to sell the pumps to the users but their willingness to assume this burden is in doubt. Initial maintenance and overhaul to increase pumping efficiencies would, no doubt, help.

In Mindanao, a separate problem is faced. The NIA provincial irrigation office in Iligan has stated that further work on the Salvador (1,275 has.) and Munai (180 has.) Communal Systems has been suspended because of peace and order problems in the area. The Salvador Communal System is 50% complete.

Except for the last one, the difficulties cited above all relate in one way or another to inadequate resources for maintenance and, even more important, inadequate programming and management of the resources that are available.

Cognizant of the importance of proper operation and maintenance practices, if the country is going to achieve a high level of productivity in irrigated lands, NIA is completing Phase II of the operation and maintenance study, which will select twelve (12) systems for carrying out a Pilot O&M Program. It is expected that this program will focus not only on O&M management and practices, but also the institutional framework for maintaining these systems. Since the IBRD assisted in financing the study, it is considering financing the Pilot Program. It is noted, however, another 115

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National Irrigation Systems, of which over 50 have already been surveyed, are also candidates for the implementation of a full operation and maintenance program.

4.7 FARM SYSTEMS DEVELOPMENT CORPORATION

Introduction and Organizational Objectives

The Farm Systems Development Corporation (FSDC) was created on April 4, 1975 by P.D. No. 681. In fulfilling the provisions of P.D. No. 681 and 1595, it engages the rural population in active partnership for the attainment of agricultural productivity and increased farm income.

FSDC is an autonomous corporation, attached to the MPWH for policy coordination, whose primary objective is to promote the organization of and assist farmer associations particularly on irrigation matters, for the purpose of hastening rural development.

Organization and Staff of FSDC

All the powers of the corporation are vested in and exercised by the Board of Administrators, which is composed of the Minister of Public Works & Highways as Chairman and the following as members: Minister of Education, Culture and Sports, the Administrators of the National Food Authority, the National Electrification Administration and the National Irrigation Administration, and the Executive Director of the National Food and Agriculture Council. The Administrator of FSDC is an ex-officio member.

The Farm Systems Development Corporation is organized along functional lines, with the following six departments:

- Engineering Department
- Planning and Research Department
- Program Management and Monitoring Department
- Equipment Management Department
- Administrative Department
- Finance Department

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In addition, there is a management services staff which reviews technical feasibility and provides the information for management control. At present, the personnel of FSDC numbers approximately 1,000.

The main functions of the Farm Systems Development Corporation, in accordance with P.D. No. 681, which created the FSDC, are to:

- make loans to irrigation associations, for the construction, operation and maintenance of irrigation systems and related farm properties, such as equipment, machinery and materials; and to make loans for the restoration or improvement of facilities.
- assist irrigation-based associations and cooperatives with related functions in planning, building, operating, maintaining and renovating their facilities and systems.
- prepare feasibility studies and engineering plans for farm-based systems development including the procurement of modern and improved facilities and equipment.
- provide managerial expertise and professional training services for associations' staffs and employees.

FSDC's headquarters are located in Pasig, Metro Manila. It has 6 area offices (Farm System Centers) and 68 Kalipunan ng mga Integrated Service Association (KAISA) offices in the following locations:

<u>Area</u>	<u>Office Location</u>	<u>No. of Integrated Service Assoc. Offices</u>
I	Santa Barbara, Pangasinan	14
II	Angat, Bulacan	16
III	Naga City, Camarines Sur	6
IV	Cabatuan, Iloilo	13
V	Panabo, Davao del Norte	11
VI	El Salvador, Misamis Oriental	8

Facilities and Programs

Normally, FSDC assists in the implementation of small area (50-100 has.) irrigation projects, in contrast to NIA, which builds and operates larger systems. From 3 to 5 years before starting a project, FSDC obtains clearance from NIA. Arrangements are made through a Coordinating Committee, between FSDC and NIA, and water rights are obtained through NWRG.

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FSDC helps organize what it refers to as Integrated Service Associations and through them provides training for the management and operation of the irrigation systems. The operation and maintenance of the systems is then done by the Integrated Service Associations, themselves.

FSDC also builds and finances the construction of the irrigation systems. In 1983, FSDC constructed a total of 38 projects servicing 3,290 hectares of land. The Corporation also helps rehabilitate and upgrade existing projects in place of expansion to new areas. In 1983, 153 pump irrigation projects covering 16,243 hectares were rehabilitated, benefitting 7,160 farmer-members. As for communal irrigation systems, 43 projects covering 4,327 hectares were also rehabilitated benefitting 2,111 farmer-members.

Integrated Services Association Programs

The heart of the Integrated Services Association Program is the farm systems approach which views the farm as an integrated unit. Its development depends on the development of its various elements. These include the farmer, his land and resources, credit, marketing and processing facilities, and technology. These precepts are translated into the two components of the Program, namely, organizational development and enterprise development.

The first involves organizing small farmers into the Integrated Service Associations mentioned above. Organized along cooperative lines, these organizations are the avenues through which development as a way of life is instilled among rural people.

The second, enterprise development, is meant to provide rural families greater economic opportunities by giving them the chance to own and operate small and medium-scale farm facilities, like irrigation subsystems, driers and threshers, as well as the chance to adopt modern technologies and engage in various income-generating projects.

At the community level, Association families engage in crop diversification, livestock production and other farm-related projects to increase

their productivity and subsequently their incomes. They also undertake Association-wise projects such as livestock dispersal, vegetable nurseries and azolla propagation.

At the provincial level, the enterprises run by the Kalipunan ng mga Integrated Service Associations, or KAISA, include ricemills, feedmills, warehouses, rice driers, livestock centers, trading and trucking services, brickmaking, charcoal making, fabrication of farm equipment and commercial vegetable production. These enterprises are intended to enhance the entrepreneurial skills of farmer-members, increase their productivity, and generate additional farm income.

Following its mandate of accelerating rural development through farm-based associations, FSDC in 1983 hastened the formation of Integrated Service Associations. At present there are a total of 2,240 Associations, with a membership of 121,319 farmers. FSDC has conducted a total of 17,000 training classes in organizational management, agricultural know-how and business operations. In addition, training was conducted for local farmer-leaders and specialized officers in crop production, forestry, aquaculture and resource management.

In 1978, PD 1595 was issued, empowering FSDC to engage in such new areas as the processing of farm produce, marketing, fishery and forestry development, agro-industrial production, rural waterworks and reclamation for agricultural production. Accordingly, the FSDC has become involved with several programs, which are mentioned only briefly here since they are only peripherally involved with infrastructure.

In May 1983, FSDC began to implement the Laguna Lake Cooperative Development Program for legitimate lake users, to promote economic and social development in the lake region. The program hopes to accomplish this by providing enterprise loans and providing managerial and technical assistance. FSDC has also undertaken a fish production program popularizing polyculture technology (growing high-value fish with complement habits) for Laguna Lake fishermen in cooperation with LLDA, the Bureau of Fisheries and Aquatic Resources, and the Southeast Asian Fisheries Development Center.

Another FSDC project has been the Coastal Area Resources and Development Program, through which fishermen are able to obtain motorized watercraft, fasifiers, fishing gear, landing sheds and ice plants.

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Tree Resources for Enterprise and Energy (TREE)

Of greater significance for the development of local irrigation systems, the Tree Resources for Enterprise and Energy (TREE) Project, involves energy development, reforestation, gasifier conversion and charcoal production. Through it, the FSDC has extended financial, managerial and technical services to more upland farmers and kaingineros. The FSDC also implements the Rural Energy Development Project which features three farming and charcoal production. Last year, the Corporation piloted a charcoal production project, using Brazilian Technology, in Antique Province.

Funded by the Economic Support Fund, the Brazilian charcoal project has potential for fueling motorized watercraft, jeepneys, ice plants and ricemills. Other possible use of the charcoal include households, blacksmith shops and eateries. Commercial users that have been identified are smelter plants, ceramic works, refineries and distilleries.

Gasifier Retrofitted Irrigation Systems

In 1979, FSDC started its search for a technology that would bring relief to more than 1500 Integrated Service Associations, which were faced with the problem of the high cost of diesel oil and gasoline for running their pump irrigation systems. The Corporation sought an answer in the gasifier, a piece of equipment that produces combustible gases to run internal combustion engines from such indigenous materials as charcoal, wood chips and other farm wastes. FSDC has applied the technology in such farm facilities as irrigation pumps, jeepneys, small watercraft, ricemills, driers, electric generators and storage units.

A number of farmers in Integrated Service Associations have shifted from diesel engine systems to the gasifier-retrofitted irrigation systems. To date, 319 gasifier units have been retrofitted to irrigation systems belonging to the Associations.

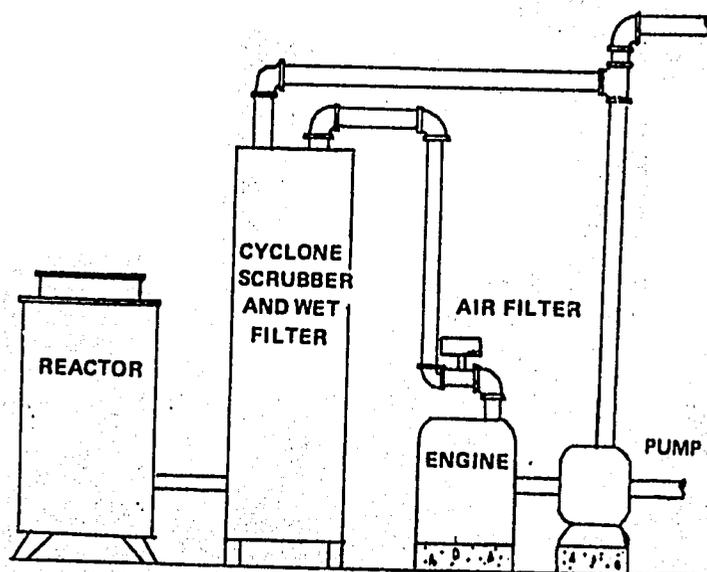
Figure 4-8 shows a typical producer gas installation. Dry charcoal wood chips, etc. are fed into the reactor, where they are partially burned,

thereby producing the mixture of combustible gases. This gas mixture then passes through a series of cleaning devices. First, the cyclone separator where solid particles are taken out; then the gas scrubber (for stationary installation) or the condenser (for vehicles) that liquifies and removes the moisture content; and lastly, the wet filter which collects the remaining impurities. The gas is now mixed with filtered air and is fed together with a reduced volume of diesel fuel to the engine.

With the gasifier unit, an equivalent of 1 KW-HR of energy is theoretically made available from one kilogram of charcoal.

The producer gas that results may also be used in electric power generation, water supply systems, ricemills, driers and other applications in which internal combustion engines are used as sources of power.

Figure 4-8



Schematic Diagram of a Gas Producer Installation for Irrigation

To provide a regular supply of charcoal for gasifier used in irrigation pumps, FSDC continued to implement the "woodlot for gasifier" project. To date, 174 such projects have been established in various Integrated Service Associations, bringing income and employment to hundreds of farming families.

The gasifier equipment is manufactured in the Philippines by the Gasifier Manufacturing Corporation (GEMCOR), a subsidiary of FSDC.

The USAID-financed gasifier program, which started in April 1982 with a loan of \$3.3 million, has funded the installation of 272 gasifier units, plus a "woodlot" project for the production of charcoal. Approximately \$400,000 had been disbursed out of the loan, as of the fourth quarter of FY 1984.

Drastic budgetary restrictions imposed by the Government during the third quarter of 1984 have adversely affected the maintenance of the gasifier units. This cutback in maintenance is in addition to other operational problems that already existed. The program is therefore, being reviewed at present by USAID, FSDC, NEA and the Ministry of Energy. The main problems affecting the gasifier program may be identified as follows:

- (a) Lack of maintenance of units.
- (b) Lack of adequate training for operators.
- (c) Lack of adequate service facilities.
- (d) Failures of the scrubber and filter systems, which results in more frequent engine overhauls.
- (e) Mismatching of engines and pumps, at times, with respect to power requirements.

USAID is planning to perform a 90-day study of the gasifier equipment application, which will look into the technical, economic, and institutional aspects of the program.

Financial Information

FSDC obtains funding from the National Budget under the General Appropriations Act. These funds are utilized as equity investment or capitalization in rural development projects.

FSDC in turn provides loan funds to the Integrated Service Associations, which are recovered through amortization. FSDC finances the installation of pumping equipment by ISA members to a 12-year term at 6% interest per annum, with a 2-year grace period on the principal amount.

FSDC's budget allocation for 1984 was P25-million; however, as of the end of October, it had only received P2.5-million. The proposed budget for 1985 is P40-million.

FSDC's public debt consist of long-term indebtedness to domestic and foreign creditors. Outstanding long-term loan balances as of the end of 1983, were as follows:

USAID Loan	P117,226,198
Danish Loan	21,871,373
German Loan	32,585,173
Domestic Loan	<u>36,792,278</u>
 T o t a l	 P208,475,022 =====

Interest rates on USAID Loans range from 2% to 3% per annum, with a maturity period of forty (40) years inclusive of ten (10) years grace period. The Danish Loan is interest free with a maturity period of twenty-five (25) years inclusive of seven (7) years grace period. Interest rate on the German Loan is 2% per annum with a maturity period of thirty (30) years inclusive of ten (10) years grace period.

Domestic loans were created by virtue of the Memoranda of Agreement with National Irrigation Administration (NIA) and Ministry of Human Settlements (MHS). The NIA loans include NIA-installed irrigation systems, plus irrigation equipment and accessories turned-over to FSDC during its first year of operation. These loans are interest free with a maturity period of ten (10) years from date of final accounting. MHS loan proceeds are utilized to provide gasifier units for irrigation and charcoal production projects under the ESF Project Grant Agreement dated August 21, 1982 (AID Project No. 492-0375). Interest rate on MHS loan is 9% per annum with a maturity period of twelve years, including a four year grace period.

Balance Sheet

For the year ended December 31, 1983, FSDC had a total gross income of P30,356,524 and total expenses of P24,616,146, which gave it a net income of P740,378. Table A-5 in the Appendix shows FSDC's Balance Sheet for 1983.

Farm Systems Development Corporation Recent Project Experience

As discussed earlier in this section, some of the 319 gasifier units installed throughout the country have experienced operational setback that have rendered most of them inoperative. This situation has been aggravated by the inadequate levels of maintenance ostensibly because of budgetary constraints imposed upon the FSDC and other government agencies. These two factors have placed the gasifier program in jeopardy.

It is understood that USAID is considering a short-term study to evaluate the technical, economic and institutional aspects of the program; In this study, other proven gasification technologies might also be investigated and their application considered. Also, such a study should determine the funding needed for a proper operating and maintenance program for the gasifiers presently in operation so that funds can be made available to stem further deterioration because of poor operation and a lack of maintenance.

4.8 MINISTRY OF PUBLIC WORKS AND HIGHWAYS

The Ministry of Public Works and Highways (MPWH) acts as an "umbrella" organization of the foregoing agencies, including NWRC, LWUA, FSDC, and NIA, and provides overall policy direction and coordination. The MPWH also plays a more direct role in:

- Rural Water Supply and Sanitation
- Flood Control and Drainage

Rural Water Supply and Sanitation

Originally, the design and construction of all rural water supply and sanitation facilities came under the jurisdiction of the Ministry of Public Works (MPW), now MPWH. This role continues even though other agencies are now involved in similar programs. The implementation of the MPWH program is performed by the Project Management Office for Rural Water Supply (PMO-RWS), under the direction of a Project Manager whose responsibility cuts across the functional organization lines of MPWH. The Office was created on December 3, 1981 by virtue of Ministry Order No. 14,, so of the three agencies involved in rural water the PMO-RWS is the last to be formally established, in spite of the Ministry's prior role. The PMO-RWS reports to the Deputy Minister for Construction and Quality Control. Figure 4-9 shows the typical organization structure of the PMO-RWS.

The role of the PMO-RWS is to exercise overall control over the Rural Water Supply Project. The Project Manager presides over meetings of the Technical Working Group and also participates as a member of the MPWH Prequalification, Bids and Awards Committee, and provides technical assistance on contracts pertaining to the Project. The PMO-RWS, as a unit, is responsible for:

- directing the preparation and execution of annual programs, budgets, plans, specifications, estimates, tender documents, materials and equipment procurement, construction work and contract payments -- and obtains their approval by the officials concerned.

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- supervising field operations of the Project, through the regional and district, engineering offices.
- taking remedial measures to resolve problem areas in the implementation of the project.

Actual construction is the responsibility of the MPWH Bureau of Construction (see Figure 3-1). Among its other duties, the Bureau of Construction develops appropriate standards and procedures for the construction and improvement of water supply facilities, either prepares or reviews programs for construction and improvement of the facilities, provides technical services for prequalification, bid and award, monitors the construction contracts and processes variation orders, claims and related matters.

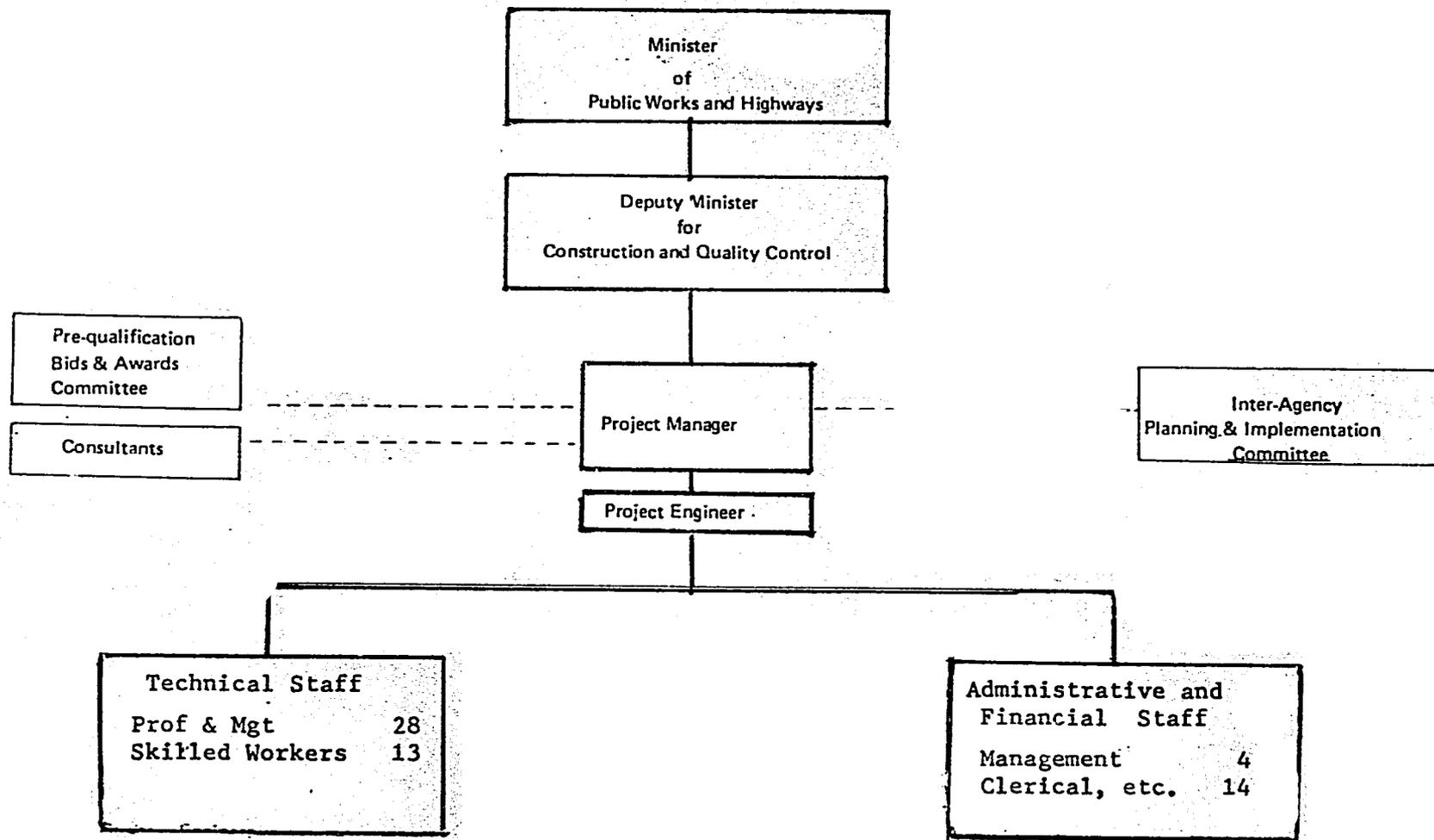
After construction has been completed by the Bureau of Construction, the PMO-RWS turns the facilities over to the Water Supply Division of the Bureau of Maintenance of the MPWH (Figure 3-3) for subsequent operation and maintenance. The Bureau of Maintenance is charged with providing overall supervision of maintenance work. For this purpose, the Bureau recommends standards and procedures for maintenance of (roads, bridges, flood control structures) water supply facilities, and monitors all maintenance activities. Actual maintenance work, however, is undertaken by the MPWH district engineering offices, which, by virtue of their location, work closely with provincial and local officials. It may be noted here that, regardless of the resources available and the effectiveness of maintenance program, of the three Ministries whose agencies are involved in rural water programs, only the MPWH through the district engineering offices plays a continuing role in the maintenance of rural water facilities once they are in operation.

Present Water Supply Coverage

The main reason for all the activity in rural water supply and the efforts of three different agencies to address the problem is that, as of 1980, only 15.1 million rural inhabitants or 47% of the 32.6 million people living in rural areas were served by public water supply facilities.

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Figure 4-9



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The rest of the rural population, some 17.5 million people, are not served by any public system and rely chiefly on the nearest sources of water, such as open wells, rain water cisterns, lakes, rivers, and streams. Many of these sources are of questionable quality and the incidence of water borne and water-related diseases is high.

Table 4-10

POPULATION COVERAGE OF WATER SUPPLY FACILITIES

	Wells		Springs		Piped System		Unserved		Total
	Pop.	%	Pop.	%	Pop.	%	Pop.	%	Pop.
<u>Urban Population</u>									
Metro Manila	0.1M	2	-	-	5.1M	80	1.2M	18	6.4M
Other	1.2M	14	0.3M	3	3.4M	38	4.0M	45	8.9M
<u>Rural Population</u>	6.4M	20	5.1M	16	3.6M	11	17.5M	53	32.6M
<u>T o t a l</u>	7.7M	16	5.4M	11	12.1M	25	22.7M	47	47.9M

Source: Rural Water Supply and Sanitation Master Plan 1982-2000 - Dec 1982.

In the Rural Water Supply and Sanitation Master Plan, prepared by MPWH, it was estimated that in 1980 there were about 22,800 public wells in the country, of which about 15,600 were in the rural areas serving an estimated 6.4 million people. Of the total number of public wells, only 13,680 were operational. The average drilled depth of these wells was 60 meters and the discharge ranged from 28 to 40 liters per minute. Around 40% of the wells required rehabilitation or replacement. Many of these were installed 10 to 20 years earlier.

The Master Plan also recorded more than 3,000 developed springs serving roughly 5.4 million persons in the rural areas. Of these, about 1,500 had been developed by the MPWH. The country abounds in springs but some are far from clusters of population.

Some 1,087 piped systems with communal faucets or public standpipes, serving around 0.73 million persons in the rural areas, were also tabulated.

To rationalize the planning and implementation of a full water supply program covering both rural and urban areas, MPWH, together with MWSS, LWUA and RWDC, prepared an Integrated Water Supply Program in July 1980. This program noted that the following institutional framework has been defined in Executive Order No. 577.

- (a) National Water Resources Council is to formulate "framework" plans and policies for water supply.
- (b) Ministry of Public Works and Highways (MPWH) is to develop integrated national water supply plans and programs consistent with the "framework" plans and policies of the NWRC. MPWH is also to be the principal implementation arm of the RWDC for engineering and construction.
- (c) Metropolitan Waterworks and Sewerage System (MWSS) is responsible for the provision of water supply in Metropolitan Manila and contiguous areas that may be added to its jurisdiction.
- (d) Local Water Utilities Administration (LWUA) is to be concerned with the provision of water supply in cities and municipalities with a population of 20,000 or more.
- (e) Rural Waterworks Development Corporation (RWDC) is to provide water supply in the rural sector and other areas not covered by the MWSS and the LWUA.
- (f) It could be noted that the Ministry of Health is also involved since it is responsible for performing tests on all water supplies at its regional laboratories.

This Integrated Water Supply Program also defined the three levels of service, Levels I, II and III, first cited in Chapter 2 and discussed further in the preceding two sections. It also proposed that the rehabilitation of existing wells and springs be undertaken where feasible, to reduce the need for costlier new projects.

The Program recognized that both MWSS and LWUA are, and for the next few years will continue to be, heavily engaged with providing water to larger poblaciones and urban centers and, therefore, directed that the RWDC and the MPWH handle, in the interim, many of the rural areas in urbanizing fringes and smaller poblaciones in the MWSS and LWUA areas.

Project identification and initiation is to be essentially the task of the end-user communities and local governments concerned. Technical assistance is to come from LWUA, RWDC and MPWH and project feasibility studies and designs are to be undertaken by the agencies concerned, viz., the MWSS, the LWUA, the MPWH, and the RWDC. The last thru provincial engineer's offices, in consultation with the communities affected. Construction is to be the responsibility of the concerned agencies and the Rural Waterworks and Sanitation Associations, with general technical supervision by MPWH, provincial engineers and LWUA.

The Rural Waterworks and Sanitation Associations were identified in the Program as being responsible for the maintenance and operation of rural water supply facilities. Operating and maintenance costs are to be defrayed thru water charges on the using households. (The average monthly charge per household for Level I was to be about P0.50 to P1.00). No mention is made of MPWH in this regard.

The Program stated that project financing is to be derived from National Government funds (for source development of Levels I, II, and III projects), corporate equity funds (MWSS, LWUA, and RWDC), in the form of grants and loans to the associations, and equity from the associations. Loan collection from the RWSA's is to be done by the LWUA and the RWDC, through water districts and electric cooperatives, respectively.

Monthly fees are to be collected from the using households to cover operation and maintenance expenses and to amortize the loans for Levels II and III systems. (Fees ranged from P5.00 to P10.00 for Level II, and P8.00 to P15.00 for Level III in 1980.)

The Integrated Water Supply Program set forth the following factors for determining priorities in selecting water supply projects:

- Community commitment and capacity - Projects will be undertaken in communities which commit to form a RWSA, contribute the required equity and pay service fees.

- Community need - Priority to be given to communities with the greatest inadequacies in the quantity, accessibility and quality of water.
- Community development level and potential - Poor or depressed areas with economic potentials will be given prior attention, other things being equal.
- Capital cost - Other things being equal, projects with the lowest project investment per capita, for a given level of service, would be preferred.

At this point, the role of the Ministry of Health should be expanded upon. All community drinking water supplies are supposed to be inspected and water samples collected periodically by MOH sanitary inspectors and other authorized personnel for bacteriological, chemical, physical, biological, and radiological analyses at the regional laboratories.

The policy on disinfection of drinking water supply is that disinfection will be done on all newly-constructed water supply facilities and also on water supply source found to be positive bacteriologically by laboratory analysis. Disinfection will also be undertaken whenever water supply facilities have been repaired or improved. Continuous chlorination will be carried out in piped water supply systems that have surface water known to be contaminated as a source, provided no other source is available in the area. Periodic disinfection may be conducted on the water supply facilities other than those requiring continuous chlorination.

For a locality where an open dug well is the only water supply for the community and this source is contaminated, continuous chlorination of the well should be conducted until a safe water supply is provided and the original well is condemned.

The extent to which these policies are carried out in practice is not known. It is recognized, however, that the MOH is subject to the same fiscal restraints as other ministries. Also, as noted earlier some RWSA's have complained that they never receive the results of periodic tests made by the MOH regional laboratories.

Major Rural Water Supply Projects

Table A-6 of the Appendix provides a list of projects either under-way or scheduled to be started, as of the end of 1981, by all three agencies involved in rural water supply - the FSDC, the Barangay Water Program and the PMO-RWS of the MPWH. Some of these projects are designated as MPWH projects and the Barangay Water Program is itself a distinct project, but others may fall under either the RWDC or PMO-RWS (MPWH). In these cases, it is not clear which agency has responsibility.

Future Plans and Studies

The Rural Water Supply and Sanitation Master Plan 1982-2000, has the physical targets shown in Tables 4-11.

Table 4-11
PHYSICAL TARGETS FOR RURAL WATER SUPPLY
(1982-2000)

<u>Level of Water Service</u>	<u>Stage I (1982-1985)</u>	<u>Stage II (1986-1990)</u>	<u>Stage III (1991-2000)</u>	<u>Total (1981-2000)</u>
LEVEL I	<u>55,490</u>	<u>50,135</u>	<u>70,885</u>	<u>176,510</u>
Construction	45,290	45,635	67,885	158,810
Shallow Wells	29,500	34,000	45,100	108,600
Deep wells	14,300	10,700	18,000	43,000
Springs	1,315	470	2,700	4,485
Others*	175	465	2,085	2,725
Rehabilitation	10,200	4,500	3,000	17,700
LEVEL II	<u>8,000</u>	<u>7,750</u>	<u>11,300</u>	<u>27,050</u>
LEVEL III	<u>1,300</u>	<u>2,000</u>	<u>4,000</u>	7,300

* Others include rainwater collectors, infiltration galleries.

Source: "Rural Water Supply and Sanitation Master Plan, 1982-2000 - December 1982", prepared under the MPWH with participation of representatives from MH, MLG, RWDC, LWUA, MWSS, and NWRC, with the financial assistance of the IBRD (World Bank).

The corresponding investment requirements for construction work are shown below in Table 4-12.

Table 4-12
INVESTMENT REQUIREMENTS FOR RURAL WATER SUPPLY
(1982-2000)
(millions of pesos)

Level of Water Service	Stage I (1982-1985)	Stage II (1986-1990)	Stage III (1990-2000)	Total (1982-2000)
Level I	<u>416.64</u>	<u>317.84</u>	<u>42.06</u>	<u>1,376.54</u>
Construction	375.84	299.84	630.06	1,305.74
Shallow Wells	61.95	71.41	94.71	228.07
Deep Wells	245.96	184.03	309.60	739.59
Springs	59.18	21.15	121.50	201.83
Others	8.75	23.25	104.25	136.25
Rehabilitation	40.80	18.00	12.00	70.80
Level II	<u>999.32</u>	<u>968.22</u>	<u>1,411.41</u>	<u>3,378.95</u>
Source Development	199.32	193.22	281.41	673.95
Distribution	800.00	775.00	1,130.00	2,705.00
Level III	<u>1,338.29</u>	<u>2,108.89</u>	<u>4,117.82</u>	<u>7,565.00</u>
Source Development	38.29	108.89	117.82	265.00
Distribution	1,300.00	2,000.00	4,000.00	7,300.00

The proportions of funds, by source, that are expected to be applied to the rural water supply program are as follows:

	Foreign Financing	Government Counterparts	RWSA Contribution	Total
Grant or aid projects	9.0%	4.5%	1.5%	15.0%
Loan-assisted projects	27.0%	13.5%	4.5%	45.0%
Purely locally funded projects	-	36.0%	4.0%	40.0%
T o t a l	36.0%	54.0%	10.0%	100.0%

Training in Rural Water Supply

The responsibility for a consolidated and well coordinated training program for the entire water supply field has been given to the National Water Resources Council. The RWDC, however, is to take the lead in the rural sector and MPWH (through LWUA) is more concerned with urban water supply training.

All Government agencies involved in the provision of water supply, therefore, tend to have their own independent training programs which may be categorized in the following areas: Orientation Seminars; Professional, Technical and Scientific Development Programs; and Supervisory Development Programs. Oftentimes, agencies conduct training on a project-by-project basis in keeping with the requirements of international lending institutions that each project package have a specific amount committed to training. This project-by-project training, however, lacks the element of continuity which is essential to the very nature of training per se.

Operation and Maintenance of Rural Water Systems

As noted earlier, the MPWH currently assumes responsibility for rural water supply systems constructed under the aegis of the Project Management Office for Rural Water Supply. This maintenance is carried out by the district engineering offices under the direction of the MPWH Bureau of Maintenance in Manila. For 1985, the Bureau of Maintenance has programmed maintenance activities for the following number of installations:

Level I sources	18,554
Level II systems	1,007
Level III systems	<u>62</u>
T o t a l	19,623

For this maintenance activity, a total of P15,379,000 has been allocated in the 1985 budget, including about P248 million for operational support. In 1984, only P4,205,000 was allocated and spent, including P1.2 million for operational support, so the 1985 budget represents an increase of about 265%.

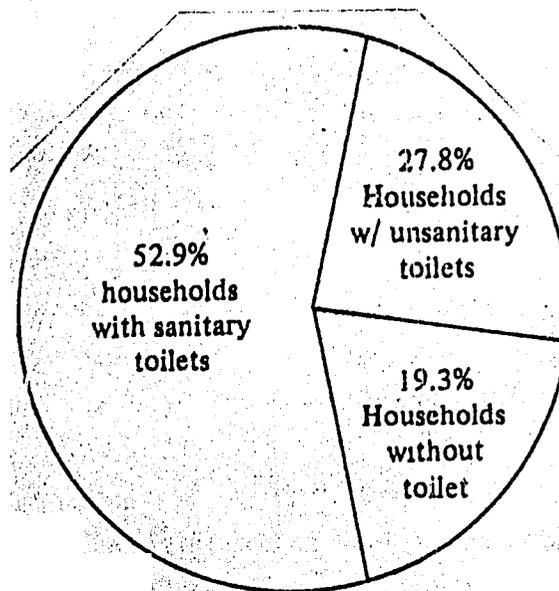
As for rural water supply systems built through the RWDC or the Barangay Water Program, operation and maintenance is, theoretically, the responsibility of the RWSA's and they are supposed to cover maintenance from the fees collected from householders. For a Level I system serving say 25 households, with a monthly charge of say P2.0 and an 80% collection rate, the amount available each year for operation and maintenance would be about P500. If the well has a hand pump and thus no power costs, this should cover new glands, pull rods, etc. It would not cover any significant repairs, though the Government does support the RWSA's in the operation and maintenance of water systems, if necessary, through technical assistance, use of workshops and equipment, plus some financial support, depending on the extent of damages to a system.

Regarding the disinfection of water supply sources, Levels I and II facilities are operated and maintained by a person from the community who receives technical guidance from MOH sanitary inspectors. Level III facilities are operated and maintained by paid part time operators. Both types of individuals receive some training in water facility operation but it is not known how effective this is for the task of chlorination when it is needed.

In the provinces visited by the team for this study, most of the Levels I, II and III systems visited were relatively new and all were operating. There was little opportunity to assess whether maintenance had, in fact, been neglected or whether a breakdown was likely. Maintenance does, however, seem to be a matter of increasing concern and note is taken of the fact that under the IBRD-supported Rural Water Supply and Sanitation Project, operation and maintenance manuals for the guidance of the RWSA's have been prepared by MPWH. Also, aside from the workshops already installed by the MPWH and the MLG, additional workshops are to be established to complete the national coverage of one workshop per province. The workshops in the provinces serve all agencies and RWSAs.

Rural Sanitation

There are various types of toilet facilities existing in the country, depending on geographical locations and the socio-economic and cultural traits of the people. Of seven million households covered by recent surveys, 10.8% use flush toilets with septic tanks, 1.4% flush toilets connected to sewerage systems, 37.8% water-sealed toilets, 2.9% sanitary privies for a total of 52.9% using sanitary toilets. Of the less desirable types, 16.6% use antipolo systems, 6.4% open pit privies, 1.1% over-hung toilets, 2.9% drop type facilities. Some 19.3% have no toilets at all.



PRESENT STATUS OF TOTAL HOUSEHOLDS IN RELATION TO TOILET FACILITIES

The current sanitation program of the Ministry of Health provides for sanitary activities in the barangays, including toilet construction and water quality control, to be worked out with the barangay captain, barangay officers, barangay health and water brigade workers, development officers, and the RWSA Sanitary Inspector in the area. Instruction manuals and flyers are handed out to the household owners. For toilet construction, some municipalities provide a revolving fund for poor families, who in turn reimburse the concerned municipality on an install-

ment basis. Others distribute toilet slabs free-of-charge to households who can not afford them. The sanitary inspectors and sanitary engineers of the Ministry of Health are to provide technical services to related government agencies on environmental sanitation activities.

In conjunction with the International Drinking Water Supply and Sanitation Decade (IDWSSD), the Ministry of Health (MOH) has accelerated the provision of sanitary toilets for households, through community participation and coordination with related agencies.

It is the Government's policy to encourage communities to construct flush toilets with septic tanks in urban areas, and water sealed toilets for rural areas, with shallow and wide pits where groundwater is high in order not to endanger the safety of groundwater sources. In areas where water is not available or difficult to obtain, sanitary pit privies are allowed. The construction of flush toilets with a septic tank or vault is encouraged for households that are financially able to do so. To further assist the process, the Government provides loans to households whose income is P4,000 to P15,000 and desire to construct septic tanks or vaults.

In theory, during the period toilets are being constructed a sanitary inspector makes routine visits to the sites. After a "Certificate of Compliance" is issued, barangay health workers and members of the RWSA board monitor facilities to ensure their proper use and maintenance. It is the responsibility of the owner to maintain individual toilet facilities but they are supposed to be periodically inspected and the owners advised as to proper maintenance.

The MOH intends to undertake demonstration waste-water treatment projects for municipal centers outside of LWUA's jurisdiction by providing wastewater collection systems and simple stabilization ponds. If this proves feasible, it will be expanded. The materials and equipment required for the construction of the wastewater treatment with stabilization ponds would be the responsibility of the Government while land costs and labor would be borne by the beneficiary communities. It is

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also the policy of the Government that households in the rural areas who can afford to construct subsoil drainage fields for their own sewage treatment are encouraged to do so, provided that there is a community water supply in the locality and the subsoil drainage will not contaminate the drinking water supply sources.

As a final note, it should be pointed out that the MOH is in the process of improving 12 Regional Sanitary Laboratories and establishing 64 Provincial Sanitary Laboratories with the financial assistance from UNICEF.

Sanitary Sewerage Systems

At present, there are only limited sewerage systems which serve portions of Metropolitan Manila, Baguio, and Zamboanga City. Moreover, sewage treatment facilities are almost nil, outside of primary treatment in the case of septic tanks, most of which are of the leaching type.

Much domestic sewage is discharged to storm drains, as there are no other means to dispose of wastewater, which eventually finds its way into rivers, streams, seas, and other bodies of water. As expected, untreated domestic sewage is one of the major causes of pollution such as water resources, soil, food sources, etc. There are at least 60 cities in the country which require full-scale sewage collection systems and treatment facilities.

As noted above, MOH plans to develop simple wastewater treatment for municipal centers (poblaciones) by providing wastewater collection systems that convey water to simple stabilization ponds for treatment. Also, LWUA has prepared pre-feasibility studies (1978-1980) for sanitary sewage systems and treatment facilities for the following cities:

- o Baguio City, Benguet
- o Cebu City, Cebu
- o Zamboanga City, Zamboanga del Sur
- o Butuan City, Agusan del Norte
- o Ozamis City, Misamis Occidental
- o Daet, Camarines Norte

Of the above sewerage facilities, Baguio's is the only project that is going ahead with construction of a sewage treatment plant, under a Japanese Government Grant (JICA) of \$6.9 million. Construction is scheduled to begin during the first quarter of 1985 and be completed by mid-1986.

Rural Sanitation Master Plan

The sanitation portion of the Rural Water Supply and Sanitation Master Plan, prepared in 1982 and referred to earlier, has the physical targets and investment requirements shown in Tables 4-13 and 4-14, respectively.

Training Programs

Current training programs are as follows:

- National Sanitarian Training Course at IPH/UPS
- Regional Sanitary Inspectors training program
- Short course training for the Project Management office staff at all level and community groups; and
- Seminars and workshops at all levels.

This seems to be a rather short list and is related more to general public health concerns rather than specific practices or operations. As the number of facilities grows the number of courses devoted to their operation will also grow.

Observations on the MPWH Role in Rural Water Supply and Sanitation

The Philippine Government has committed itself to an extensive program designed to install safe and dependable water supply and sanitary facilities within easy reach of the majority of the rural households in the shortest practicable time and in the most cost effective manner. In furtherance of these objectives, a 'Rural Water Supply and Sanitation Master Plan,' covering the period 1982-2000, was prepared in 1982. This Master Plan retains the roles for the various agencies involved in the program, that was established in an earlier Integrated Water Supply Pro-

Table 4-13
 PHYSICAL TARGETS FOR RURAL SANITATION
 (1983-1990)

<u>CLASSIFICATION</u>	<u>STAGE I</u> <u>(1983-1986)</u>	<u>STAGE II</u> <u>(1987-1990)</u>	<u>TOTAL</u>
Sanitary Toilets			
New Construction	134,900	236,100	371,000
Rehabilitation	1,246,700	2,151,600	3,398,300
Water Laboratories			
Improvement of Regional Laboratories	12	0	12
Establishment of Provincial Laboratories	54	0	64
Water Disinfection			
Deep Wells	225,400	363,600	589,000
Shallow Wells	603,000	764,000	1,367,000
Springs	39,000	108,000	147,600
Waterworks	9,871	17,400	27,271
Open Dug Wells	17,400	0	17,400
Stabilization Ponds	85	1,250	1,335

NOTE: The number of water supply facilities to be disinfected is more than the number of existing water supply systems, since most systems will be disinfected more than once.

Table 4-14
 INVESTMENT REQUIREMENT FOR RURAL SANITATION

CATEGORY	STAGE I (1983-1986)				STAGE II (1987-1990)			
	Foreign Exchange (\$ Mil.)	Nat'l Gov't (\$ Mil.)	Community (\$ Mil.)	Total (\$ Mil.)	Foreign Exchange (\$ Mil.)	Nat'l Gov't (\$ Mil.)	Community (\$ Mil.)	Total (\$ Mil.)
1. Toilet Construction	2.50	3.84	73.13	79.47		7.02	142.22	149.24
2. Water Quality								
Chemicals	0.53			0.53	0.87			0.87
Improvised Chlo-Chlorinators		0.02		0.02				
3. Stabilization Ponds	1.39		2.14	3.53	46.56		28.91	75.47
4. Support Requirements								
Personal Services		0.33		0.33		0.42		0.42
Training		4.45		4.45		6.37		6.37
Per Diems		6.14		6.14		7.68		7.68
IEC Materials		0.92		0.92		0.92		0.92
Fuel		2.30		2.30		3.86		3.86
Transportation	2.92	0.53		3.45		0.09		0.09
T O T A L	7.34	18.53	75.27	101.14	47.43	26.36	171.13	244.92

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gram 1980-2000 as shown in Table 4-15.

The MPWH PMO-RWS would appear in this table and other plan documents to have a well-defined role vis-a-vis other agencies, particularly the RWDC and the local RWSA's. (One program that is mentioned in the Master Plan but, which appears not to be adequately integrated with other agencies and programs is the Barangay Water Program) Review of the projects undertaken by the PMO-RWS, particularly those funded by the IBRD, OECF and UNICEF, indicates, however, that the MPWH may be playing a more direct role. Through the end of 1983 the MPWH PMO-RWS administered the construction of 1370 shallow wells and 1,588 deep wells as Level I sources, the rehabilitation of another 2,157 Level I sources and the construction of 225 Level II systems. These figures represent 94% of the targets set for these IBRD, OECF and UNICEF projects. Expenditures for this work totalled P56,871,000, which is about 93% of the funds programmed, indicating that the programs are close to their targets. Most of this work was actually performed by the MPWH district engineering offices; their efforts being monitored by the PMO-RWS. What is not clear from the 1983 report of the PMO-RWS is the extent to which this effort was coordinated with individual RWSA's, or whether such associations were, in fact, formed for the projects undertaken by MPWH. It is known that training is offered to existing RWSA's the officers and members of existing RWSA's by the PMO-RWS.

As in the case of construction, the MPWH through its district engineering offices appears to take a more active part in the actual maintenance of rural water supply systems than merely technical assistance and workshop support for the individual RWSA's. As noted earlier, P15.4 million has been appropriated in 1985 for the maintenance of rural water supply systems by the MPWH. On a per well basis, this is comparable to the amounts available to the RWSA's from their members dues and, therefore, is probably not sufficient for any extensive repair work. The question that arises, which cannot be answered at this time is whether a centrally programmed and directed maintenance effort, such as that of the MPWH, achieves more effective maintenance with limited funds than a locally based effort that receives some support from government agencies, including MPWH.

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Table 4-15
AGENCY RESPONSIBILITY

NATURE OF RESPONSIBILITY	AREA COVERAGE YEAR/PARTICIPATING AGENCY		CITIES/MUNICIPALITIES WITH POP OF 20,000 OR MORE						OTHER AREAS											
	1980-1985			1986-2000			1980-1985		1986-2000											
	LWUA	RWDC	MPWH	LWUA	RWDC	MPWH	RWDC	MPWH	RWDC	MPW										
PROGRAMMING	x	Coordination		x	Coordination		x	x	x	x	Some Development of RWDC Program	x	Service Development							
FINANCING	x	x	Levels I & II projects principally in rural areas	x	Grant for service development for Levels I and II in rural areas			Grant for service development for Levels I and II in rural areas	x	Grant for service - development	x	Grant for service development								
INSTITUTIONAL	x	Upon LWUA request for rural areas		x	Upon LWUA request for rural areas			x	x (interim)	x										
ENGINEERING	x		x	Service development for Levels I and II in rural areas				x	Residual	x	Principal	x	Residual	x	Principal					
CONSTRUCTION	x	40%	x	Distribution system thru RWSAs 6	x	60% Some development for Levels I and II	x	90%	x	Distribution system thru RWSAs	x	10% Some development for Level I and II	x	Distribution system thru RWSAs	x	Source development and some distribution systems	x	Distribution system thru RWSAs	x	Some development
OPERATION AND MAINTENANCE	x	Thru WDs	x	Some rural areas thru RWSAs	Tech. assistance for major repair of Levels I and II	x	Thru WDs	x	Some rural areas thru RWSAs			x	Thru RWSAs	x	Technical assistance for major repair	x		x	Technical assistance for major repair	

LEGEND:

X - Agency Itself

Source: Rural Water Supply and Sanitation Master Plan 1982-2000

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Flood Control and Drainage

The design, construction, operation and maintenance of flood control and drainage facilities comes under the jurisdiction of the Ministry of Public Works and Highways (MPWH). The design and construction of major systems is performed by a Project Management Office (PMO) which is established for a particular project, under the direction and supervision of a Project Manager. The PMO functions under the Office of the Deputy Minister for Construction and Quality Control (CQC).

After the construction of a major flood control system is completed, the system is turned over to the Flood Control and Drainage Division of the Bureau of Maintenance in the MPWH, for operation and maintenance (see Figure 3-3 for the organization chart of the Bureau).

The functions of the Flood Control and Drainage Division are to:

- (1) formulate policies and standards for the preparation, by district and regional offices of MPWH, of the annual flood control maintenance program and annual condition/inventories of flood control structures.
- (2) recommend policies and procedures to determine the annual allocation for the maintenance of flood control structures.
- (3) review field office repairs of damage to flood control structures from typhoons, etc.
- (4) conduct periodic inspection of maintenance.

Major Flood Control and Drainage Projects

Table 1-7 in the Appendix presents a nationwide list of recent and ongoing major flood control and drainage projects, including their status and source of funding. Some of these projects, still under construction, have been severely damaged by recent typhoons.

An example may be found in the Agno River Flood Control System in Region I. The Agno River begins in the Cordillera Central Mountains, crosses Benguet and Pangasinan Provinces and flows into Lingayen Gulf.

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Its main tributaries are the Benneng and Ambayan rivers.

The Agno River Flood Control project was started in 1938 with the construction of earthen dikes by the Flood Control Commission, created the same year. The present construction project started in 1972 and is approximately 75% complete. However, the system sustained severe damage from the typhoon of August 30th this year. The estimated cost to repair the dikes and other structures is approximately P51 million pesos. Before the typhoon, the estimated cost to complete the project was P300 million.

The Project Management Office is located in the field, at Rosales, Pangasinan. The office has the typical form of a PMO, with three departments:

- Engineering Services
- Administrative Services
- Finance Services

There is a total staff of 40 employees, including the Project Manager. The PMO utilizes construction equipment from the MPWH equipment yard located at Santa Barbara, 36 km away. Equipment user charges are based on hourly rates and evidently there is no minimum charge, as is the case for MPWH district engineering offices.

The construction budget for 1984 is P10.0 million and the cost of repairs (estimated at P51 million) is supposed to also be covered by this amount. Even then only 95% is utilized by the PMO, 2% is retained by the Office of Budget and Management, and 3% by the MPWH. The proposed budget for 1985 is also P10 million, which includes P5 million from Calamity Funds.

Sources of Funds for Maintenance of Flood Control Works

Maintenance funds for flood control and drainage systems come from the National Budget and are appropriated in the chapter on the Ministry of Public Works and Highways of the General Appropriations Act. In 1984, in response to a budget request of the Bureau of Maintenance, a total of P40 million was appropriated for maintenance purposes. As of the end of November, however, CDC's have been issued for only P2,395,000, an amount

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which the Bureau of Maintenance has found to be grossly inadequate.

The amount appropriated in the recently passed budget for 1985 is some P78 million. This amount is intended to cover the maintenance and operation of the following flood control and drainage structures, countrywide:

- 130 km of earth dikes in 106 locations
- 30 km of spur dikes in 189 locations
- 156 km of revetment in 420 locations
- 88 km of drainage mains in 177 locations

This excludes those flood control structures, mains and channels still under the Project Management Offices. (In addition, 260 km of drains, 6 floodgates and 9 pumping stations in Metro Manila must be operated and maintained. P10.5 million additional is budgeted for this work.)

Some 128 km of river channels and waterways, plus 2009 km of channels in Metro Manila, are also to be maintained. Money for this work is included in the appropriation for ports, lighthouses, etc. (See Chapter 3, Section 3.6)

Before 1982, the flood control and drainage systems were built by the then Ministry of Public Works, largely for the account of local governments. Only nominal amounts were appropriated for operation and maintenance in the National Budget, often for specific projects. The MPWH is aware of a need for more emphasis upon the maintenance of these systems and, starting in 1982, has inventoried the various elements to be maintained. Maintenance needs, however, are to a large degree still determined by reports from regions and observed cases of deterioration. A regular cycle of preventive maintenance, with a schedule of activities and normative values for the cost of these activities, has not yet been developed.

Earlier, this year a start was made towards such an approach when the National Economic and Development Authority (NEDA), in collaboration with MPWH, embarked on a "Resource Allocation Study for Maintenance of Infrastructure Projects" which included flood control systems (in addition

to ports and airports). Recently, however, information was received that this effort may be abandoned because of the lack of staff time and resources for the study.

Observations on MPWH Activities in Flood Control and Drainage

The design and construction of major flood control systems is undertaken by specialized Project Management Offices (PMO) in the MPWH. After construction is completed, systems are turned over to the Bureau of Maintenance, Flood Control and Drainage Division, for operation and maintenance. Maintenance work is programmed by the Bureau of Maintenance but, as is the case with other infrastructure elements, actual maintenance is done by regional and district engineering staffs.

Added to the maintenance burden is the fact that these systems, by their very nature, are subject to damage from excessive rains and high water flows. An example of this was found in Region I - the Agno River Flood Control System, which has not yet been finished but sustained heavy damage from a typhoon this past September. Maintenance allocations would not be sufficient to repair this damage and, in any event, are not available to the responsible PMO, since the project is incomplete and, therefore, has not been turned over to the Bureau of Maintenance. Construction funds must be used for repair work.

In theory, contingent emergency funds are available and, indeed in the case of the Agno River System a small amount from the Calamity Fund will be available in 1985 for repairs. It is only 10% of what's needed and procedures for obtaining other emergency funds are so complex that individual units in the MPWH, and other ministries, seldom make use of such funds. This is so, in spite of the fact that extensive rich agricultural lands are at risk until such time as essential repairs are made.

As a corollary to this, it might also be noted that the division of responsibility for drainage mains in agricultural areas is not clearly drawn between the National Irrigation Administration and the Bureau of Maintenance in MPWH. This fact, coupled with the present scarcity of

local funds for maintenance purposes has resulted in a very low level of maintenance for drainage facilities.

The study started earlier this year by NEDA on the resources needed for maintenance of flood control systems is badly needed. It should be directed towards the development of norms for routine maintenance, as well as repair of failed structures, and develop alternative approaches to the funding of an adequate maintenance program. It would be unfortunate if this study effort were abandoned because of the lack of staff time and resources.

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CHAPTER 5
INSTITUTIONAL SETTING FOR
THE MAINTENANCE OF
ELECTRIC POWER AND TELECOMMUNICATIONS FACILITIES

5.1 ORGANIZATION OF THE POWER SECTOR

The major supply of electric power in the Philippines is (96%) from National Power Corporation. It has generation and transmission facilities on the islands of Luzon, the Visayas and Mindanao. The small remaining amount is about equally divided between the electric cooperatives with self generating capability and small private or municipal franchise holders. Of the 184 utilities distributing electric power, 118 are cooperatives organized by the National Electrification Administration. The rest are privately owned, municipal or other government agency operations ranging in size from Manila Electric Co. (MERALCO) with over million customers to Mercy de Vara with 1210. The cooperatives range from Central Negros with 51,720 households connected to Cagayan de Sulu with only 278.

The National Power Corporation is a government-owned entity. The National Electrification Administration is also an agency of the federal government. Its primary function is to implement the ultimate nationwide availability of electrical service through the formation of electric cooperatives. The cooperatives in areas as yet isolated from the NPC supply, generate their own power. Even when connected to the NPC system, they are also developing supplemental renewable energy sources, primarily hydro electric plants of 10 MW capacity or less and dendro-thermal plants.

The National Electrification Commission, whose members are the NEA Board of Administrators with the Minister of Human Settlements as Chairman (who is also Chairman of the NEA) is empowered to grant, alter or amend electric franchises. It also regulates the rates of the electric cooperatives. The rates of other franchises are controlled by the Board of Energy, which is under the supervision of the Office of the President.

The National Power Corporation, in effect, establishes its own rates although its rates are subject to review by the Cabinet and the President.

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The National Power Corporation is under the jurisdiction of the Ministry of Energy; the National Electrification, under that of the Ministry of Human Settlements.

5.2 POWER GENERATION

Sources of Power

As of 1981, the latest date for which summaries on a nationwide basis were obtained, the installed generating capacity was:

NPC	4014.99 MW	or	86.1%
NEA	183.20 MW		3.9%
Others	468.00 MW		10.0%
	<hr/>		<hr/>
T o t a l	4666.19 MW		100.0%

In that year, the listed generating capacity generated a total of 19,824 gigawatt hours. Broken down by energy source, this was:

Oil fired thermal	8,893 GWh	or	44.9%
Coal fired thermal	247 GWh		1.2%
Diesel	4,165 GWh		21.0%
Hydro	3,748 GWh		18.9%
Geothermal	2,771 GWh		14.0%

1983 figures, neither for capacity nor for GWh generation were not available for NEA or "others" (small power utilities and self-generating industries). However data was available for NPC, the major power supplies. They reported an increase in capacity to 5,001 MW with generation of 18,682 GWh.

Oil based (diesel and steam)	11,514 GWh	or	61.6%
Coal/oil fired	111 GWh		0.6%
Hydro	2,964 GWh		15.9%
Geothermal	4,093 GWh		21.9%

Their long term trend in reduction of the share of energy from oil

based sources from 74.6% in 1979 to 57.5% in 1982 suffered a slight reversal in 1983 due to the prolonged draught which reduced hydro generation from its 1982 share of 21.5%. Planned additions of hydro, geothermal, coal fired and nuclear capacity in the near future will further reduce the percentage of oil based power to 50% in 1984 if there is adequate rainfall.

Responsibility of NPC and Others

NPC is a stock corporation fully owned by the government and run by a Board of Directors who are all appointed by the President. The Chairman of the Board is the Minister of Energy. Prior to 1972, its role was limited to the construction and operation of hydro-electric plants, including multi-purpose projects in which power generation is the primary use. Since that time its responsibility has been extended to include all large scale power generation projects and the construction and operation of transmission lines and substations in Luzon, Mindanao and the Visayas. At the end of 1983, NPC operated 10,298 km of transmission lines in these three grids to which 10,842 MVA of substation capacity was connected.

NEA and its electric cooperatives generate power in those areas not served by the NPC grids. They are also engaged in the development of mini hydro projects and of dendro thermal (wood fired) power plants which, depending on their location, may or may not tie into the NPC grids. NEA reported in 1983 that it had added 9 MW of mini hydro capacity and has 12.7 MW of dendro-thermal under construction for 1984 operation.

Philippine National Oil Corporation (PNOC), another fully owned government corporation attached to the Ministry of Energy is also involved in power supply through its interest in geothermal energy. Geothermal field development is also being done by Union Oil and Caltex.

Sources of NPC Income and Areas of Expense

NPC's self generated income comes from the sale of its generated energy to privately owned utilities, such as MERALCO, large industrial customers, electric cooperatives and municipal systems.

For recent years, the following table is indicative of the money flow. The figures have been rounded out to millions (M) of pesos and extracted from NPC annual reports.

	<u>1983</u>	<u>1982</u>	<u>1976</u>
Operating Revenue	P9,628.8M	P6,665.3M	P 342.0
Operating Expense	8,142.8	6,058.8	192.4
Operating Income	1,486.1	606.4	149.6
Other Income	1,634.4	755.2	18.5
Interest and Other Charges	2,501.3	1,199.7	31.3
Net Income	619.2	161.9	136.8

The values for 1976 were included to illustrate the growth of the NPC system in recent years. Obviously, this growth has not been financed solely from net income, even though actual cash position is better than indicated by net income since operating expense includes depreciation, a non-cash item. Net internal cash generation in 1983 was actually P721 M. Extensive borrowing has been necessary to finance system expansion. As of the end of 1983, long term debt totalled P36,716.4. In 1976, this was P4,437.2. Of the P8,010 M in capital outlay in 1983, 59.3% were financed from foreign borrowing. A significant portion of the increase in the peso value of long term debt from P19,796.8 in 1982 to its current value was due to devaluation of the peso from P8.54/ US \$, the average rate in 1982, to 11.11 in 1983. The sources of loans have been worldwide. The latest list available of long term debts includes US\$, French Francs, Japanese Yen, Italian Lira, Swiss Francs, Deutchmarks, Australian Dollars and other currencies. Of its loans for infrastructure development in the Philippines, Asian Development Bank has granted a larger portion (31%) to the power sector than any other. Because of NPC's major expenditures for generating equipment, off shore

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suppliers of that equipment arrange for a significant portion of NPC's necessary borrowings. The Philippine government has in the past provided sizeable government equity contributions for NPC's capital outlays (over one third in 1982) but the deteriorating financial situation in 1983 caused them to reduce their contribution materially. It amounted to only 14.3% of capital outlays in 1983.

Flow of Funds

While the NPC's total capital outlays for each year are available from the annual reports, those reports do not provide sufficient data to allocate the funds accurately between the three principal items, generating plants, transmission lines and substations. However, using a series of physical quantities and monetary values, the following tabulation shows what was achieved by the capital outlay.

		<u>1983</u>	<u>1982</u>	<u>1981</u>	<u>1980</u>	<u>1979</u>
Capital Outlay	(PM)	P8,005	P6,304	P6,623	P4,959	P5,859
Capacity Added	(MW)	677	421	87	300	1,328
Lines Added	(KM)	1,763	629	1,372	737	1,271
Substations Added	(MVA)	1,832	529	679	1,120	1,606

Since generating plants represent cumulative capital outlays over a period of years, but the capacity is only added to the system when the plant is operational, large capital outlays in one year may not be accompanied by a proportionate capacity increase. This is also true for transmission lines and substations, although the time period is shorter. A balance sheet entry for Construction Work in Progress gives a better picture of what is underway on the system, but, unfortunately, NPC only adopted the use of that line item in 1983. It was P35,110 M in 1983. This is more than four times the capital outlay in the same year, indicative of the lead-time required before investment in this sector yields a return.

Adequate funding to continue NPC's expansion plans as foreseen in the Ministry of Energy's 1982-1987 Philippine Energy Development Plan

will be extremely difficult to secure. The financial situation in 1983 caused foreign loan commitments of \$91 M to be cancelled, the undrawn balances on three loans totalling \$49 M to be cancelled and drawing against unutilized balances of nine other loans totalling \$49 M to be suspended. Additionally, government equity contributions were cut in half because of financial restraints that year.

However, NPC has improved its rate structure considerably by introducing a Foreign Exchange Rate Adjustment, a Steam Cost Adjustment and a Fuel Cost Adjustment besides increasing its base rate 10% om 1983. These moves enabled it to earn an 8.2% rate of return on its rate base in 1983, finally passing the 8% minimum received by its covenant with World Bank. This improved the net internal cash generated for capital outlay by P200 M. If sales had not been restrained by a drought, a further P420 M could have been generated.

Maintenance Management in the N.P.C.

N.P.C. has a formal maintenance schedule for their generating plants. It is prepared yearly with outages for plant overhaul arranged to permit the retention of the desired reserve capacity in addition to meeting forecast loads. This is standard utility practice. As with all utilities, the schedule can not be cast in concrete. Forced outages of other generating equipment may make it impossible to remove a unit from service without jeopardizing reserve margins or materials and parts for use during the overhaul would fail to arrive as scheduled. However, recent improvements in plant availability have permitted closer adherence to the schedule.

There is evidence to support the application of good maintenance practices in the NPC generating plants. Availability of the thermal generating stations increased from 84% in 1982 to 96% in 1984 (first nine months).

Although here the terms are often used interchangeably, the standard definition of "brownout" is the periodic and sequential disconnect-

ion of service to portions of a service area due to lack of generating capacity, whereas "blackout" is the total interruption of service to a system or segment thereof due to equipment failure. The number of gigawatt hours of energy sales (and revenue) lost to NPC in 1982 from brownouts was 156.0. In spite of drought restricted hydro plant output in 1983 (25%) only 130.3 gigawatt hours were lost during that year and, through September 1984, only 41.5. The addition of 125 MW of geothermal generation in 1983 plus 270 MW of hydro and 19 of diesel offset part of the drought induced loss of 862 gigawatt hours, but increased thermal plant availability due to an aggressive maintenance program must be credited with a contribution to the 1983 figures.

The maintenance program also contributed to the reduction of the system heat rate from 10,808 BTU per kWh in 1982 to 10,451 in 1983 and consequent savings of almost 450,000 barrels of oil.

Funding restrictions in 1983 prevented the planned rehabilitation of some of the former MERALCO units which would further improve availability and reliability.

There is also a periodic maintenance program for substations. Besides frequent visual inspection to detect items requiring corrective maintenance such as oil leaks; oil tests, relay and meter calibrations, breaker timing, bushing power factor tests, etc. are performed on a periodic basis. They maintain strict housekeeping standards in plants and substations.

Transmission lines are patrolled periodically, in addition to the patrols of particular sections often necessary to detect the cause of an outage. A climbing inspection of the lines is nominally scheduled on a yearly basis, but due to a shortage of personnel it is actually being done every two years. Right of way clearing is an ongoing project, especially in the rainy season when some species, such as bamboo can grow almost a meter a day. Cogon grass is also a problem when dry and accidentally set on fire, the rising smoke and ionized air may

cause line flashovers and, occasionally a pole fire. Chemical brush control on the rights of way has only been used in limited areas. This is due both to the cost of the herbicides and environmental constraints. Getting permission to trim or cut trees adjacent to the line which threaten service continuity is a continuing problem. NPC finds that people will only let them cut trees if they pay for them.

The funding difficulties of 1983 have prevented NPC from proceeding as rapidly as they planned with reinforcing their transmission system, both to provide alternative routings in case of loss of a line segment and to provide increased capacity. At present, the loss of one line frequently causes the loss of other lines from the subsequent overloading, a cascading effect resulting in a blackout. Recent transmission system additions, however, have improved the capability for North-South power flow with consequent increased flexibility of operation. Metro Manila represents 65% of the Luzon Grid load so all power flows in that direction.

They are now trying to develop a load shedding scheme based on transmission loading to supplement the existing one based on under frequency.

The interface with the cooperatives on substation maintenance is not well-defined. Some 69/133.8 kV substations are owned by the cooperatives, others still by NPC although NPC would like to have them transferred to the cooperatives. However, they do not wish to make the transfer until they have received payment. It is standard practice to meter at 69 kV with that eventuality in mind.

NPC does all substation relay testing and, upon request, will also do transformer testing in the cooperative-owned substations.

At present NPC has to operate the oil fired former MERALCO plants on base load. If the staff tries to operate them as peak load plants, their reliability and availability fall off severely. NPC is currently trying to arrange funding with the IBRD and ADB to allow it, to reha-

ilitate these old plants and, in the process, make them suitable for peaking operation. This will provide increased flexibility of operation and reduce oil consumption.

The current economic situation has actually caused the NPC system to show a negative load growth of 10% from 1983 to 1984. They expect growth to resume next year and are confident that with present plant additions and the continued reduction of the derating on some existing plants through their ongoing maintenance and rehabilitation programs they will be able to supply the increased load reliably.

NPC does maintain complete outage records, but not in any centralized location. A complete and ongoing analysis of these records is not performed.

Performance of contractors on transmission line construction has generally been satisfactory since NPC makes a rigorous inspection before accepting the completed work. There have been problem, however, with subsequent failures of compression splices on the conductors. This, unfortunately, cannot be detected by visual inspection once the splicing sleeve has been compressed.

NPC has its own system wide communications system. They utilize microwave, power line carrier and VHF radio for voice communication, relaying, system control and data acquisition (SCADA), and telex. They try to utilize telex for all administrative communications to keep the voice channels from overloading.

5.3 POWER DISTRIBUTION

Role of NEA and the Individual Cooperatives

We have limited our review of the power distribution system to the electric cooperatives established under the aegis of the National Electrification Administration (NEA), a public corporation established by Presidential Decree No. 269. Although each cooperative is an independently chartered corporation and NEA fosters independence of the

of the cooperatives, as the source of funds for the cooperatives' construction programs NEA has de facto control over their activities. It periodically audits the job performance of cooperative staffs and Boards of Directors in addition to financial audits. Where necessary, it recommends and monitors corrective actions and, in extreme cases, is empowered to remove and replace Boards of Directors and/or staff members.

NEA organizes the initial formation of a cooperative, utilizing for that purpose teams of representative local residents who are given extensive training by NEA before setting about promoting and publicizing electrification for their area. This is followed by the organization of District Electrification Committees in each municipality within the service area of the proposed cooperative. The chairmen of these district committees serve as interim members of the cooperative board of directors pending formal incorporation of the new cooperative.

In addition to indoctrination and training of the personnel who will establish the new cooperative, NEA provides extensive training in all phases of management and operation for the cooperative staff. It also provides engineering and operating standards, centralized purchasing and specifications for and procurement of plant construction services in the initial phases of cooperative existence. As the cooperative matures, it will continue to provide managerial and technical support upon the request of the cooperative as special needs arise.

Once established, it becomes the responsibility of the cooperative itself, not that of NEA, to serve its members/customers. All operating functions from operating and maintaining the substation through which it receives its power from NPC (or its own generating plant if has one), constructing and maintaining the distribution system through to the meter on the customer pressure must be performed by its own staff. It must also perform all the commercial functions from meter reading through billing and collection. Its management must ensure that the

staff is adequately trained and numerically sufficient to perform those essential functions and provided with the required support services and equipment to do so. In addition the management, as in any corporation must follow sound fiscal policies so that it may pay for the power it receives, meet its payroll and its amortization payments on its loans from NEA. This must all be attended to while continuing to expand its system with the ultimate goal of making electric service available to all households in its franchise area.

Sources of NEA & Cooperative Funds; Areas of Expenditure

Funding for the NEA has been by the Philippine government and loans and grants from foreign agencies. The NEA when organized was capitalized by a Philippine government appropriation of P5,000 M (million). By the end of 1983, P2,283 M had been released. This amount included minor funds from other ministries for special projects. Foreign agency funds, including Japanese reparation payments, totalling \$442 M had been committed to NEA by that time, of which letters of credit for \$378 M had been opened.

Historically, USAID has been the major source of off shore funding to the NEA with a total (including pre-1971 loans of almost \$3.5M) of about \$89.5 M. Almost matching this is the recent ADB loan of \$88 M. World Bank has provided \$60 M and the Japanese, including reparations payments, \$53 M. France, the United Kingdom, the Peoples Republic of China, West Germany and OPEC have been the other foreign lenders.

The cooperatives, in turn, have been dependent upon NEA loans for capital. For example, the six cooperatives visited had been funded by NEA as follows, through 1983.

	<u>TOTAL AMOUNT OF LOAN</u>	<u>RELEASED</u>	<u>% OF POTENTIAL CONNECTIONS ACTUALLY SERVED</u>
Pampanga II		P 29.6 M	91
Tarlac II		11.5	49
Iloilo I		35.2	40
Central Negros		117.0	54
Lanao del Norte		29.4	24
Maguindanao		32.7	10

The cooperatives can also, in theory, generate additional funds for capital investments from retained earnings. For many, extension of service to the remaining potential customers will require additional loans from NEA, as for example Iloilo I, Lanao del Norte and Maguindanao listed above.

For many cooperatives, it will become increasingly expensive to extend their lines to reach new customers. In a recent address, the Administrator of the NEA quoted the average cost of connection of a new customer as being P1,600. This is, in fact, an average cost, marginal costs are much higher. The more highly developed cooperatives have already extended service to the more populous part of their territories and extension of their lines to increasingly more thinly populated zones will be at a much higher unit cost for installation and, potentially higher costs for maintenance from increased travel time for crews. It would appear that achieving even a close approximation of the ultimate goal of making electric service available to 100% of the population can only be achieved with heavy government subsidization of the cooperatives.

The actual operating revenue picture for the six cooperatives visited is listed in Table 5-1. This data is from their final financial and statistical reports to NEA for 1983.

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Table 5-1
FINANCIAL AND PERFORMANCE DATA
 (All Values in 000's of Pesos)

<u>FINANCIAL HIGHLIGHTS</u>	<u>PAMPANGA II</u>	<u>TARLAC II</u>	<u>ILOILO I</u>	<u>CENTRAL NEGROS</u>	<u>LANAO DEL NORTE</u>	<u>MAGUINDANAO</u>	
Operating Revenue	44,306	9,612	22,110	133,779	8,258	14,321	
Cost of Power	38,175	7,612	16,273	104,275	4,745	10,430	
Operating & Maint.	1,299	543	703	4,320	469	757	
Const. Account Exp.	2,054	469	1,347	2,711	750	659	
Admin. & Gen. Exp.	1,638	667	1,140	6,525	1,206	1,076	
Total Operating Exp.	43,166	9,192	19,463	117,830	7,165	12,722	
Operating Margin	1,140	420	2,648	15,948	1,093	1,399	
Depreciations & Interest	2,054	538	1,552	13,303	1,662	1,604	
Net Operating Margin	(915)	(118)	(1,095)	2,645	(570)	(205)	
Non-Operating Revenue	116	68	295	226	109	125	
Non-Operating Expense	26	2	133	125	10	537	
Net Margin	(825)	(53)	1,257	2,746	(471)	(618)	
Number of Customers	52,192	17,358	25,667	43,476	20,454	9,526	
% Paying Minimum Bill	8.5%	15.1%	30.2%	Not Avail.	43.1%	37.3%	
<u>PERFORMANCE INDICATORS (Z)</u>							<u>NEA STANDARDS</u>
Power Cost Ratio	86.1	79.2	73.6	77.9	57.5	73.0	55-60%
Opn. & Maint. Exp. Ratio	2.9	5.6	3.2	2.5	5.7	5.3	5-8 %
Customer Exp. Ratio	4.6	3.8	6.1	2.0	9.1	4.6	3-5 %
Admin. & Gen. Exp. Ratio	3.7	6.9	5.2	4.9	14.6	7.5	10-15%
Operating Ratio	97.3	95.5	88.1	88.0	86.9	90.4	90-95%

NOTE: Financial Data may contain slight errors due to round out.

Although the NEA standard form used for the Financial and Statistical Report contains a column headed "Budget" only two of the six cooperatives posted this information. The information, where given, is only for the current month. Other information in the same section gives both current month and year to date figures.

A supporting schedule filed with the Financial and Statistical Report by one of the cooperatives is reproduced below as Table 5-2 to illustrate the type of expenses included under each heading in Table 5-1.

Flow of NEA Funds

In peso amounts, NEA funds as of the end of 1983 had been expended or committed as follows:

	<u>Expended</u>	<u>Committed</u>
Rural Electrification	P3,491 M	P 764 M
Dendro-Thermal	462	356
Mini-Hydro	369	1,381
In-House Expenditures	275	
Special Projects	44	
Others	160	
	<hr/>	<hr/>
T O T A L	P4,801 M	P2,510 M

Additional funds, not as yet expended or committed, in the amount of P3,886 M were still available to NEA from unreleased portions of the government equity and foreign loan commitments.

For the cooperative, Table 5-1 gives an overall picture of where the self-generated funds go for the sample of six organizations checked. Their basic supply of funds for construction, rather than operating and maintenance is from an NEA loan. A positive net margin means that internally generated funds can offset some of the demands upon NEA, as well as result in the repayment of NEA loans.

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Table 5-2
TARLAC II ELECTRIC COOPERATIVE, INC.
 Capas, Tarlac
SUPPORTING SCHEDULE
 December 1983

I. Schedule of Operating Revenue (Sch. A)	
Residential Sales	P 784,637.58
Commercial Sales	225,185.93
Industrial Sales	174,871.84
Public Street & Hiway Lighting	17,997.60
Sales to Public Bldg. & Other Pub. Authority	<u>27,422.36</u>
T O T A L	<u>P 1,230,115.31</u>
II. Schedule of Distribution Expense Operation (Sch. B)	
Overhead Line Expense	P 22,493.64
Station Expense	160.90
Street Lighting & Signal System Exp.	2,577.80
Meter Expense	7,589.42
Miscellaneous Distribution Expense	<u>476.40</u>
T O T A L	<u>P 33,298.16</u>
III. Schedule of Distribution Maintenance (Sch. C)	
Maintenance Supervision & Engineering	P 5,392.66
Maintenance of Station Equipment	6,375.27
Maintenance of Overhead Line	<u>35,509.95</u>
T O T A L	<u>P 47,277.88</u>
IV. Schedule of Consumer Accounts Expense (Sch. D)	
Supervision	P 6,734.96
Meter Reading Expense	21,288.65
Consumer Records & Collection Expense	<u>41,665.64</u>
T O T A L	<u>P 69,689.25</u>
V. Schedule of Administrative & General Expense (Sch. E)	
Administrative & General Salaries	P 49,446.11
Office Supplies & Expense	4,332.45
Outside Service Employed	1,000.00
Property Insurance	572.06
Injuries & Damages	10.00
Miscellaneous General Expense	31,212.62
Rent	3,050.00
Maintenance of General Plant	<u>1,760.38</u>
T O T A L	<u>P 91,383.62</u>

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While the "net operating margin" shown in Table 5-1 may be a negative value, it is not necessarily a negative cash position since it is influenced by depreciation charges, a non-cash expense item. The item listed in the table as Depreciation and Interest also includes any amortization payments on their NEA loans. Thus, a negative net operating margin is an indication that no amortization, and perhaps no interest, will be paid that year on the NEA loan.

As indicated by Table 5-1, the increasing cost of power has put the power cost ratio for all cooperative outside the range considered appropriate for fiscal soundness by NEA as late as 1980.

The obvious result is that the other ratios will be reduced in compensation. It is certainly a good management practice to reduce the customer expense ratio, as long as it is not causing reduced collection efficiency. Central Negros has done this successfully with their computerized billing system.

There can also be reductions effected by alert management in the administration and general expense ratios. Again, however, care must be exercised to guard against those which may have a negative effect upon performance, such as elimination of employee training programs.

A drop in the operating and maintenance ratio can be a sign of increased efficiency. It can also, unfortunately, be a signal that the system is being allowed to deteriorate physically and/or that the quality of service to the consumers has worsened.

Maintenance Management in Cooperatives

Maintenance, in its broader sense in electric distribution system operations, means both the prevention of deterioration to the physical plant and the expeditious restoration of service to customers when interrupted. In the latter area, although system betterment expendi-

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tures will often require additions to system capital investment, they may be considered improving maintenance by the reduction of customer exposure to service interruption, or by the reduction of the time required to restore service.

Successful maintenance management entails the conscientious and periodic performance of adequate inspections and tests and the prompt corrections of any defects or potential defects or irregular conditions encountered. It requires careful scheduling, adequate personnel training, and previous allocations of funds, manpower, equipment, tools, spare parts, and materials to ensure that the schedule can be kept and required action taken in a timely manner. Preventive rather than corrective maintenance should be the goal of the program. Senior management support is a must.

In the case of overhead systems, such as predominate in the electric cooperatives, periodic inspections of all elements of the systems on at least an annual basis must be made. For most system elements this entails only a rapid visual inspection which may be made while driving down the line.

During their daily travel through the system, construction crews and maintenance crews, properly trained and motivated, will be able to detect many conditions requiring correction. If lack of time or materials prevents immediate corrective action, a system of written reports must be utilized. Verbal reports are too often forgotten. Further, prompt action must be taken upon those reports. Failure to do so results in an apathetic attitude towards maintenance by field forces.

However, there will be many sections of the system that will not be visited by line personnel over long periods. Although the meter readers will travel the entire system every month, experience has not

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shown them to be a dependable inspection force for overhead lines. They should, however, be required to report any irregularities in meter and service installations. To ensure that a complete system wide inspection is made at least annually, and to ensure their intimate knowledge of their system, supervisors should personally conduct a visual inspection of the system every year.

The most common cause of distribution system problems, inadequate tree trimming, is readily spotted by visual inspections. So are such conditions as broken insulators, excessively sagged wires, dangerously rotten or warped cross arms, loose or missing hardware, leaning poles, slack guywires or dislodged anchors, overload lights on completely self-protected (GSP) transformers, oil leaks, broken lightning correctors or fuse mounts.

Certain system elements are not, however, adequately inspected by a "drive by". They require periodic examination by specially trained personnel. The inspection schedule may not be on an annual basis, but based on equipment manufacturers recommendations. This includes such items as reclosers and sectionalizing switches, street light timers, etc. Although residential meters need not be tested periodically, those of industrial and large commercial customers, as well as those on substations should be. Transformers, other than the CSP type should be given periodic load tests.

Pole inspection for ground line rot is a tedious, but necessary element of a complete maintenance program. Some serious cases will be detected by visual inspection, but many will go undetected, resulting in pole failure. Past experience will determine the minimum number of years after installation that a pole should be given thorough inspection at above and below the ground line with the proper tools. The period will vary with the type of wood and treatment. Of course, as a safety measure every lineman should be trained to inspect a pole visually and by sounding it with a hammer before climbing.

It is also essential to the proper maintenance of the overhead system that there be a co-existent maintenance program for all required support services. This will include vehicles, tools, and test equipment. Storerooms and yards should be adequately organized so that needed materials and parts are readily located and protected from deterioration or theft while in storage.

Specific Experience of Cooperatives

The field survey consisted of visits to six pre-selected cooperatives. These six provided a reasonably representative cross section. In terms of customer density, they ranged from 23 per kilometer of line to 300. In number of customers, from 9,500 to 113,500. One included a significant urban area, two were a mixture of small city, suburban and rural, and three were serving predominantly rural areas. Four systems incorporated varying amounts of old distribution systems taken over from former franchise holders, two had been entirely constructed by the cooperative. One had been incorporated in 1971, one in 1972, one in 1974, one in 1975, one in 1979, and one in 1981. In general, actual operation began from one to two years following.

A standard pattern was followed in each field visit.

Through NEA, the cooperative was notified of the date and intent of the visit. Upon arrival at the cooperative headquarters, the manager was shown our scope of work to further orient him in the purpose of the visit. He was then presented with a questionnaire and requested to have his staff provide the listed information. The questionnaire was designed to provide statistical data, information on policy and opinion concerning operations. It was anticipated that the rapidity with which the data could be assembled (and the lack of data in some areas) would be indicative of management effectiveness.

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While data were being collected, an inspection was made of the headquarters offices, shops and stores facilities. Substations and some district offices were also visited. Overhead line facilities were inspected while in transit from one point to another and while travelling to and from the point of entry in the province to the coop headquarters. Only one cooperative had its own generation, Central Negros. Those diesel plants were inspected. At Iloilo, the NPC power barge and transmission substation were also visited.

During the course of the inspection tours, comments of the managers and of engineers and department heads were elicited. In several instances, there was opportunity for conversation with members of the board of directors. The comments provided information not covered by the questionnaire and also served as a check on the answers by others to items in the questionnaire. In every instance, the people encountered were generous of their time and eager to talk about their cooperative and their individual part in it.

Field observation of these six cooperatives confirmed the conclusions about operating and maintenance practices contained in the NRECA "Report on the Philippine Rural Electrification Impact Survey (1981)". The NRECA survey covered seven cooperatives, two of which were included in the current survey, Lanao del Norte and Iloilo I. Except for Central Negros, with its high proportion of urban load, the two surveys covered cooperatives with a similar range of characteristics.

Specific areas where improvement in current operating and maintenance practices should result in improved service reliability, more efficient operations and a sounder financial position are discussed below. In general, the comments apply to all six cooperatives. Any exceptions are noted.

No systematic and complete record of customer outages, giving duration, number of customers or KVA of load affected and cause, was maintained. In response to our request, partial data was supplied by some cooperatives but, from the time required for compilation, it was apparent that it was necessary to search for it. Generally, an interruption to service is noted on a piece of paper somewhere, a substation log book or a work order form for example, but the information is rarely, if ever, collected and analyzed. Such an analysis is useful to both engineering and management in the wise allocation of available funds for system betterment projects and for maintenance. Conversations with an expatriate consultant to NEA, indicate that this lack of records is widespread.

From the limited information available, it appears that at least half of the service interruption to cooperative customers are due to the interruption of the supply from NPC, both scheduled and unscheduled. A major cause of the remaining 50% of the outages is tree trouble. In part, this is due to Ministry of Natural Resources, Bureau of Forestry Development regulations limiting trimming to maintaining no more than one meter clearance. Many common species, such as ipil-ipil grow that much in less than a year. Uniform maintenance of outage records by all the cooperatives could possibly supply the Federation of Elec. Coop. of the Philippines (FECOPHIL) and NEA with sufficient data to persuade the Ministry to relax these regulations. This would both improve service and reduce the frequency of tree trimming, a significant maintenance expense.

Another area where well organized outage records are helpful is in justifying the expense of installing additional protective and sectionalizing devices on the primary circuits to limit the number of customer affected by line trouble. This method of limiting the impact of outages does not appear to have been exploited as fully as possible by the cooperatives. It is common practice to fuse all

laterals off the backbone feeder, but the use of a series of coordinated protective devices in the backbone itself is not common. At times, the installation of line sectionalizing devices can be economically justified by the reduction in lost revenue caused by scheduled outages for work on the feeders.

Scheduled outages can also be reduced by the provision of hot line tools and adequate instruction in their care and use. They are admittedly expensive but, again, an economic analysis of the lost revenue which could be prevented by a reduction in scheduled outages should at least be attempted. The minimum set of tools adequate for routine tasks such as insulator, crossarm or pole replacement should be considered. Most cooperatives do have records of past scheduled outages, since it is common practice to publish notices of them.

Abnormally high system loss factors constitute a financial hazard to almost all cooperatives. The 1983 loss factors for the six cooperatives in our study were:

Pampanga II	32%
Tarlac II	29%
Iloilo I	22%
Central Negros	13%
Lanao del Norte	19%
Maguidanao	13%

The latest available national summary figures (for 1980) gives system losses of electric cooperatives by regions as follows:

Region I	25%
Region II	22%
Region III	23%
Region IV	20%
Region V	18%
Region VI	17%
Region VII	24%
Region VIII	17%
Region IX	20%
Region X	8%
Region XI	18%
Region XII	22%

and for the Philippines as a whole, 20%. The low 8% shown for Region X is suspicious, to say the least. An examination of individual system data in 1983 showed one system reporting a 5% loss and another 1%!

ADB considers a 12% loss factor to be generally reasonable. Amounts above that can be considered to be partly due to metering errors, but any considerable deviation is undoubtedly due to theft. On at least one of the cooperatives visited, Iloilo I, the Chief Engineer had computed this theoretical system loss to be 10%. An aggressive campaign to detect and correct energy theft had resulted in a system loss reduction to 18% by September 1984 from the 1983 average of 23% and the recovery of some P250,000.

Central Negros also has an aggressive anti-theft campaign which can be credited for their 1983 average 13% loss factor. They have a specially trained group for this function, the Apprehension Inspection and Detection Department, popularly known by the acronym A.I.D. (Their consumers service group is known as C.I.A. for Complaints, Information, and Action.)

Many of the cooperatives, who are still operating the old and usually rundown systems of previous private franchise holders in their service area, blame their high loss factors on excessive losses in the older plant due to inadequate conductor sizes, etc. Recent ADB loans have been made to NEA for reconstruction of these old systems to modern standards. There is no doubt that a rebuild should improve service and public safety and reduce maintenance but the Central Negros experience would seem to indicate that a rebuild is not essential to loss factor reduction; the Central Negros system still incorporates much old reconstructed aerial plant.

Reported loss factors may in some cases, be less than the actual.⁴ In one cooperative, all meters were deliberately calibrated at 102%.

Their actual load factor may thus be 2% higher than reported. In another, one large industrial customer accounted for 76% of their 1983 sales. Thus the low loss factor (13%) recorded in 1983 may conceal a significant amount of theft by their other customers.

It is strongly recommended that all cooperatives have their engineering staff compute what the system losses should be for their actual configuration and loads so they can assess the amount of revenue they are losing due to energy theft and take aggressive action to recover it. Assuming the 20% average figure given for the cooperative systems as a whole for 1980, could have been reduced to the ADB target of 12%, the increase in revenue from the additional 121 gigawatt hours billed in that year would have been quite significant. Even more so at today's rates.

For a really accurate picture of the load flows and losses throughout their systems, the cooperatives need to acquire additional metering equipment, especially for use at primary voltage levels. Permanent metering of kilowatts and kilovars should be installed on each feeder at the substation. The meters should have demand elements. Portable metering should be available to check voltage, load and power factor at selected points on the feeder at both peak and light load times. This information would permit sound decisions to be made concerning proper conductor size, capacitor and voltage regulator location and rating, etc.

Most of the cooperative meter shops have only one rotating standard and one load box. Any systematic counter theft programs will require that the common present practice of testing most meters in the shop be supplemented by a program of field testing, (now only a practice with large users) for residential and small commercial customers. That will require at least one additional rotating standard and load box, plus, of course additional personnel at each cooperative.

All new meters are generally tested before being installed. In many cooperatives, this is being done one meter at a time. Even with the limited equipment available, gang testing is feasible and time saving. The possibility of only testing a sample of the new meters should also be examined if records indicate only a very small portion of the as received tests are requiring re-calibration to be within acceptable error limits. Such limits could probably be set at 1% plus or minus, or even 2% with little danger of the meter drifting outside the legal limits of plus or minus 3%. It will probably be found that such a program may be acceptable only with certain manufacturer's meters. The records of past test experience, if available, should be analyzed as an aid to making a decision in that area.

Harbin two wire residential meters were a universal source of complaint among the six cooperatives. They reported many customer complaints about noisy meters and customer apprehension about over billing because of the rapid speed of the small disc. The meter shops complained of wear problems with the plastic gears and that the meter would either stop or seriously under register if it were turned from its normal vertical position.

Other reports have already directed attention to the effect upon crew productivity of inadequate transport. It is hardly fair to use the term poor maintenance in this connection for what would belittle the efforts of the mechanics to keep many worn out vehicles operable. To quote from the NRECA 1981 survey: "The recent ADB loan to NEA will assist in modernizing this transportation deficiency at the cooperatives". There is still much to be done. Breakdown maintenance rather than preventive maintenance is imposed by the old vehicles.

Many of the cooperatives had sizeable stocks of defective transformers, oil reclosers, meters, etc. All of them were attempting,

at least to some extent, to repair meters by cannibalizing parts, etc. Two claimed to have the capability to repair transformers. Only one, Central Negros, had a filter press and oil test capability. Both of these are essential to a transformer repair shop. This stock of defective transformers and oil circuit reclosers represents a salvageable investment. The establishment of repair facilities at a small cooperative may be impractical, but a common facility to serve three or four may be justifiable. In areas such as Region III or IV-B, commercial facilities can be perhaps be utilized.

In general, most storerooms had need of additional space and bins, racks and shelves. Materials are generally received in much larger quantities here than in the U.S. where there is ready access to distributors and it is possible to have them assume the burden of warehousing. Even outdoor storage, in some instances, was quite crowded. Aside from the lack of ease in locating and issuing materials under crowded conditions, there is also a greater possibility of damage to transformer bushings, insulators, etc.

Many reels of conductors were observed with rotten and broken chines where the cable had escaped from the reel and "bridged" to the extent that it would be a real task to rewind it on another reel. The general practice of storing reels flat on the ground, instead of an edge on checks or in racks contributes to this ultimate unnecessary use of manpower or, in severe cases, untimely relegation of material to the scrap pile.

Computerized stores records have been implemented at NEA, but among the cooperatives manual systems are the general practice and usually adequate. For a large system such as Central Negros a computerized system, which they have, is advantageous. The managers all reported that, when they needed emergency issues of stock items, they could get information through NEA as to the closest cooperative where the items were available. There did not appear to be any such

information regarding spares such as transformer bushing, oil circuit recloser parts, etc. Perhaps because these items are not stocked.

A universal complaint on the six properties visited was the high incidence of early rot in the "Tanalyze" treated poles. This was reported to have begun with poles received since 1980. The worst cases were with luan poles. Apitong poles were reported to be giving good service. Termit infestation in relatively new poles was also reported. One manager reported that he was replacing about one percent of these poles a year due to rot. This is far in excess of what should be expected for poles in service such a short time. It was even reported that poles were rotting in the store yard. An excellent report on pole selection and treatment entitled "Power Pole Survey" of 12 April 1972 should be brought to the attention of NEA. A copy is available in the AID resource library. Evidently a strong quality control program is needed here.

A structural strength of these poles may also be inadequate. Photographs of typhoon damage on the Central Negros system showed several poles broken midway between the ground line and the crossarm. Usually, when the ground is as thoroughly soaked as it is during typhoon rains, the pole will fall over or lean due to footing failure rather than breaking at midpoint. Of course, impact loading such as might be due to a tree being blown into the line can cause such failures, but the photographs revealed no such cause.

A minor item frequently observed was a street light burning in daylight because of a photo cell control failure. These controls are sealed units and not subject to field repair. With present power costs, it is suggested that an economic study be made to determine the pay back period for a replacement control. It may be rather short. Except for shortened bulb life, the fact that street lights burn both day and night does not lessen their important contribution to security.

Bill collection is a continuing problem in all the cooperatives visited. The percentage of accounts one month overdue was high on all properties. This might be improved by making the penalty for late payment more severe. Presently applied penalties are relatively minor in the current atmosphere of high interest rates.

There seemed to be more lip service to safety programs than actual practice. Safety records, in terms of man-days lost due to accidents were not available. NEA has standard forms upon which cooperatives are to report accidents or property damage, but no analysis of the data appears to be made. In one cooperative, such a form was shown as an example. It was for a 15-day lost-time accident caused by a welder getting a splash of hot metal on his eyelid. In answer to an obvious question, the answer was that the welder had not been wearing safety goggles, since only one pair of goggles are available for three welders. Less than one hour later, in the shop area, one man was seen welding - with no goggles.

Another minor item observed which is indicative of a lax attitude towards safety was the sharpening of the gaffs on climbing irons. None of those actually examined at several cooperatives were sharpened to the correct profile. No gaff gaugers, an inexpensive item, were reported to be available.

The manager of one cooperative reported that a recent FECOPHIL meeting he had heard that it was possible that USAID might finance another series of training program in the U.S. for cooperative personnel by NRECA. Obviously, the idea of an all expense paid tour to the U.S. is very attractive. However, it must be noted that the three better managed of the six cooperatives visited had managers who had been sent to NRECA in the U.S. - perhaps it is time that NRECA was requested to conduct another round of training, here in the Philippines, however rather than in the U.S.

The area of substation maintenance needs to be examined. In

general, substations did not appear well maintained. Several transformers had defective oil temperature indicators, an important device since transformer capacity is limited by temperature. Also yards were frequently full of debris and high weeds, even though the substation was manned. Although they are universally metered at 69 kV by NPC, in some cases the 69/133.2 kV transformers are owned by NPC, while others belong to the cooperatives. NPC's policy is to eventually transfer ownership of all substations to the cooperatives, but they will not do so until the cooperative pay for the transformers. The local coops furnish the staff to tend the substations. In general, the coops do not have the test equipment required to maintain the transformers and must depend on NPC. This is also true for the protective relays. Where it is impractical or uneconomical for the local coops to acquire the capability to take over maintenance, a formal agreement for periodic maintenance should be executed between these coops and NPC.

5.4 TELECOMMUNICATIONS

Organization of the Sector

Telecommunications in the Philippines come under the jurisdiction of the Ministry of Transport and Communications.

The Bureau of Telecommunications (BUTEL) reports to the Ministry of Transportation and Communications (MOTC). It is charged with the operation of all government-owned facilities for telephone, telex, telegraph and radio, including government-owned microwave links used in the above services.

The other agency of the MOTC treating with telecommunications is the National Telecommunication Commission (NTC). They adjudicate rates, control issuance of securities, assign radio frequencies and enforce the national technical standards applying to telecommunications systems.

This is principally to ensure the compatibility of the systems. For example, the on going program to standardize on a seven digit number system and digital switching.

Most telephone service is, however, provided by private firms and the sector is dominated by the Philippine Long Distance Telephone Co. (PLDT), which owns the existing trunk lines and also provides local service in Metro Manila and elsewhere.

Franchises for all privately-owned telephone systems are now issued by the Batasan. NTC regulates the rates of all systems, government and private.

Worldwide service for telephone, telegraph, telex, facsimile and data transmission is available from the major cities through the PLDT and linkages are provided to such international communications concerns at ITT, RCA, Western Cable and the Philippine Communications Satellite via the Pacific Satellite.

Many institutions, such as NPC, NEA and the Armed Forces have developed extensive private networks. This has been primarily due to the fact that existing system in the Public and Private sectors, do not provide full coverage of the country. Private institutions have also developed their own radio nets in some cases because of inadequacy or non-existence of other means of communication.

Existing Telecommunications Systems

Table 5-3, extracted from NEDA's Philippine Statistical Yearbook for 1984 lists the telecommunications facilities available in the Philippines in 1983.

The existing telephone systems are concentrated in urban areas. The brochure "Telecommunications in the Philippines" (published by MOTC in June 1984) shows that while telephone main stations were available at a rate of 3.04 per 100 population in large urban areas, the rate was only 0.18 in other areas. The national average was 0.9 per

100, only a third of the average for developing nations. Seventy-one (71%) percent of the existing telephone in the country are in the Metro Manila area and its environs. PLDT, headquartered in Manila, serves 91% of the subscribers in the nation. Besides Manila, Baguio (Region I), Bacolod and Iloilo (Region VI), Cebu (Region VII), Davao (Region XI) and Cagayan de Oro (Region X) have major telephone systems, accounting for 12% of the telephones while the remaining 17% are distributed among only 211 of the nation's 1559 municipalities. Telegraph service, however, is available to 1223 municipalities (78%).

According to MOTC sources, there are some 62 local telephone companies, seven domestic records carriers, four international records carriers, one international satellite carrier, one domestic satellite carrier and several enfranchised radio carriers for marine coastal, public fixed point-to-point voice communications and radio/television broadcast stations.

The quality of existing service, where available, was rated by the relatively small sample questioned as from poor to barely acceptable.

Other documents reviewed during this study support their opinion of the service. Existing local and toll telephone facilities are frequently overloaded and subject to high traffic congestion. Repeated dialing on local calls is common. Long Distance calls that take from hours to days to complete are reported. Traffic congestion between cities outside Metro Manila often completely blocks long distance service. Local calls frequently have a poor signal to noise ratio. When existing exchanges are modernized, the old equipment is often moved out into the fringe areas of the systems. Subscribers in those areas, thus, complain of poor service due to frequent equipment failure.

On the other hand, where it is available, international service is quite acceptable.

Table 5-3
TELECOMMUNICATIONS FACILITIES FOR PUBLIC SERVICES AND
BROADCASTING STATIONS IN THE PHILIPPINES BY REGION: 1983

Region	Total Faci- lities and Stations	Telecommunication Facilities							Broadcasting Stations ¹			
		Total	Tele- phone	Tele- graph	Telex	Point-to Point Radio- Tele- phone	Marine coastal	Special Servi- ces ²	Total	Radio	TV	TV Trans- lator
Philippines	<u>3,129</u>	<u>2,742</u>	<u>221</u>	<u>2,113</u>	<u>122</u>	<u>102</u>	<u>26</u>	<u>158</u>	<u>387</u>	<u>310</u>	<u>31</u>	<u>46</u>
Metropolitan Manila Area (National Capital Region)	296	247	20	158	39	6	17	7	49	44	5	-
Region 1	264	217	23	161	10	8	0	15	47	40	-	7
Region 2	163	148	9	122	5	5	0	7	15	14	-	1
Region 3	267	237	40	152	14	10	0	21	30	20	4	6
Region 4	399	382	41	276	7	29	0	29	17	16	-	1
Region 5	255	223	16	159	6	26	1	15	32	25	2	5
Region 6	279	243	15	197	11	4	2	14	36	30	6	-
Region 7	269	237	9	204	8	2	4	10	32	27	3	2
Region 8	230	212	10	181	6	7	0	8	18	11	2	5
Region 9	143	119	6	103	3	1	0	6	24	14	2	8
Region 10	228	190	9	162	6	4	0	9	38	31	2	5
Region 11	195	172	18	136	4	-	2	12	23	20	3	-
Region 12	141	115	5	102	3	-	0	5	26	18	2	6

¹Excludes HF (high frequency) stations.

²Includes domestic satellite stations, microwave stations and tone/voice paging systems.

³Includes AM and FM radio stations.

Source: National Telecommunications Commission.

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Planned Telephone System Expansion

The MOTC brochure referred to above provides an overall view of the Master Plan for the step by step expansion of the telecommunication system. The stated goal is to meet 80% of the demand for telephone, telex, telegraph and other telecommunication service and provide service coverage to all municipalities by the year 2000. In the course of this program it is also planned to correct the current segmentation and fragmentation of the telecommunication sector by service, technology and geography. The currently estimated demand for telephones is over 1,200,000 of which only 460,000 are now served. This demand is projected to grow to 2,100,000 by 1990. The MOTC program is reported to be based in large part upon a study prepared by A.D. Little. The study, however, has not yet been released to the public.

An initial step in the long-range plan is Phase A of the Regional Telecommunications Development Project now under construction in Regions I and II. Phase A of the project will provide services to seventeen cities in Northern Luzon. Interconnection between cities will be from a backbone microwave system with linkage to individual exchanges by VHF links and, in some cases, by cable.

This project is being constructed as a design-install project for BUTEL by Nippon Electric Co. Principal financing is by a yen loan, covering equipment including power supplies and trunk cables and the salaries of the Japanese engineers. Poles and hardware for these cables are purchased from local suppliers by the Japanese.

BUTEL is responsible for providing buildings and access roads, and is also providing the local cables and drop wires. They are using the poles of the electric cooperatives. If these poles are set on 100 meter spans, BUTEL provides short midspan poles because

their cables (and Nippon Electric's) are limited to a 50-meter span.¹

The initial, or backbone, project to be done under Phase A will extend service to subscribers within 4 km of the exchange. With a total installed capacity of 10,600 lines, they expect an actual 5,000 subscribers to be on the system when it goes into service in mid-1986. BUTEL says it uses a minimum of 20 subscribers per km to justify extending additional lines. The maximum distance for local lines from the exchange is 7 km without exceeding BUTEL's limit of an 8db. loss, unless loading coils or other devices such as repeaters are added.

PLDT will operate the system for BUTEL and, through the PLDT exchange at San Fernando, it will be tied into Manila and the PLDT system. It will be a modern system using digital switching. The exchanges consist of a 200 line basic building block expandable in multiples of 50 lines. The system is based on the 1978 study prepared by the Japanese International Cooperative Agency. Expansion of the backbone system will be dependent upon additional loans.

It was reported that there were, in the past, some plans for NEA to sponsor telephone cooperatives. It was indicated that they were abandoned because there already existed a government agency (BUTEL) charged with the task of extending telephone system coverage. MOTC sources also feel it would be undesirable to introduce additional small entities in the already overly fragmented telecommunication system.

¹MOTC reports that the two Philippine companies making telephone cables are not tooled up to make lightweight, long-span cables for rural use. They would have that potential, but only after a sizeable investment in new plant. This could only be justified if there was a large market for the product. At present it is cheaper to put in short midspan poles on the cooperative's 100-meter standard spans than to import the lightweight, long-span cables from America.

Implementation of the MOTC Master Plan upon the original schedule is now impossible. In the light of the current economic conditions the next stage may have to be postponed indefinitely, according to MOTC. As an alternative, between now and 1990, MOTC hopes to implement five small projects.

1. Add 6000 lines to the Region I/II project (Phase B) with yen financing.
2. Install a new control office in the Pasig-Cainta area to increase the lines of the old Republic Telephone Co. with those of PLDT. A DM 40-million loan is available for this.
3. Install similar new exchanges for facilities in Mandaue, Bacolod and Iloilo using a DM 32 million loan.
4. Add new exchanges and trunk lines in the areas around Metro Manila required to integrate the remaining Republic Telephone Co. system with PLDT.
5. Implement Phase I of the National Telephone Program.

No funding is yet available for Items 4 and 5.

The IBRD has agreed to let MOTC use the, as yet, unallocated portions (70% plus) of the APEX loan program for the peso portion of items 1, 2 and 3.

MOTC is requesting NEDA to move the telecommunications higher on the national priority list. They were ranked 31st last year. They hope to be able to move up to 15th or better this year but the criteria adopted by the Cabinet for ranking projects tend to work against capital-intensive projects, such as those in telecommunications. Therefore, the MOTC has opted to divide Phase I of the National Telephone Program (Item 5 above) into three steps. The first, involving 100,000 telephone lines (28% of the 380,000 included in Phase I has been directed to the IBRD for financing the estimated \$100 million foreign exchange cost.

MOTC, because of the current financial restraints, may be forced into purchasing used exchanges, which are being replaced during modernization of systems in other nations, in order to proceed with their

program. They plan to do this only if they can buy complete packages with a full complement of spare parts.

They are buying Japanese and German equipment because those are the only countries who will provide financing. They would be very happy to buy American equipment if funding were available from that source. In all cases CCITT specifications are used to avoid equipment compatibility problems.

In the private sector, PLDT has a large scale expansion program, coded X-4, under way to supply the 200,000 or more pending applications for lines in its service area. In 1983, P3,866 million were invested in its service improvement and modernization program. During the year, over 30,000 telephones were added to the system. The ongoing conversion of exchanges to electronic switching totalled 58,000 lines. A 17% increase of circuits in the national toll facilities and the growing capability of the electronic switching system increased the volume of toll traffic and revenue significantly. Completion is expected by 1990.

The MOTC Master Plan forecast of telephone demand used an economic model based on subscriber ability to pay for service expressed in terms of household income threshold level. The privately owned systems usually use the number of unfilled requests for service as a measure of demand.

CHAPTER 6

GENERAL ISSUES IN MAINTENANCE

6.1 OVERVIEW

The maintenance of capital facilities and equipment is, of course, accepted in all the industrialized countries as being essential. It's recognized that routine maintenance keeps facilities and equipment performing as close as possible to their optimum level and prolongs their life. What is called preventive maintenance is undertaken to prevent small potential failures from rapidly becoming big failures. It's readily accepted that, without maintenance, partial breakdown of a facility or piece of equipment can occur in a relatively short time and a complete breakdown will occur long before the end of its expected, useful life is reached.

In most developing countries the general desirability of maintenance is also accepted and quite often, in the private sector, facilities and machinery are regularly maintained. It's just that maintenance is generally regarded as having less importance, so that, particularly in the public sector, there is less institutional commitment to the idea of maintenance and other priorities take precedence. The fact that in the Philippines, monies intended for maintenance are often diverted to capital projects is a reflection of that attitude.

6.2 ECONOMIC CASE FOR MAINTENANCE

It's not difficult to develop a very good case for the economic value of attention to and adequate expenditures for maintenance. Savings realized from a regular maintenance program stem from the fact that it:

akes it possible to obtain the highest level of service from facility or piece of equipment for the major share of its useful life.

rolongs that useful life and postpones the time when the facility or piece of equipment must be replaced or completely rebuilt.

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Conversely, the costs of neglecting, deferring or providing inadequate maintenance will result in early deterioration of the facility or piece of equipment, resulting in a decline in the level of service provided. This decline in the level of service means the facility or equipment is not delivering the benefits anticipated at the time of investment. If this loss of benefits is significant, then the costs may exceed the benefits and the original investment will have been a waste of capital. Moreover, the expense of rebuilding or replacing the facility or equipment must be borne much sooner than anticipated. On a discounted basis, the present value of the maintenance cost is generally much less than the present value of early replacement.

A road is normally built with the expectation that, given both routine and periodic maintenance, it will provide substantial savings in vehicle operating costs and will last perhaps 35 years. Without maintenance, rutting and potholes will appear early and at certain times of the year it may become impassable. Savings in vehicle operating costs will disappear and, by the end of perhaps 7 or 8 years, the basic structure will have broken down to the point where complete reconstruction is needed. The original savings in vehicle costs would have to be phenomenally high in order to make the road an economic investment.

Maintenance expenditures have other economic advantages. Existing facilities have a developed clientele, who are already dependent upon them and, therefore, benefit immediately from maintenance expenditures. New facilities may not yet have a full clientele ready to use them so it will take several years before the full economic benefits of the facilities are realized. The present value of benefits from maintenance is therefore, considerably higher than the present value of benefits from comparable expenditures on new projects. At today's high interest rates, this becomes an important consideration.

6.3 EFFECT OF DEFERRING ADEQUATE MAINTENANCE

In addition to reducing the levels of service provided by a facility and shortening its life, the deferment of adequate maintenance measures have other untoward consequences that are not fully appreciated. One is the increase in the cost of maintenance itself. Not only is the amount of work increased but work methods and types of equipment may change.

An example is the build-up of a dredging backlog, such as the one that now exists in the Philippines. As sediments settle to the bed of the ocean they are unconsolidated and in a state of semi-suspension for quite a while. In this state they can usually be removed with a trailing suction dredge (usually of a hopper type, which itself transports the dredged materials to a disposal site), which has a relatively high productivity. Four of the PPA's six dredges are of this type. As time goes on, however, the sediments consolidate and become more of a solid mass. Eventually a point is reached at which a suction draghead doesn't have sufficient breaking power to free the sediments and a different type of dredge, most commonly a cutterhead dredge, is needed. Production rates are an order-of-magnitude lower than with a trailing suction dredge and, even though the actual volume of material is reduced by the consolidation process, dredging costs are far higher. Furthermore, PPA has no cutterhead dredge in its inventory.

In the case of a road, water is the enemy. On an unpaved road, it is necessary to maintain a well-bound surface on the road and a good crown, in order to drain water away as rapidly as possible. If this isn't done and water penetrates the structure of the road itself, the resultant softening of underlying materials, combined with the action of passing vehicles, will lead fairly rapidly to a complete breakdown of the road structure. In stretches where this occurs, the road becomes unmain-
tainable and needs to be restored before effective maintenance is possible. Once again, the cost of this restoration is far higher than the cost of routine and periodic maintenance.

Thus, deferring regular maintenance activities has the added effect

of changing the nature of the maintenance process itself. Routine activities no longer suffice and more complex and costly endeavors become necessary.

6.4 VALUE OF PERSONNEL MANAGEMENT AND HUMAN RESOURCE DEVELOPMENT

If changes in the manner in which maintenance is carried out are to be effected, perhaps nothing is so important as personnel management and what has now come to be called "human resource development". This covers a range of concerns. It's necessary to inculcate far more individual awareness of the need for maintenance. This means, among other things, continued training in the reasons for maintenance; the programming, direction and control of maintenance activities; and various maintenance techniques.

Training alone is not sufficient, however; personnel management policies must be established and carried out which provide maintenance employees at all levels with an understanding of their individual roles and ensure that they are adequately instructed each day on their tasks. They need to know what they are doing and why they are doing it. Most importantly, they must be given some pride in their position. Related to this is the need to link participation in training courses on maintenance activities) to possible advancement within the different organizations.

Changes in the present approach are needed. A senior official in the MPWH Bureau of Maintenance has noted that it is still quite normal to assign engineers with somewhat lower qualifications to maintenance work and the present pattern of promotions reflects this approach. Thus, almost all district engineers have been promoted from design and construction divisions rather than maintenance. This is in spite of the fact that the bulk of expenditures and personnel at the district level are devoted to maintenance activities. Specific information on promotion policies in provincial engineering offices has not been obtained but it is quite likely that the pattern is similar, if not even more heavily biased towards design and construction, since that is where the engineer-

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ing is done for politically attractive projects. It's not entirely facetious to suggest that perhaps the completion of a good job of resurfacing or reforming a road should be made the occasion for ribbon-cutting by prominent local figures. The idea is to enhance the prestige of maintenance personnel.

Further on the subject of personnel management it should be noted that in the industrialized countries it is assumed that the only objective of maintenance is to keep a facility operating at its peak level of performance, or at least as close to it as is reasonably possible. In the developing world, there may be other objectives, which are not necessarily compatible with the best performance of a facility. One objective is to maximize the number of people employed. Thus, hand methods of maintenance may be favored even in situations where, as one maintenance consultant has claimed, the use of equipment would result in a better job at lower cost. This is not to say that the labor intensive approach is necessarily wrong; the second objective may be equally valid, though it's not related to maintenance needs. Another objective that may favor hand methods, rather than the use of equipment is fuel conservation. The importance of this objective is obviously affected by the external price of fuel. A similar objective is the conservation of the foreign exchange required to purchase equipment and stock spare parts.

Finally, there may be other objectives which are less valid. One is the preference for a new facility or piece of equipment, rather than an existing one that is well-maintained but doesn't have all the latest devices. With respect to equipment, one way to recognize this objective, while also getting good maintenance, might be to allow MPWH regions or provincial engineers to establish a market for their used equipment after a specified number of years. Their access to new equipment, however, would be governed by the price received for the old equipment -- which price should reflect the amount of maintenance done.

Best Available Document

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6.5 TECHNOLOGICAL LEVELS FOR MAINTENANCE

The technological level needed for maintenance may be affected by the level of sophistication of the facility, but this is not necessarily so. The issue of using hand methods to maintain gravel-surfaced roads, vs. the use of equipment has already been cited. The roads are comparable but the maintenance approach may be different. In Chapter 3 the possibility of an intermediate way of maintaining gravel-surfaced roads, using an animal-drawn device, was noted but this would require a change in the size of aggregate used for surfacing. Whether hand or mechanical methods are used to screen the aggregate, costs would increase.

With paved roads the technological level for maintenance will rise. Periodic seal coating of bituminous pavement is needed (generally every five years) if the surface is to maintain its integrity and protect the sub-grade. For most provincial engineering offices, an asphalt kettle with a hand distributor is sufficient.¹ Chips, however, must then be spread by hand and distribution is very uneven. A few districts, with a high proportion of bituminous paved roads can justify the purchase of asphalt tankers with distributors, plus tail-gate mounted chip spreaders. In fact, some 30 asphalt distributors and 14 mechanical chip-spreaders have already been acquired through the IBRD-financed Fourth Highway Project.

(One prevalent assumption which the both IBRD-supported maintenance consultants have been at pains to correct is that concrete roads need little maintenance. In fact, the maintenance of shoulders and ditches is most important and joints must be resealed if the subgrade is to be protected. Furthermore, once a concrete road starts to deteriorate, it requires far more work than a bituminous road.)

In the area of water supply, more sophisticated systems would definitely imply a higher technological level and more management expertise for effective maintenance. With Level I systems using hand pumps, few

¹ A common practice right now is simply to punch a lot of holes in a drum of bituminous material and roll it down the road -- which results in poor distribution and is very wasteful. The production rate is also very low.

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parts need to be stored and in many areas local merchants might be able to stock enough parts to serve the needs of water service committees. For Level II systems, with powered pumps, pipe and fittings, a much wider range of replacement parts needs to be carried in district inventories and a pipeline for replenishment established. Once the level of poblaciones and small cities is reached, an unavoidable minimum level of technology is required, not much different from that in the industrialized countries. In the sanitary area, the Ministry of Health is considering demonstration projects with sewage collection systems and oxidation ponds for wastewater treatment. In most cases this is about the highest practical level for the present but, if land costs are high, alternative systems may be necessary, if treatment is warranted. These would have to be very carefully considered in terms of their maintainability.

6.6 IMPACT OF MAINTENANCE NEEDS UPON DESIGN AND CONSTRUCTION STANDARDS

The maintainability of a facility should be an obvious consideration in design. In general, simplicity of design, robustness of various elements and, in machinery, easy access to various parts, all help to make maintenance easier and less costly. Example of this are a minimum number of parts in a hand pump, heavier elements in a public faucet, a profile for a roadway that is sufficiently above the water table in paddy areas, together with enough depth of granular materials to prevent capillary rise, etc. Other examples will come up in any dialogue with someone charged with maintenance. Yet, as noted in Chapter 3, Section 3.2, there is within the MPWH organization relatively little contact between design and construction staffs on the one hand and maintenance staff on the other, except perhaps at the district engineering office level -- where many standard design details are already taken as given. Maintenance engineers should be given the chance to review construction drawings before new facilities are built and also to discuss standard details, etc. with designers.

One budgetary practice that has had unfortunate consequences for maintenance was the previous limit of 12% on the allowance for inflation. As discussed in Chapter 3, since recent inflation rates have been above

this level, the funds originally budgeted for a given road, water supply or power project have generally proven inadequate. Construction personnel, typically, have either reduced the scale of the project or lowered construction standards. All too often, because of political pressures to maintain the original scale of the project, the construction standards have been lowered. Evidently, contracts have been let with the recognition of both parties that the specified standards couldn't be met. In the case of a road, this may have meant an inadequate thickness for the surface course, or the use of pieces of aggregate that are too large. The result has been a road that will be more difficult to maintain and may shortly reach a point where it can't be maintained. This is now being corrected by amendments to the rules implementing PD 1594, which now allow a 30% allowance for inflation, but a number of sub-standard roads constructed in recent years must still be maintained.

6.7 OTHER CONSIDERATIONS

In addition to the foregoing discussion on the need for maintenance and some of the issues it entails, it's necessary to point out that it is not sufficient to have maintenance alone, no matter how good the program is. In a situation such as the Philippines, where maintenance is less than optimum and many facilities may start out being substandard, it's very necessary to have a program of restoration of roads and rehabilitation of water supply and irrigation systems in order to return badly deteriorated facilities to a condition in which they can be maintained. This has been recognized in recent donor programs such as the IERD-financed Rural Roads Improvement Project and National Irrigation System Improvement Projects and the ADB-financed Third Road Improvement Project, two of which devoted considerable resources to maintenance while all three had a restoration or rehabilitation element. Also, one of the more senior people in the MPWH expressed the opinion that road restoration is the class of projects that is most attractive in terms of return.

Restoration is in many ways allied to maintenance and, in the case of roads, it is difficult to establish the point at which periodic maintenance activities, such as resurfacing, may, in fact, become restoration.

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The point may be academic, since both are necessary, as long as a balance is struck that errs on the side of sufficient attention to periodic maintenance and recognizes that major reconstruction needs to be justified like any other capital project.

* * *

One final point needs to be made in this brief chapter on maintenance issues. As pointed out in Chapters 3 & 4, systems for the management of maintenance have recently been developed for national roads, provincial roads and national irrigation networks. Each of these seem to be gaining acceptance from government officials, albeit less so in the case of the system for irrigation networks which has not yet been fully tested. None of the systems are perfect and no doubt could in time be improved upon, but it would at this point be self-defeating if Terms of Reference for USAID-supported maintenance projects in these areas were to be written in a way that encouraged future consultants to develop sets of recommendations that conflict with those maintenance systems which have begun to gain acceptance. It will be far better to ensure that any programs developed will reinforce those systems as much as possible, and let improvements come over time mainly from the affected Philippine Government agencies, on the basis of their actual experience with the systems.

CHAPTER 7
DEVELOPMENT OF RECOMMENDATIONS FOR USAID

7.1 THRUST OF PAST USAID ASSISTANCE

Since 1950 the United States has provided the Republic of the Philippines with about \$850 million in Development Assistance. This has been supplemented by roughly half a billion in food assistance, mostly PL 480, and, in the last few years, the assistance program has been expanded with the addition of the Economic Support Fund, which provided \$200 million in FY 1980 through FY 1984.

In the early years, assistance was spread across a number of fields, including agriculture, transportation (highways), health and sanitation, education, public administration and industry, and there was a substantial component of administrative and technical training. Agriculture, however, was the chief beneficiary of grant programs, which covered irrigation, fertilizer supplies, and agricultural credit, and there was an early stress on agrarian reform. In the mid-1960's a program document set forth 9 objectives for USAID assistance, of which 5 were related to agriculture. Loans during this early period covered public works projects, plus some industrial development.

In the 1970's programs focused more specifically on rural poverty, in response to a Congressional mandate. These programs included improved agricultural production and marketing (under the rubric of food and nutrition), irrigation, rural roads, potable water, rural electrification, family planning and various activities intended largely to benefit small-scale, lowland rice and corn farmers. During the 1970's Development Assistance rose to an average of over \$40 million annually (from a low of about \$6 million during the 1960's), while the PL 480 program averaged about \$25 million per year. Beginning in 1980, the Economic Support Fund has been added to USAID's program for the Philippines and during the next 5 years, is slated to be the chief vehicle for U.S. bilateral assistance.

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It is evident that agriculture and rural development have maintained a relatively high priority throughout the life of the U.S. foreign assistance program in the Philippines. There have been changes in emphasis but a wholesale reorientation of the program does not seem to have occurred. Thus, the most recent CDSS draft stresses the growth of productive rural employment and recommends that the chief activities include the development of rainfed agriculture, promotion of small and medium sized rural enterprises, improvement of the capacity of local governments to plan and carry out programs and, over a long-term, reduction of labor force growth by family planning and lessened infant mortality.

7.2 THRUST OF OTHER LENDER PROGRAMS

IBRD-Assisted Projects

By far, the largest source of external concessionary loans for the Philippines has been the International Bank for Reconstruction and Development (IBRD) or World Bank. IBRD loans approved since 1964 have totalled \$4.06 billion, plus \$122 million in credits from the International Development Associations. Over half of these loans have been approved in the last five years as the World Bank has expanded the scale of its lending and the Philippines has moved to take advantage of the funds available. Between 1964 and 1979 the average value of loans approved was \$125 million annually; beginning in 1984 this pace has increased to over \$425 million annually. This increase is significantly more than the degree to which the US dollar has lost purchasing power as a result of inflation.

Table 7-1 shows the sectoral distribution of loans approved by the World Bank. A more detailed tabulation, of the sectoral distribution, and some information on geographic location is given in Table A-8 of the Appendix. It can be seen that borrowing has been relatively uniform across a number of sectors though, even in this case, agriculture (including fisheries and forestry) has received more than other productive sectors. Reflecting recent World Bank emphases, lending for energy projects (as distinct from the production and distribution of power) has increased considerably in the last few years. Also, lending for urban projects including

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Table 7-1
 SECTORAL BREAKDOWN OF IBRD LOANS

Agriculture	
Agricultural credit	\$ 76.0 M
Agriculture-sectoral projects	312.6 + 28.0 M (IDA)
Area development projects	79.0
Magat River dam & reservoir (Irrigation)	150.0
	<u>(see below)</u>
	\$ 617.6 M + 28.0 M (IDA)
Industry	
Industrial credits & mill rehab.	282.4
Small-scale industries	<u>187.0</u>
	\$ 469.4 M
Energy (New)	\$ 90.5 M
Infrastructure	
Irrigation	441.2 M + 9.5 M (IDA)
Roads	435.0
Ports	93.1
Power	213.0 + 10.0
Water supply	<u>229.7 + 16.0</u>
	\$1,412.0 M + 35.5 M (IDA)
Urban Services (New)	\$ 261.5 M
Others (Population, Health, Educ., etc.)	\$ 353.4 M + 58.7 M (IDA)
Financial Facilities (ind. Structural Adjustment Loans)	\$ 857.3 M
T O T A L 1965-1984	\$4,061.7 M + 122.2 M (IDA)

M = Million

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urban upgrading and sites and services, has taken a greater importance in the Philippines as well as elsewhere. Of the amounts that may be considered location specific (roughly \$2.3 billion) approximately 285 million or 12% have been devoted to projects in Metro Manila.

There has been a very clear pattern in World Bank lending in recent years. Apart from the Magat River project for which a loan of \$150 million was approved in 1978, the trend, since the mid-1970's, has been away from large-scale single projects and toward smaller-scale projects in which it is easier to identify the actual beneficiaries. The loan packages have become larger but the individual projects making up the packages have been smaller. Consistent with this trend there has been an emphasis on working with local government units in both rural and urban areas, as in the case of the Regional Cities Development Program and Rural Roads Improvement Program; encouraging local participation and the formation of local user units, as in the case of assistance to Communal Irrigation Systems; restoring and rehabilitating existing facilities rather than building new, as in the case of various road programs and the National Irrigation Systems Improvement Projects; and developing the institutional capability to operate and adequately maintain facilities, as in the case of the Fourth and Fifth Road Projects and the National Irrigation Systems projects.

Together with these modifications in World Bank approaches, there has been a renewed emphasis on training, particularly at the lower levels. Thus, in the program of assistance to Communal Irrigation Systems, members of the local water associations were given training on organization, system operation and financial practices. An important adjunct to this is recognition that most people must "learn by doing". Thus local capability is developed over time and the process is monitored, both to see the extent of progress but, more importantly to learn how to design future projects. Under the Rural Roads Improvement Program and the Fourth Road Project, training in the use of the new maintenance management systems was provided to provincial and MPWH district engineering staffs throughout the country. Since progress to date has been spotty, there is a need to continue training and supplement this by actual operation of the system. Once again it is recognized that institutional capability must develop over time.

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ADB-Assisted Projects

The second most important source of concessionary loans has been the Asian Development Bank (ADB). Loans to the Philippines approved by the ADB have totalled \$1.89 billion, plus 79.3 million from the soft-loan Asian Development Fund. These loans have been much more heavily concentrated in the area of infrastructure (some 64%). Of the total amount for all projects that may be considered location-specific (over \$1.4 billion), some \$239 million or 17% has been in Manila -- mostly for water supply and sanitation. This is shown in Table 7-2.

The sectors that have benefited most from ADB loans, however, are power and irrigation. The power portion, it might be noted, includes a significant amount for rural electrification.

Most of the recent projects that have received support from the ADB have also included a substantial technical assistance and training component, beyond the project preparation studies. For example, the Third Road Improvement Project has included an element for continuing the training effort for provincial engineering staffs in planning and undertaking the maintenance of provincial roads which was started under the World Bank's Rural Road Improvement Project. Lending by the ADB in what might be called the "softer" areas of population, health and education has been proportionately much less than that of the World Bank.

Other Donor Programs

A bilateral aid program in the Philippines has been undertaken by Japan through the provision of eight yen loans, administered by the Overseas Economic Cooperation Fund (OECF). Other smaller programs have been carried out with assistance from Australia (ADAB), Germany (KFW) and Denmark (DANIDA). These various bilateral programs have included infrastructure projects in rural water supply, irrigation, port improvements and, most recently, in sewerage. Also, some of these programs have included the financing of equipment for maintenance. As with most bilateral programs, selected projects may reflect the commercial interests of the countries providing the aid, but no clear pattern or emphasis has been established in the projects that have come to the attention of this study.

Table 7-2
SECTORAL BREAKDOWN OF ADB LOANS

Agriculture	
Agricultural Inputs	\$ 130.0 M
Agriculture-sectoral projects	153.5
Area development projects (Irrigation)	63.1 + 21.0 M (ADF) <u>(see below)</u>
	\$ 346.6 M + 21.0 M (ADF)
Energy	
	14.0 M
Infrastructure	
Irrigation	\$ 235.0 M + 57.3 M (ADF)
Roads	204.2
Ports	38.1 + 1.0
Power	434.3
Water supply/sanitation	245.1
Manila Int'l Airport	29.6
Phil. National Railways	24.2
	<u>\$1,210.5 M + 58.3 M (ADF)</u>
Others (Spec. Proj., Educ., etc)	
	69.7 M
Financial Institutions	
	<u>245.0 M</u>
T O T A L 1969-1984	\$1,885.8 M + 79.3 M (ADF)

M = Million

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7.3 TYPES OF USAID FUNDING AVAILABLE

Throughout much of the history of USAID programs in the Philippines, most of the grant and loan funds have come from Development Assistance. As the more traditional form of bilateral aid, Development Assistance is essentially restricted to the purchase of goods and services originating in the United States and is generally provided for specific projects -- which are defined in duration and have identifiable products. In recent years, Development Assistance has levelled off at about \$40 million per year, which means that there has been a gradual decline in real terms because of U.S. inflation.

The second source of funds, and one that will be the most important during the next five years, is the Economic Support Fund, which is linked to recent amendments to the 1974 Military Bases Agreement. The regulations governing the use of amounts under the Economic Support Fund do permit somewhat more flexibility in the manner in which they are spent and the purposes to which they are put. They may, for example, be converted to local currency if such a move is warranted to support a particular program. In the period FY 1980 through FY 1984 a total of \$200 million was obligated under the Economic Support Fund. During the next 5 years, (FY 1985 to FY 1989) a total of \$490 million should become available from this same source for a range of assistance programs.

The PL 480 Title II (Food for Peace) Program is of lesser importance. Once the Philippines begins to pull out of the present economic crisis, and certainly the hope is that it will, the program is scheduled to be phased out.

* * *

The particular funding source to be used for a given program will be a matter for USAID to decide and is not addressed here. Nevertheless, the recommendations below are made with an awareness of the source of monies and the restraints that may exist upon their use.

7.4 INFRASTRUCTURE SECTORS FOR POSSIBLE CONCENTRATION

The economic discussion of Chapter 2 has indicated that, if there is to be a continued emphasis upon the rural poor and their need for markets, jobs and services, the infrastructure sectors of perhaps greatest importance are roads, and more specifically local roads, and potable water for rural communities. Local roads are the rural dweller's links to the outside and the farmers' access to markets and inputs. Local road conditions have a direct impact upon the prices farmers receive at the farm gate for their products and the cost of agricultural inputs. The importance of potable water in rural areas is more a matter of judgment than the result of analysis. It is, however, based on the recognized linkage between freedom from debilitating waterborne diseases, on the one hand, and productivity, on the other. Also, by reducing infant mortality, good water can have the effect of lowering birth rates. Irrigation projects (and multi-purpose projects with an irrigation component) are also important to the small farmer but such projects are typically large in scale with benefits that may not be felt for a number of years. A possible exception to this may be the repair of damaged irrigation systems and flood-control works. Even if the implementation of such projects should cover a number of years, as it has with recent IBRD projects, the investment in farms, etc. is in place, so that benefits are realized soon after the projects are finished.

This is not to say that other elements of the infrastructure are not important. They are; but the linkage with the well-being of rural people is less direct. Looking at other elements of local infrastructure: electric power is more a matter of improved life style than one of economic necessity for the small farmer. Power for local, rural-based industry can be important to a town or poblacion but this need is likely to develop where there already is a concentration of infrastructure, including an electric cooperative, for which serving a new industry would be a high priority. Also, while rural water supplies are identified as having the higher priority, water supply systems for provincial-level cities and poblaciones may be important to local economies. Normally, these larger systems can be developed on a basis of full cost recovery and external loans can be covered. As discussed in Chapter 4, the Local Water Utilities Authority (LWUA) already has unused balances from external loans but

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does not have the local capital resources to match this financing. There may be a role here for programs, such as CIP or PL 480, which generate peso funds. Perhaps such funds could be used to meet the local capital needs of LWUA.

In the case of national infrastructure, both ports and roads, the resources available for their improvement and maintenance, while still not adequate¹ are, nevertheless, greater than those available for local roads, and the institutional base for undertaking such work is markedly better. In the case of national roads, furthermore, the recently approved Fifth Road Project of the IBRD includes continuing assistance to the Ministry of Public Works and Highways for the implementation of the recently developed Highway Maintenance Management System. The national road system, is largely complete and, while upgrading in response to traffic increases and continued restoration is needed, support for this effort is also included in the Fifth Road Project.

National ports may represent a special case and a possible opportunity. If it were able to avail itself of the funds it collects from port fees and charges, the Philippine Ports Authority (PPA) would have both the financial and institutional capability to operate and maintain the approximately 145 national and larger municipal ports in the country. Under normal circumstances, there would be little need for outside resources. Since, however, the PPA has access to only a portion of the funds it collects from port users, much maintenance work continues to be deferred. A possible approach could be to urge the Philippine Government to restore full financial autonomy to the PPA and, as an inducement, offer to provide assistance for a one-time effort to reduce the current backlog of dredging work in the nation's ports. Such an effort could provide a significant boost to ports such as Cebu and would probably show a high return on investment.

Regarding municipal ports, as noted in Chapter 3 many municipal ports are in a state of disrepair and few resources are available for their development or maintenance. The MPWH is pressing for a program to improve a number of muni-

¹As of the end of 1983, allocations for national roads were roughly 60% of what was needed. Inflation since that time has been only partially offset by a 21% increase in the allocated amounts. So by 1985 there may be 50% or less of what is needed.

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cipal ports but the issue of providing sufficient resources to assure their continued maintenance has not yet been seriously addressed. Given the fact that, outside of the 45 or so municipal ports for which the PPA is willing to assume responsibility, these ports as a group handle only about 3% of the total water-borne traffic and the fact that outstanding institutional issues remain to be solved, there seems to be little scope for a beneficial program of external assistance.

In summary, the infrastructure sectors in which a program of assistance might be most effectively concentrated are local roads, potable water in rural communities, flood control systems (where repairs are needed to overcome recent damage) and, to a lesser extent, various irrigation systems. In other sectors, there may be areas of opportunity, where specialized programs can fit in. They would have to be justified by unusually high economic internal rates of return, however, and would depend upon available funds.

7.5 POLICY ISSUES

Need for New Construction

The main thrust of this report has been upon the maintenance of existing facilities, since the current economic crisis and shortage of funds require that a number of desirable new construction projects be postponed. Furthermore, the poor state of maintenance for many roads, the fact that many of the country's primary water sources are not functioning and the declining efficiency of some irrigation systems, emphasize the importance of using most available funds now for the maintenance and, where necessary, restoration of existing infrastructure. A permanent program of adequate maintenance should, in fact, be put in place for all types of infrastructure, so that they continue to provide the maximum services to users.

In the long run, however, adequate maintenance of existing infrastructure alone will not satisfy the infrastructure needs of the Philippines. The population growth rate of 2.3 percent a year, the lowest current estimate, will increase the total population by 25 percent in

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10 years. New jobs must be created and a steadily expanding output will be required to provide the current, or an improved, standard of living for Filipinos.

To raise the productivity of arable land not now being used effectively, and to bring new areas into cultivation, new access roads will be required.

To provide faster and cheaper access to markets from existing farm land the upgrading of roads will be required.

To increase rice and corn yields, irrigation systems will need to be extended to areas that are not now irrigated.

To connect interior agricultural and forest lands in Luzon and Mindanao to nearby market towns or ports, the development of more farm to market or port roads will be required.

New construction projects should be evaluated on a fairly rigorous basis. Benefits may include the benefits of new private investment and primary employment induced by the project, but costs must include the cost of adequate maintenance as well as the costs of related projects, such as agricultural extension services, needed to develop those benefits -- which would be reflected in newly-generated traffic.

Even in the near term, new or improved facilities may need to be provided for various reasons. This is reflected in the 1985 MPWH budget. A large share of the proposed capital expenditures will be for restoration and rehabilitation of facilities but a significant amount is understood to be devoted to the upgrading of roads and possibly some new roads. The various rural water supply projects, of course, are entirely capital outlays -- for something that didn't exist before or else to substantially upgrade a system.

There may be various reasons for continuing to provide some new or upgraded facilities even in times of financial stringency. Political imperatives are always there. There may be valid security reasons for rapid access to new areas. Both reasons could be applicable in locations in Mindanao where substantial farming areas and populations have no reasonable access to the outside. In Sultan Kudarat, an isolated pla-

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teau with no roads other than privately-owned logging roads, yet with a substantial rural population, lies between the center of the province and its ports. There may be other areas similar to this where the need to provide access is more urgent and conceivably USAID could be asked for assistance. Assuming that a valid economic case could be established, there may be reasons for moving ahead even under present circumstances.

In the case of the electrical cooperatives, a different situation may occur. In some instances, where they have absorbed systems that had been operated under private franchises, the primary voltages are lower than the NEA standard of 13.2 kV. Often, the cooperatives have simply torn down the old systems and replaced them with new, standard construction. This is generally quicker to accomplish than the more laborious process of rehabilitating a slowly disintegrating old system. It is not clear, however, that the decision to replace has always been made on the basis of economics, rather than expediency.

It is commonly stated among the cooperatives who have high loss factors and are still operating inherited, non-standard primaries in parts of their system that this is a major contribution to the high loss factor. As stated elsewhere, there is little evidence that this statement results from a thorough engineering analysis of system losses. Such an analysis should be made prior to any decision to rebuild purely for the sake of standardizing, particularly in light of the present economic situation.

In many cases, the preferable solution may be to replace only limited sections of the old plant and install the salvaged conductors in parallel with those of the most heavily loaded sections of the remaining older system. This will reduce losses, as desired, but with less capital outlay. The least-cost solution should always be sought in distribution planning when it does not jeopardize operations.

Concept of Restoration

As noted in the preceding chapter, some roads are in such bad shape that maintenance alone cannot enable them to function adequately and full scale restoration is necessary. The same situation could apply to an irrigation system or possibly a municipal port that has become so delapidated that it

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cannot function effectively. Whether such roads or other facilities are candidates for restoration must be decided on the basis of their existing condition; the in-place investment in farming or in urban industrial and commercial activities, which depends on the facility for its own productivity; and the potential new investment in farming or in urban activity which would result from a full restoration or rehabilitation of the facility.

Restoration can be carried out under current fiscal stringency if the expected benefits are great enough and soon enough to warrant the use of funds that might otherwise be available for maintenance activities. With respect to roads, the vehicle already exists for restoration in the Rural Roads Program. This rather popular USAID-supported program should be continued, for the purposes of restoring roads when this becomes necessary but should be modified as suggested below in Section 7.6.

Decentralization versus Centralized Control

A policy issue that continues to vex planners in any government organization is the degree to which a particular function should, or can, be decentralized as opposed to centralized control.

Decentralization has become popular in recent years among various donor agencies, as they've become disillusioned about large-scale, centrally planned projects and wish to get closer to the intended beneficiaries of foreign-assisted programs. And indeed there are advantages to decentralization, since local people are more involved in the decision-making for a project and its execution, as is the case with various rural water supply programs. As a result, people are more aware of the potential benefits of a project. Less time is spent in making decisions about priority uses of local resources, local institutions and capabilities are strengthened and local officials are more motivated to get things done.

Decentralization may also have several disadvantages. At the local level there are fewer available mechanical, technical and administrative skills. Also there may be a limited availability of specialized equipment, such as graders, back hoes and others, and limited capacity to maintain and repair such equipment. Funds for both routine and unscheduled jobs will probably be in short supply and there may not be the motivation to use them for their

intended purpose. Finally, there may be little uniformity in the quality of project execution or maintenance. All of these problems have shown up recently in the Barangay Road Program, both on the maintenance and the CRBI (construction, rehabilitation, betterment and improvement) aspects.

The fact remains, however, that the central government is a long distance from the local scene, and tends to have limited awareness of local needs and priorities. Clearance through various governmental decision levels lengthens the decision-making process considerably. Centralized control tends to leave localities with little sense of responsibility for their own situation and a lack of any sense of ability to effect their condition. It may put the primary emphasis on political pressures on the central authority instead of on a local effort to create a solution.

Achieving the best balance between centralization and decentralization, so as to realize the maximum total of advantages from each, is a political and administrative art. It should be remembered that while decentralization is an appropriate goal, to decentralize responsibilities to local government levels, without ensuring that they have the resources to discharge those responsibilities, can make the process a farce.

Often some partial centralization at an intermediate level can provide the necessary resources of skills, equipment and funds and yet remain close enough to the local level to retain responsiveness to local needs and priorities, to make and execute decisions fairly rapidly, and to get some active participation by people in the local community.

Also, programs can be established with full decentralization as a specific goal, but recognizing that the development of capabilities at the local level takes time. In such programs, early realization of physical results is given a lower priority than getting people really involved in making decisions and carrying them out. The idea is to build institutional capability at the local level by having people learn through actually planning, then executing and operating specific projects. Guidance and initial resources are provided from higher levels. This is the approach currently used in the IBRD-assisted project to improve Communal Irrigation Systems by establishing water-user associations and then involving them in the execution of the work.

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Training

Training is generally accepted as a necessary part of any program. The real issue is what type of training and where.

In general, and particularly for lower-level skills, training should be close to home, use the resources that will actually be available to the trainee when he's finished training and should concentrate on the task at hand. The trainee should learn by doing and he should be able to immediately see the value of any new techniques that are imparted.

Further up the ladder of specialized technical and managerial skills, there may not be enough people qualifying for training at the local level to warrant a training program. Then a provincial, or even regional, level program may be required. For highly professional or responsible administrative jobs at the provincial or regional level, training programs in Manila, or other national training center may be necessary. They will be cheaper than similar programs overseas and, once again, local resources and local practices should form a significant part of the training materials. Overseas training, except in rare circumstances -- such as say six months actual field work with a selected U.S. county highway department -- is generally of limited usefulness. It may not be very relevant since it may focus on alien practices rather than evolving solutions to local problems, it disrupts the organization from which the trainee is taken and it is costly. If such training is for an extended period of say a year or more, an organization may pick someone it feels is expendable -- who will still be expendable when he or she returns.

One important feature of training that is often overlooked when programs are designed is that to be most effective, training and selection for training programs should be linked to advancement in an organization. Thus, except for mass training programs and certain refresher courses, someone should be picked for a training program because he or she shows promise and has already demonstrated a responsible interest. When training is successfully completed, the individual should be moved ahead on promotion list or given some other tangible benefit. USAID might press for modifications to the civil service regulations, if necessary, to allow this.

A final point to be made is that training programs supported by foreign

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donor agencies most typically are organized on a project basis. Depending upon the organizational context for a project, this may or may not help an organization as a whole in fulfilling its mission. Quite often the results are fragmented and there may be no coordination among training programs supported by various donor agencies. An alternative approach may be a set of complementary training programs, that is intended to increase the capacity of an entire organization at all levels to conceive, administer, operate and maintain a range of projects that fall within its area of responsibility.

Diversifying Employment Opportunities in Secondary Cities as well as Rural Areas

There is an interdependence among rural areas, small towns and secondary cities which requires effective functioning at each level. Growth at one level generally requires, or creates opportunities for, growth at the others. Stagnation at one level will hold back development at the others. People in the lower half, or lower two-thirds, of the income scale live within all three community levels and can benefit from job opportunities at the level in which they live.

Activities which help secondary cities, and indirectly their rural hinterlands, are local port development, industrial power expansion, urban water supply and sanitation, local highway improvements, small business assistance, and telecommunications development. Top priority has not been given to these programs at the present time, but over a longer time horizon they can be very important for growth in productivity and employment opportunities. In the near term, assistance to a number of cities is being provided through three IBRD-assisted projects -- the Regional Cities Development Project, covering 4 larger cities, the recently approved Premium Cities Project, covering 15 smaller cities, and the Small Enterprise Finance and Financial Institutions Project. Depending upon funds availability, possible USAID programs for the medium term could include assistance to small entrepreneurs through a re-established Commodity Imports Program (Participants must put up the full amount in pesos but USAID would provide the U.S. Dollar funds) and reinstating CDAP, the City Development Assistance Project, which previously provided technical assistance for the formation of City Development Staffs and City Service Centers in at least 23 cities. This program was generally considered rather suc-

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cessful and led to the development and completion of 200 or more small urban services projects by city government units.

It may be noted that certain urban projects, such as local port development, industrial power supply, urban water supply, telecommunications development, and some aspects of urban sanitation are able to charge the direct beneficiaries fees which will cover operating costs and debt service for justified levels of expansion. Only local roads, and perhaps some urban sanitary systems, must depend on a general tax revenues for part or all of their costs.

7.6 SPECIFIC PROGRAMS TO SUPPORT LOCAL ROADS, RURAL WATER SUPPLY SYSTEMS, REPAIR OF FLOOD CONTROL WORKS AND IRRIGATION SYSTEMS

If we consider the three or four infrastructure sectors in which it is desirable to concentrate and also recognize that within each there are major shortfalls in terms of the levels of service provided and the manner in which maintenance programs are planned and undertaken, we can begin to develop a set of infrastructure programs that will have an impact upon local employment and income potentials.

Local Roads

Looking first at local roads, three major levels are involved: provincial, municipal and barangay roads and separate organizations are responsible for their maintenance.

The initial paragraphs for this section concentrate on provincial roads. Because of the lack of solid information about municipal maintenance capabilities, which may be addressed by an ADB-supported consultant, little can be done right now to program support for municipal roads. As in the case of municipal ports, it is likely that institutional changes must be undertaken before significant capabilities can be developed. Later in the 1985-1989 period, based upon the results of the ADB-supported review of capabilities, USAID may decide to initiate a program of technical assistance to selected municipalities to develop their capabilities along the lines suggested by MLG.

Provincial Roads

While the focus of the present study has been upon maintenance efforts including those for maintaining provincial roads, it is also recognized that

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it is not reasonable for a program to be involved solely with this aspect of road provision. As discussed in the preceding section, if maintenance has been neglected for a long period and the basic structure of a road breaks down, it is no longer maintainable. Thus, improved maintenance practices must also be accompanied by a continuing program of road restoration. This has been recognized in the highway programs of all three major donors -- the IBRD-supported Rural Roads Improvement Program, the ADB-supported Third Road Improvement Program and the USAID-supported Rural Road Program. Of these programs the most popular with provincial engineers has been the Rural Roads Program, since it is flexible in the manner in which it is administered. As suggested earlier, it should be continued primarily as a program for road restoration, which can yield substantial quantifiable benefits. Since it is a reimbursement-type program, however, it tends to favor the more wealthy provinces, which have the resources to initiate road construction and wait for reimbursement. In order to make the program more equitable, it would be useful to introduce a revolving fund -- from which amounts could be advanced to the provinces that have fewer resources of their own. The fund could then be repaid from the reimbursement funds. One reason for the popularity of the Rural Roads Program is that provincial engineers have the option of using contracts or force account for undertaking road improvements. This feature can be retained since many provincial engineers feel that they can save money by using force account on occasion. At the cost of some flexibility, however, protection against the diversion of maintenance resources should be included in the program. One approach is that provinces not having a separate division for construction and separate construction crews would have to undertake road improvements by contract in order to qualify for reimbursement.

Turning to provincial road maintenance, it has been noted that, as in the case of national roads, a road maintenance management system has been developed and is being used within an increasing number of provinces. Training programs and technical assistance have actually been provided in 15 provinces covered by pilot and implementation programs of IBRD and ADB, as noted in Chapter 3. While the funds allocated for provincial road maintenance are clearly inadequate, amounting at present to perhaps 40-45% of what's needed, one of the features of the technical assistance received by the 15 provinces has been an illustration of how to use a performance-type of maintenance budget to get more effective maintenance from the funds that are available.

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While training programs have been conducted on a nationwide basis and all provincial engineers have been provided with copies of the manual for the provincial road maintenance management system, the full implementation program covering:

- equipment procurement
- technical assistance in executing maintenance activities
- training of personnel in planning and executing maintenance activities

should be extended to a larger number of provinces. It has been pointed out in Chapter 3 that feasibility studies for implementation have been done for another 6 provinces (Footnote on Pg 3-30). These studies outline the scope of the implementation program. External funding is needed, however, and continuation under USAID auspices could be welcomed by the Ministry of Local Government. USAID participation might be designed so that a modified program could later be extended to municipalities.

Training is an essential part of implementing the maintenance system, as discussed in Section 7.5. This should focus on the practical elements of programming, directing and executing maintenance work. Much of the time should be spent in the field. One training feature that might be added if USAID were to participate, would address the problem of a lack of models of what well-maintained gravel-surfaced roads look like. An adaptation of the "training-production brigade" system used in Africa by the IBRD might be developed. Under this system, expatriate equipment operators, working together with local operators and maintenance crews, undertake maintenance of say 100 kms of provincial roads. As the maintenance effort proceeds, the expatriate first demonstrates techniques, then has local operators and crews assume an increasing share -- so that by the end of the 100 kms both operators and crews have a good idea of techniques and desired results. Scheduling of this work could be intricate, because of the fragmented nature of provincial road systems but the problems should not be insurmountable.

Barangay Roads

As noted earlier the roads most important to rural people, the ones they see and use each day, are barangay roads. Programs for constructing, rehabilitating and improving barangay roads have existed for years and much has been

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said of their importance. Various donor programs that include provision for barangay road construction, including those of the IBRD, ADB, USAID and other bilateral donors, are continuing and barangay roads are the only locally-funded road construction program to be funded in the 1985 General Appropriations Act. Because of the manner in which road construction is programmed it is difficult to establish the actual amount of funds available under various programs for barangay roads. There is no evidence, however, that these construction, rehabilitation and improvement programs should necessarily be increased at this time.

The situation with respect to the maintenance of barangay roads is sharply different. The amounts allocated to the maintenance of barangay roads in 1985 may only be 35-40% of what is needed. Also, from 1981 until earlier this year no government agency above the level of the barangays themselves has had any clearly defined responsibility for the maintenance of barangay roads. As discussed in Chapter 3, the MPWH has now been given the responsibility of programming and supervising barangay road maintenance, though the actual work will continue to be done by the barangay brigades under the captains. The MPWH has not been able to increase its staffing, however, and there are few resources to discharge this responsibility. Only a few districts have any equipment, for example. Some suggestions have been put forth but they hardly appear commensurate with the task of ensuring that in each MPWH district, roughly 900 kms of road in 300-400 barangays are, in fact, maintained. MPWH officials recognize that a new organization, coming under the Bureau of Maintenance and operating through each district, is needed. At this time a four-fold program could be developed to ensure its effectiveness. The program could embrace:

design of the most appropriate form of organization, its levels of staffing and funding requirements.

development of a system for programming, directing and controlling the maintenance of barangay roads -- assuming that the bulk of the work would be done by the barangay brigades.

training of cadres in a select number of barangays, plus equipment operators who might move from one barangay to the next under the supervision of the district barangay road unit or the regional equipment services.

research into appropriate methods for barangay road maintenance. The need is to retain the importance of labor-intensive methods but also to use equipment, or equipment substitutes, where it is essential to maintaining quality and holding costs in line.

As a supplement of this program, items of equipment essential to its realization in a given number of districts could be procured. Suitable controls would need to be instituted to ensure that the equipment is indeed used for barangay roads.

The indications are that a program such as the one outlined above could, by organizing an area that is as yet unorganized and providing the necessary resources for a number of districts, fill a large gap in the current maintenance programs of the country.

Equipment for Local Roads

Before leaving the subject of local roads, several notes should be added on equipment needs. As noted earlier, provinces obtain equipment through several means -- not all of them satisfactory. One that has been used the past is the USAID excess property program and a number of provinces have equipment from this source in their rosters. Much of it is of uncertain age and much of it is sidelined because of a lack of spare parts -- spare parts for which provincial engineers are unable to find outlets or sources. Therefore, a small program to inspect equipment from the excess property program to determine if it is worth restoring, then the establishment of a liaison office to advise provincial engineers of where to find the spare parts for specific pieces of equipment, if the serial numbers are given, would be useful. Most of the surplus equipment in the Philippines was acquired on an "as is, where is" basis from Clark AFB or Subic Bay N B and records may still exist on the original manufacturers and spare parts sources. Cooperation may be sought from U.S. military personnel.

Spare parts are a problem for all pieces of equipment, not just items from surplus stocks, and the foreign exchange situation has made it more difficult. While equipment from Japan and elsewhere will normally will need spare parts from the same sources and cannot be helped by a USAID program, certain common items, particularly tires, are also a problem. To address this problem, the AID Commodity Import Program could be used. Provinces

would have to include the peso amounts in their provincial budgets, but USAID would provide the dollars for purchases in the U.S.

All Roads

In Section 3.2 of Chapter 3 reference is made to the major problem of overloaded vehicles, which affects all roads, including national roads. The effect of overloaded vehicles is to overstress the basic structure of a road and thus accelerate its deterioration and require a greater amount of maintenance if its integrity is to be maintained. The chief culprits have been identified as the straight three-axle, ten-wheel trucks that are the most commonly used vehicle in the Philippines for the movement of goods.

Regulations on vehicle weights and axle-loads exist, albeit they have been found to be internally inconsistent, but the main problem is that they are not effectively enforced by the appropriate authorities in the Ministry of Transportation and Communications. The National Transportation Planning Project stated in 1982 that sufficient personnel and equipment were available for a program of enforcement but that neither the will nor the administrative structure for such a program existed. This seems to be changing and, indeed, an article in the Bulletin Today for December 10, 1985 noted that the Ministry of Public Works and Highways has called attention to the severity of the problem and its impact upon maintenance budgets.

This may be an appropriate time, therefore, to establish a technical assistance project with the following components:

- review and possible modification of the current regulations on vehicle weight and axle loads.
- development of an institution framework for the enforcement of these regulations
- development of actual procedures for enforcing the regulations, including safeguards against possible subversion of enforcement measures.
- a pilot program, involving actual enforcement by responsible officials, to demonstrate proper coverage, preventing vehicles from detouring, protective measures, etc.

It may be that the technical assistance component would be supplemented by equipment procurement, if the equipment identified in 1982 is no longer serviceable or if it's inappropriate.

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Rural Water Supplies

As noted in Section 4.8 of Chapter 4, only 47% of the 32.6 million rural inhabitants of the country are now served by public water supply facilities. The majority of the rural population, some 17.5 million people must rely upon other sources of water, such as dug wells, rainwater cisterns, lakes, rivers and streams. Many of these sources are of questionable quality and the incidence of water-borne and water related diseases is still significant.

The Government of the Philippines has committed itself to an extensive program designed to bring safe and dependable water supplies and sanitary facilities within easy reach of as much of the remaining population as is practicable, in the shortest possible time and in the most cost-effective manner. To quantify the objectives of this program, a Rural Water Supply and Sanitation Master Plan for the 1982-2000 period was prepared in 1982. The Government is now implementing this Master Plan through the cooperative efforts of the Project Management Office for Rural Water Supply in MPWH and the Rural Waterworks Development Corporation of the MHS.

This Master Plan, of course, involves capital expenditures. However, because of budgetary constraints linked to the current economic stabilization program, all government agencies have had to curtail new construction programs, reflecting the non-availability of local funds -- even when foreign exchange is available through ongoing foreign-assistance programs. An example of this is the Barangay Water Program II, which originally contemplated building 600 rural water systems. As of October 1984 only 350 systems had been completed. Under the Loan Agreement, provincial governments have to make the initial investments to build the projects. After the systems are built, USAID funds are made available for partial reimbursement of the provinces' outlays. (There is also a small National Government subsidy.) A number of provinces are finding it very difficult at the present time to find the money for the initial investment. Because of the low disbursements of loan funds, to date, there is a danger that \$9 million of the Barangay Water Loan II may be deobligated.

Based largely upon the discussion in Section 7.5 regarding the desirability of continuing some capital programs, even under the present fiscal constraints if they can be justified on economic security, or even political grounds, it seems desirable to strengthen the Barangay Water Program so that

it can make a significant contribution towards achieving the targets of the Rural Water Supply and Sanitation Master Plan. This Master Plan can provide a means to demonstrate the willingness of government agencies to respond to rural needs and maintain links with people and their local organizations. In light of these considerations and discussions with staff members of agencies involved in water supply and sanitation, and observation made during field trips to various regions of the country, it is recommended:

- that the current loan for Barangay Water Program II under the MLG be restructured in order to provide a revolving fund, similar to that suggested for the Rural Roads Program, from which amounts could be advanced to the less wealthy provinces to cover their initial investments.

The budget situation has also affected the maintenance of water supply systems, when such maintenance cannot be covered by user chargers -- as appears to be the case with virtually all Level I rural water supply systems and probably many Level II systems. The impact has not been as severe as in the case of capital programs but maintenance funding is clearly inadequate. It seems to be largely a matter of the specific agencies not requesting more than they feel is likely to be approved. The result, of course, is continuing deterioration of systems already installed and a gradual loss of these systems as they fail and are not returned to operation. Therefore it is suggested that USAID may wish to undertake a program to first define the extent of rehabilitation and maintenance needs, then support the current maintenance efforts of the Rural Water and Sanitary Associations and MPWH. Such a program should be started in a particular region and then extended to other parts of the country. The initial program would include the following elements:

- survey of current and likely future needs (materials, equipment and labor) for the rehabilitation and adequate maintenance of the systems; defining the proportion of these systems that are in operating condition.
- review of the degree to which local efforts are supported by the MPWH districts and whether this is the most appropriate organizational form.
- development of a system for programming maintenance on a regular basis, scheduling repair and maintenance activities (including quick responses where needed) and establishing a pipeline for spare parts.
- provision of offshore resources (technical skills, training, materials) and operation of the system in the selected region.

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Flood Control and Drainage

The same budgetary constraints that afflict the Rural Water Supply and Sanitation Program have also affected existing flood control and drainage systems. MPWH regional and district engineering offices are most concerned about the fact that they have no funds currently available to repair the damage wrought by recent typhoons. An example of this is found in Region III, where the Agno River in September breached a main dike and flooded a large area of land. The cost of repairing this damage is estimated by the Project Management Office to be over P50 million. In the meantime, a project 75% complete is largely stalled and much rich farming land and populated areas remain at hazard because of damaged and incomplete works.

It should again be noted that, while the MPWH has inventoried the various flood control works for which it is responsible, it has not yet established a regular program of routine and periodic maintenance for these works, plus a contingency program for extraordinary repairs.

An area for fruitful USAID assistance, therefore, would be to assist the Philippine Government in the repair and rehabilitation of selected flood control and drainage facilities throughout the country. Since the work to be done is partial and the lands at risk are highly productive bottom lands in most cases, the returns on such a program are likely to be quite high. However, since the cost of repairs at any given project is also likely to be quite high, it will be necessary to undertake an economic study to evaluate the various candidate projects to establish overall costs and a priority ranking before a final commitment is made.

The second portion of this study should be devoted to the development of a system for the programming, direction and control of routine and periodic maintenance work. This part of the study could start by taking over the resource allocation study for flood control projects that was started by NEDA but has since been ended for lack of staff time. The recommended program would therefore include:

economic evaluation of works required and benefits to be realized from repair of flood control works around the country.

selection of a certain number of damaged flood control projects and the provision of funds, materials, etc. for their repair.

establishment of the resources required for an adequate program

of maintenance for flood control works, including contingency amounts for extraordinary repairs.

development of a system for the management of regular maintenance programs, including the programming of funds, direction of the work and monitoring the results.

undertaking of a training program in the operation of the maintenance management system.

Irrigation Sector

As discussed in Section 4.6 of Chapter 4, the National Irrigation Authority (NIA) through its regional irrigation offices, is currently spending only a fraction of what it should on the operation and maintenance of irrigation systems. The NIA is fully aware of this deficiency, but maintains that, with the prices farmers currently receive for their products, fees cannot be raised sufficiently to meet the cost of a full maintenance program. If it were to do so, the NIA believes that its current collection rate of only 60% would decline even further.

An operations and maintenance study, has been undertaken in recent years, however, with assistance from the IBRD. In the now completed Phase II of that study, operating and maintenance procedures were developed for one NIA irrigation system with the idea that they would be generally applicable to all systems. It is expected that, by next March, twelve systems will be selected, which will form the basis for a loan request to actually carry out the proposed operations and maintenance procedures and review their impact. It may be a part of this effort to try to optimize the amount of maintenance that can actually be carried out with what are deemed to be affordable water fees.

It may be noted that these 12 systems represent less than 10% of the total number of irrigation systems operated by the NIA, so the impact of the proposed procedures for operation and maintenance will be rather limited for the foreseeable future. The funding by USAID of additional systems could, of course, broaden that impact -- provided that its participation is coordinated with that of the IBRD so that common lessons can be drawn and the effectiveness of the proposed operating and maintenance procedures enhanced. The recommendation is therefore made that USAID consider funding the implementation of the recently-developed operating and maintenance procedures in a selected number of irrigation systems. Elements of the program would include:

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review of the operating and maintenance procedures developed by an IBRD-supported consultant and adaptation of these procedures to one or more specific systems.

provision of the necessary resources (technical skills, training and materials) and actual operation of the maintenance system on one or more specific systems.

evaluation of the performance of the system, particularly with respect to optimizing the level of maintenance achieved with limited funds, and development of modifications in light of operating experience.

Gasifi

Before leaving the subject of irrigation systems it might be useful to mention the present USAID-funded gasifier program, which is preceeding under the auspices of the Farm Systems Development Corporation. The gasifier units are intended as power sources for agricultural irrigation. However, as discussed in Section 4.7 of Chapter 4, this program has been experiencing problems related to the design, operation and maintenance of the units. Therefore, it is recommended that USAID proceed with its intended, short-term study to look into the technical, economic and institutional aspects of the gasifier program and to review the viability of these units in light of recent experience on costs and performance. This study should also consider other gasifier technologies presently available.

S u m m a r y

Specific programs which might be suitable vehicles for USAID's support of various infrastructure sectors in the Philippines may be summarized as follows:

Local Roads

Continuation of the Rural Roads Program as a program for road restoration, but with the addition of a revolving fund to assist poor provinces with the initial investment.

Extension of the recently-developed maintenance management system for provincial roads to up to 6 additional provinces. This program would include technical assistance, training and equipment procurement, and it might later be extended to certain municipalities.

Development of the institutional framework and a suitable management system for maintaining barangay roads, together with training for cadres and research into methods.

- Establishment of a liaison office to assist provincial engineers in locating spare parts for equipment obtained from excess property sources and the use of CIP as a means to provide spare parts that are not specific to brands of equipment originating outside the U.S.

All Roads

- Technical assistance for the review of present vehicle weight and axle-loading regulations and the development of the institutions and procedures needed to properly enforce these regulations.

Rural Water Supply

- Strengthening of the Barangay Water Program, so it can continue to contribute to achieving the Rural Water Supply Master Plan goals, by establishing a revolving fund to assist provinces in the initial investment required.
- Supporting rehabilitation and maintenance of rural water supply facilities through technical assistance to develop a maintenance system, plus training programs and commodity assistance.

Flood Control Works

- Determination of which flood control systems can most profitably be repaired, followed by the provision of financial assistance for their repair.
- Technical assistance for the development of a management system for programming, directing and monitoring routine and periodic maintenance, plus extraordinary repairs of flood control works.

Irrigation

- Expansion of the number of systems that may be included in the implementation and evaluation of a new but untested system for the operation and maintenance of national irrigation systems. Implementation would include technical assistance, training and possible commodities.

Possible programs in other sectors are discussed in Section 7.4 of this chapter. Programs in these other sectors, however, are considered to have a lesser impact upon the poorer populations of rural areas than the ones identified above.

NATIONAL IRRIGATION ADMINISTRATION

Table A-1
 LOCALLY FUNDED NATIONAL IRRIGATION SYSTEM PROJECTS
 UNDERWAY IN 1984

NAME OF PROJECT AND LOCATION	Irrigable Area (Ha.)	1983 Updated Est. Cost (P Mil.)	IMPLEMENTATION SCHEDULE	
			Date Started	Date of Completion
REGION I				
1. Agno Clear Water Dev. Proj., Pangasinan	(5,442)	20,265	Apr 1981	Dec 1985
2. Lower Agno River Irrig. Project, Pangasinan	8,000	46,500	Jan 1974	Dec 1985
3. Ambayoan-Dipolo Ext'n Project, Pangasinan	1,140	7,295	Dec 1978	Dec 1984
REGION II				
1. Mallig River Irrig. Proj., Isabela	2,493	25,173	Jan 1976	Dec 1984
2. San Pablo-Cabagan Irrig. Project, Isabela	2,890	32,000	Mar 1979	Dec 1984
3. Pinacanauan River Irrig. Project, Cagayan	1,500	15,195	Jun 1978	Dec 1983
REGION III				
1. Bayto River Irrig. Proj., Zambales	1,600	19,200	May 1981	Dec 1986
2. Bucao River Irrig. Proj., Zambales	2,000	24,300	Mar 1979	Dec 1985
3. San Antonio Ext'n Project, Nueva Ecija	3,308	25,000	Apr 1981	Dec 1986
REGION IV				
1. Amnay River Irrig. Proj., Occ. Mindoro	6,000	68,000	Jul 1976	Dec 1985
2. Lumintao River Irrig. Proj., Occ. Mindoro	3,300	65,500	Apr 1977	Dec 1985
REGION XII				
1. Kabacan (Pag.) Ext'n Proj., Maguindanao	3,500	10,100	Mar 1974	Dec 1984
2. Rungnan River Irrig. Proj., Lanao del Sur	4,300	25,810	Jul 1974	Dec 1984

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Table A-2
FOREIGN ASSISTED NATIONAL IRRIGATION SYSTEM PROJECTS
UNDERWAY IN 1984

<u>NAME OF PROJECT AND LOCATION</u>	<u>Irrigable Area (Ha.)</u>	<u>1983</u>		<u>IMPLEMENTATION SCHEDULE</u>	
		<u>Updated Est. Cost (P Mil.)</u>	<u>Foreign Loan (\$ Mil.)</u>	<u>Date Started</u>	<u>Date of Completion</u>
I. WORLD BANK-ASSISTED PROJECTS					
A. ON-GOING					
1. Chico River Irrig. Project/1227- PH, Cagayan & Kalinga Apayao	19,700	P 548,000	\$ 34,162	Mar 1976	Jun 1984
2. Magat River Multi- purpose Proj. (Dam Aspect) 1567-PH, Isabela	NA	3,339,129	150,000	Jun 1975	Jun 1984
3. Magat River Multi- purpose Proj. (Magat III)/1639- PH, Isabela	26,529	559,819	31,000	Mar 1978	Dec 1984
4. Watershed Mgt. & Er. Control Proj./1890-PH, Mt. Prov. Auro- ra, NE & NV	34,244	349,413	38,000	Jul 1980	Dec 1986
5. Phil. Medium Scale Irrig. Proj./1809-PH, Mindoro & Palawan	41,480	1,165,750	71,000	Jan 1979	Dec 1987
II. ASIAN DEVELOPMENT BANK-ASSISTED PROJECTS					
A. ON-GOING					
1. Second Laguna de Bay Dev't Proj./466-PHI, Laguna and Cavite	15,230	381,000	27,500	Aug 1980	Jun 1985
2. Naga Calabanga Irrig. Proj./ 417-PHI, Cama- rines Sur	17,310	400,425	28,320	Oct 1979	Dec 1985
3. Second Agusan Irrig. Proj./ 362-PHI, Agusan del Norte & Sur	6,200	223,080	12,696	Jan 1979	Dec 1985

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(Table A-2 cont'd.)

NAME OF PROJECT AND LOCATION	Irrigable Area	Updated Est. Cost	Foreign Loan	IMPLEMENTATION SCHEDULE	
				Date Started	Date of Completion
4. Bukidnon Irrig. Proj./406-PHI, Bukidnon	(Ha.) 12,000	(P Mil.) P 248,406	(\$ Mil.) \$ 12,800	Oct 1979	Dec 1986
5. Allah River Irrig. Proj./341-PHI, S. Cotabato & S.. Kudarat	18,812	529,605	19,500	Jun 1978	Dec 1985
6. Second Davao Irrig. Proj./285-PHI, Davao del Norte	15,737	359,441	14,010	Apr 1977	Dec 1984
7. Third Davao Irrig. Proj./580-PHI, Davao del Norte	9,000	472,211	18,603	Apr 1983	Dec 1987
8. Tago River Irrig. Proj./305-PHI, Surigao del Sur	14,500	424,553	22,000	Jul 1977	Dec 1985

III. OVERSEAS ECONOMIC COOPERATION FUND (JAPAN)-ASSISTED PROJECTS

A. ON-GOING

1. Palsiguan River Mul- tipurpose Proj./ PH-P32 & PH-P45, Ilocos Norte	10,793	491,666	28,279	Apr 1979	Dec 1986
2. Cagayan Integrated Area Dev't. Proj./ PH-P14, Cagayan	14,000	355,774	17,767	Apr 1977	Dec 1984
3. Bohol Irrig. Proj. (Stage I), Bohol	4,960	316,813	4,600	Jan 1983	Apr 1989

IV. U.S. AGENCY FOR INTERNATIONAL DEVELOPMENT-ASSISTED PROJECTS

A. ON-GOING

1. Rinconada/Buhi- Lalo Proj./492-T- 056 A & B, Cama- rines Sur	3,168	78,413	5,000	Jul 1979	Dec 1984
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B. COMPLETED IN 1983 - NONE

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Table A-3
FEASIBILITY STUDIES

<u>Name of Project</u>	<u>Location</u>	<u>Service Area (Ha)</u>	<u>Estimated Const. Cost</u>	<u>Status</u>
A. FOREIGN-ASSISTED PROJECTS				
1. Balintingon Reservoir Project	Nueva Ecija	21,800	P1,471 M (Oct. 1983 price level)	Study completed early 1984. (Italian Grant)
2. Matuno River Multipurpose Project	Nueva Vizcaya	17,000	\$ 53.6 M Stage I \$347.0 M Stage II (May 1983 price level)	Report completed 1984 (JICA)
3. Mabini Agricultural Development Project	Pangasinan	11,500	P1,104 M (1981 price level)	Revised report submitted August 1983.
4. Asue Integrated Agricultural Development Proj.	Iloilo	5,000	-	Study by JICA Team. Should be complete.
5. Ilocos Sur Transbasin Proj.	Abra, Ilocos Sur	10,000	-	Study nearing completion (Italian Grant)
6. Casecnan Transbasin Diversion Project	Nueva Ecija, Pangasinan, Tarlac	92,300	P7,604.2 M (1982 price level)	Study completed 1983. (World Bank)
7. Gumain Reservoir Proj.	Pampanga	16,200	-	Study by JICA Team nearing completion.
8. Operation and Maintenance Study of 18 National Irrigation Systems	12 Provinces	37,125	P594.6 M (Mid 1983 price level)	Study report by JICA Team completed 1984.
9. Operation and Maintenance Study of Angat-Maasim River Irrigation Systems and Upper Pampanga River Integrated Irrigation Systems	Bulacan, Nueva Ecija	147,165	P1,432 M (Aug 1983 price level)	Study by JICA Team completed.
10. Magat Watershed Feasibility Study	Isabela	414,000	-	Study with financial assistance from World Bank is underway.
11. Environmental Studies	-	-	-	Training of personnel on-going (Australian Grant)

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(Table A-3 cont'd.)

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<u>Name of Project</u>	<u>Location</u>	<u>Service Area (Ha)</u>	<u>Estimated Const. Cost</u>	<u>Status (Dec. 1983)</u>
B. LOCALLY FUNDED PROJECTS				
1. Binalbagan RIP	Negros Occ.	7,500	P100.0 M	Recon. Invest. completed.
2. Hilabangan RIP	Negros Occ.	3,890	P 52.6 M	-do-
3. Malbug-Nabuyan RIP	Masbate	1,160	P 20.2 M	-do-
4. Malitbogay IP	Leyte del Norte	1,015	P 12.0 M	-do-
5. San Francisco RIP	Albay	1,755	P 24.0 M	-do-
6. Tanjay RIP	Negros Oriental	2,185	P 29.4 M	-do-
7. Virac-Calolbon IP	Catanduanes	1,270	P123.0 M	-do-
8. Buyaan RIP	Surigao del Sur	2,000	-	Recon. invest. underway.
9. Ipayo RIP	Antique	1,200	-	-do-
10. Paliwan RIP	Antique	1,500	-	-do-
11. SWIM Projects				
a. Tagum-Angas	Marinduque	535	P 16.6 M	Feasibility study complete
b. Alapasco	Iloilo	680	P 11.9 M	-do-
c. Tugas	Bohol	250	P 18.76 M	Eng. design completed.
d. Bocacao	Zamboanga del Sur	470	-	Eng. design underway.
e. Ilaya	Bohol	250	-	Feasibility study underway
12. Surface and Ground-water Investigation and Monitoring				
Nationwide				Continuing
13. NWRC Groundwater Resistivity Study (Data Collection)				
Catanduanes, Masbate, Romblon, Marinduque				

FARM SYSTEMS DEVELOPMENT CORPORATION

Table A-5

FARM SYSTEMS DEVELOPMENT CORPORATION
BALANCE SHEET
 December 31, 1983

ASSETS		LIABILITIES AND GOVERNMENT EQUITY	
CURRENT ASSETS		CURRENT LIABILITIES	
Cash	P 28,088,447.00	Payables	P 66,771,717.00
Receivables	49,212,550.00	Trust Liabilities	31,314,687.00
Inventories	17,143,751.00	Depository Liabilities	109,472.00
TOTAL CURRENT ASSETS	P 94,444,748.00	TOTAL CURRENT LIABILITIES	P 98,195,876.00
OTHER ASSETS		OTHER LIABILITIES	
Miscellaneous Assets & Deferred Charges	P 133,489,200.00	Miscellaneous Liabilities & Deferred Credits	P 571,755.00
Contingent Assets	400,185.00	Contingent Liabilities	41,737.00
TOTAL OTHER ASSETS	P 133,889,385.00	TOTAL OTHER LIABILITIES	P 613,492.00
INVESTMENT AND FIXED ASSETS		LONG-TERM LIABILITIES	
Investments	P 285,786,288.00	Public Debts	P 208,475,022.00
Fixed Assets (Net)	67,885,801.00	GOVERNMENT EQUITY	
TOTAL INVESTMENTS AND FIXED ASSETS	P 353,672,089.00	Authorized Capital Stock (8,000,000 shares, no par value)	P 255,565,000.00
TOTAL ASSETS	P 582,006,222.00	Capital Stock Paid	702,032.00
		Donated Surplus	84,669.00
		Contingent Surplus	18,370,131.00
		Retained Earnings	274,721,832.00
		TOTAL EQUITY	P 274,721,832.00
		TOTAL LIABILITIES AND GOVERNMENT EQUITY	P 582,006,222.00

FARM SYSTEMS DEVELOPMENT CORPORATION
STATEMENT OF INCOME AND EXPENSES
 For the Year Ended December 31, 1983

INCOME	P 30,356,524.00
EXPENSES:	
Personal Services	P 10,494,110.00
Travelling Expenses	644,618.00
Repairs and Maintenance	727,572.00
Depreciation/Amortization of Deferred Charges	6,094,432.00
Freight and Shipping Cost	54,340.00
Supplies and Materials	499,086.00
Rentals and Utilities	2,615,933.00
Other Services	8,486,055.00
TOTAL EXPENSES	P 29,616,146.00
NET INCOME	P 740,378.00

MINISTRY OF PUBLIC WORKS AND HIGHWAYS

Table A-6

CURRENT RURAL WATER AND SANITATION PROJECTS

(a) Samar Integrated Rural Development Project

Under the village water component, the MPWH was to construct or develop around 2,000 wells, 100 springs, and 270 filter systems and rehabilitate 200 wells in the three Samar provinces. The project, estimated to cost P70.3 million in 1980 has been partly financed by a loan from the World Bank (IBRD).

Under a separate waterworks component, five Level III systems in Northern Samar were constructed, rehabilitated or improved at a cost of P5.9 million, with financing from the Australian Development Assistance Bureau (ADAB). The project should have been finished in 1983.

(b) OECF-assisted Rural Water Supply I

An average of 15 deep wells per year are being constructed by the MPWH in each of 45 provinces over a five year period, which started in 1980. (Total of 3,375 wells) Aside from well construction, 4,500 wells are to have been rehabilitated. Construction materials, equipment and vehicles were procured thru the 7th Yen Credit from the Overseas Economic Cooperation Fund (OECF) of Japan. The total project cost was approximately P238.6 million in 1980.

(c) OECF-assisted Rural Water Supply II

The MPWH should be completing the upgrading of around 1,100 Level I facilities to Level II communal faucet systems under the Rural Water Supply II Project, partly financed under the 8th Yen Credit package. The total project cost was about P67.7 million in 1981.

(d) MPWH-NIA Projects

In conjunction with the irrigation projects of the National Irrigation Administration in Davao del Norte, Surigao del Sur, Agusan del Sur, South Cotabato, Sultan Kudarat, and Bukidnon, partly financed by the Asian Development Bank (ADB), the MPWH constructed about 600+ wells over a five year period that should have ended in 1983. The investment requirement was estimated to be P39.0 million.

(e) Bicol River Basin Development Project

The MPWH is installing 176 wells, plus filter systems and storage tanks to serve 33,000 persons in 91 barangays as a part of an ADB/EEC assisted project. The project has also involved the construction of five Level II systems in Camarines Sur to benefit 42,000 inhabitants in 49 barangays. The project cost was placed at P23.8 million, with construction over five years starting in 1980.

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(Table A-6 cont'd.)

(f) Palawan Integrated Area Development Water Supply Component

This project includes the construction of wells, development of springs, installation of filter systems and the rehabilitation of existing deep wells in the province of Palawan during a five year period starting in 1982. The project covers six municipalities and one city (about 80,000 to 100,000 persons altogether). The project cost was P23.5 million, partly financed by the ADB.

(g) Zamboanga del Sur Development Project

The project has included the drilling and construction of 500 deep wells in the province of Zamboanga del Sur. The Project cost in 1981 was P23.3 million, partly financed by the Australian Development Assistance Bureau over a period of five years starting 1981.

(h) Philippine Rural Infrastructure Project I

The project included the construction of about 400 wells in six depressed provinces between 1978 and 1982. Construction materials, drilling equipment, and vehicles covering project requirements were procured on a staggered basis through an IBRD loan and IDA credit. The estimated cost was P23.6 million.

(i) First IBRD-assisted Rural Water Supply and Sanitation Project

The project started in 1983, includes (i) the construction of about 4,500 shallow wells and 2,300 deep wells (Level I), (ii) rehabilitation of 2,900 existing nonfunctioning wells, (iii) construction of 400 Level II systems, (iv) installation of 750,000 toilet units, (v) construction and maintenance of 12 regional maintenance workshops for rural water system equipment and (vi) research, training, and consulting services. The total project cost is P485 M, with the World Bank financing P35.5 million through a loan. The MPWH is implementing source development for Levels I and II, plus the maintenance workshop components; RWDC is implementing the Level II communal faucet systems. The Min. of Health is to undertake the sanitation component. About 1.7 million people will benefit from the water supply component and 4.5 million from the sanitation component.

(j) UNICEF-assisted Projects

Approximately 2,500 rural barangays are to have been benefitted, with the construction of 3,000 shallow and deep wells from 1981 to 1983. The estimated project cost was P48.5 million, of which 55% was to be financed by the UNICEF. The MPWH PMO-RWS is the executing agency for this program.

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(Table A-6 cont'd.)

(k) Barangay Water Project II

The Barangay Water Program, assisted by the United States Agency for International Development (USAID), has been described in Section 4.5 of Chapter 4. Targeted at small rural communities of up to 10,000 people, it is now programmed to cover 40 provinces and 18 cities between 1981 and 1986. The Barangay Water Project II is a reimbursement-type program partly financed by USAID.

Table A-7

LIST OF
MAJOR FLOOD CONTROL & DRAINAGE PROJECTS
NATIONWIDE

NAME OF PROJECTS	LOCATION	IMPLEMENTING OFFICE	SOURCE OF FUNDING	STATUS
1. Manila and Suburbs Flood Control and Drainage Project	Metro Manila	MPWH Regional Office - NCR 2nd St., Port Area, Manila	IBRD. (Prop.)	Ongoing
2. Mangahan Floodway Project	Rosario, Pasig, Metro Manila	Mangahan Floodway - PMO Rosario, Pasig, M.M.	OECP	Ongoing 80% complete
3. Napindan Hydraulic Control Structure	Taguig, Metro Manila	MPWH Regional Office - NCR 2nd St., Port Area, Manila	ADB	Completed
4. Agno River Control System including Tarlac River Control and allied projects	Pangasinan	MPWH Regional Office Region I, Rosales, Pangasinan	Local Funds	Ongoing
5. Pampanga River Control System including Pasig-Potrero RC, Gumain-Porac RC, Abacan RC, Rio Chico RC, Gumain-Porac-Caulaman RC and Parua RC	Pampanga, Bulacan, Tarlac and Nueva Ecija	MPWH Regional Office Region III, San Fernando, Pam.	Local Funds	Ongoing
6. Amburayan River Control Project	Sudipen and Bangar, La Union	MPWH Regional Office Region I, San Fernando, La Union	Local Funds	Ongoing
7. Bailili River Control Project	La Trinidad, Benguet	- do -	Local Funds	Ongoing
8. Cagayan River Control Project	Cagayan, Isabela & Quirino	MPWH Regional Office Region II, Tuguegarao, Cagayan	Local Funds	Ongoing
9. Magat River Control Project	Nueva Vizcaya & Isabela	- do -	Local Funds	Ongoing
10. Sablayan River Control Project	Sablayan, Occ. Mindoro	MPWH Regional Office Region IV-B, EDSA, Quezon City	Local Funds	Ongoing
11. Bicol River Control Project	Camarines Sur	PMO-Bicol River Basin Development Project Camaligan, Camarines Sur	ADB	Completion in 1985

(Table 1-7 cont'd.)

LIST OF
MAJOR FLOOD CONTROL & DRAINAGE PROJECTS
NATIONWIDE

NAME OF PROJECTS	LOCATION	IMPLEMENTING OFFICE	SOURCE OF FUNDING	STATUS
12. Mayon Volcano Sabo Works and related projects	Albay	MPWH Regional Office Region V, Legaspi City	OECF (Prop.)	Ongoing
13. Laoag River Control Project	Ilocos Norte	MPWH Regional Office Region I, San Fernando, LU	Local Funds	Ongoing
14. Ilog-Hilabanga RC	Negros Oriental	MPWH Regional Office Region VI, Iloilo City	Local Funds	Ongoing
15. Panay River Control	Capiz	MPWH Regional Office Region VI, Iloilo City	JICA	Ongoing
16. Tagoloan River Control	Misamis Oriental	MPWH Regional Office Region X, Cagayan de Oro City	Local Funds	Ongoing
17. Mambayan River Control	- do -	- do -	Local Funds	Ongoing
18. Cotabato-Agusan River Basin	Cotabato - Agusan	Cotabato-Agusan River Basin Development Program, Davao City	OECF (Prop.)	Ongoing
19. Libuganon River Control	Davao Oriental	MPWH Regional Office Region XI, Davao City	Local Funds	Ongoing
20. Davao River Control	Davao City	- do -	Local Funds	Ongoing
21. Allah River Control	Cotabato	MPWH Regional Office Region XII, Cotabato City	Local Funds	Ongoing
22. Maranding River Control	Lanao del Norte	- do -	Local Funds	Ongoing
23. Quidalos-Butadon RC	- do -	- do -	Local Funds	Ongoing
24. Tuganay River Control	Davao del Norte	MPWH Regional Office Region XI, Davao City	Local Funds	Ongoing

(Table A-7 cont'd.)

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LIST OF
MAJOR FLOOD CONTROL & DRAINAGE PROJECT
NATIONWIDE

NAME OF PROJECTS	LOCATION	IMPLEMENTING OFFICE	SOURCE OF FUNDING	STATUS
25. Makar River Control	South Cotabato	MPWH Regional Office Region XI, Davao City	Local Funds	Ongoing
26. Nationwide Dredging and Reclamation	Nationwide	PMO-Nationwide Dredging and Reclamation, Port Area, Manila	OECF	Ongoing to be completed 1965
27. Small Water Impounding Manage- ment (SWIM)	do	PMO - SWIM, Port Area, Manila	Local Funds	Ongoing

Table A-8
IBRD AND ADB PROJECTS

YEAR	I B R D			A D B		
	PROJECT	AMOUNT (\$ M)	LOCATION	PROJECT	AMOUNT (\$ M)	LOCATION
<u>AGRICULTURAL DEVELOPMENT</u>						
1969	Agricultural Credit	\$ 12.5	Nationwide			
1970	Agriculture/Irrigation	34.0	Nationwide			
1971	Rice Processing	14.3 ^{1/}	Nationwide			
1972	Livestock, Poultry	7.5 ^{1/}	Nationwide			
1973	Fisheries	11.6	Nationwide	Angat-Magat Integrated Agri. Dev.	\$ 3.6	Central Luzon
1974	Agricultural Credit	22.6 ^{2/}	Nationwide			
1975	Agr. Area Development	25.0 ^{1/}	Mindoro	Laguna de Bay Dev.	27.5	Metro Manila & Southern Luzon
1976	Fisheries	12.0	Nationwide			
	Livestock	20.5	Nationwide			
	Crop storage	11.5	Nationwide			
1977	Rural Dev. Agr. Land Settlement	50.0	Ilocos, Cagayan, Visayas			
	Rural Credit: Coastal Fishing, Livestock	36.5	Nationwide			
1978	Agriculture: Paddy	28.0	Nationwide	Laguna de Bay Fishpen Dev.	9.0	Metro Manila & Southern Luzon
	Tree Farming	8.0	Nationwide			
1979	Agri Extension - Cottage Ind.	35.0	Nationwide	Northern Palawan Fisheries Development	18.0	Palawan
	Rice Maize	16.5	Luzon			
1980	Area Development	27.0	Rural Samar			
	Area Development	12.0	Rural Iloilo			

^{1/} Bank Loan
^{2/} IDA Credit

(Table A-8 cont'd.)

YEAR	I B R D		A D B			
	PROJECT	AMOUNT ^{1/}	LOCATION	PROJECT	AMOUNT	LOCATION
1981	Agr.: Livestock & Fisheries	\$45.0	Nationwide	Palawan Integrated Area Development	\$32.0	Palawan
	Agr.: Livestock & Fisheries	38.0	Nationwide	Smallholder Livestock Development	8.0	Nationwide
1982	Agricultural Supp. Services	45.0	Nationwide	Agro-Processing & Mktg.	36.0	Nationwide
	Marketing for Small Fishermen	22.4	Nationwide	Cotton Development	26.7	Nationwide
				Agro-Processing & Mktg.	36.0	Nationwide
1983				Aquaculture Development	21.8	Nationwide
				Fishery Development	34.0	Nationwide
1984	Agri: Land Assembly	25.6	Nationwide	Agricultural Input Program	130.0	Nationwide
IRRIGATION						
1973				Davao del Norte Irrigation	4.2	Sou. Mindanao
				Pulangui River Irrigation	13.5	Bicol
1974	Irrigation	9.5 ^{2/}	Aurora, Quezon			
1975	Irrigation	17.0	Central Luzon			
1976	Irrigation	42.0	Region II, N. Luzon	Second Davao del Norte Irrigation	22.0	Southern Mindanao
	Irrigation	50.0	Cagayan			
1977	Irrigation	15.0	Leyte	Tago River Irrigation	22.0	
	Irrigation	50.0	Reg. I, II, VIII			
1978	Irrigation	65.0	Reg. IV, V, VI, IX, X, XI, XII	Allah River Irrigation	23.5	Southern Mindanao
	Dam/Reservoir: Magat River	150.0	Isabela			
1979	Irrigation	21.0		Third Mindanao Irrigation Bicol River Basin Irrigation Dev.	1.7	Mindanao Bicol
1980	Irrigation/Flood Control ^{3/}	71.0	Mindoro/Palawan			

^{1/} Bank Loan
^{2/} IDA Credit
^{3/} Also noted in Flood Control.

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(Table A-9 cont'd.)

YEAR	I B R D			A D B		
	PROJECT	AMOUNT	LOCATION	PROJECT	AMOUNT	LOCATION
1981	Communal Irrig. Development	\$71.1 ^{1/} + 12.0 ^{2/}	Nationwide			
1982				Third Davao Del Norte Irrigation	\$45.3	Southern Mindanao
1983				Irrigation Sector Loan	67.4	Southern Phils.
				Fourth Mindanao Irrigation Study	1.5	Mindanao
1984	Irrigation Supplement to earlier loans	5.1	Nationwide			
<u>ROADS & HIGHWAYS</u>						
1970						
1971	1st Roads Project	8.0	Mindanao	Cotabato-Gen. Santos Roads	10.6	Southern Mindanao
1972						
1973				Iligan-Cag. de Oro-Butuan	22.3	Northern Mindanao
1974	2nd Roads Project	68.0	Luzon	Tarlac-Sta. Rosa & Feeder Roads		Central Luzon
1975						
1977	3rd Roads Project - 500 km	95.0	Visayas & Mindanao	Mindanao Secondary & Feeder Roads	0.5	Mindanao
1978				Road Improvement Project	45.0	
				Mindanao Secondary & Feeder Roads	24.0	Mindanao
1979	4th National & Feeder Roads Proj.	100.0	Nationwide			
1980	Rural Roads Imp. Proj	62.0	Rural Mindoro	Second Road Improvement Proj	30.0	Nationwide
1982				Third Road Improvement Proj	68.0	Nationwide
1984	5th Roads Project	102.0	Nationwide			

^{1/} Bank Loan
^{2/} IDA Credit

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(Table A-8 cont'd.)

YEAR	I B R D			A D B		
	PROJECT	AMOUNT	LOCATION	PROJECT	AMOUNT	LOCATION
<u>PORTS & WATERWAYS</u>						
1971				Fisheries Port	\$ 4.5	Nationwide
1973				Cotabato Port Dev.	6.6	Southern Mindanao
1974	Power: Mindanao Expansion	\$ 6.1	Mindanao			
1975	Port & Ship Repair	20.0	Nationwide			
1979				Manila Port	27.0	Manila
1980	Port & Waterways	67.0	Nationwide			
<u>POWER/ENERGY</u>						
1971				Mindanao Power	23.4	Mindanao
1972	Power Distribution	22.0 ^{1/} 10.0 ^{2/}	Nationwide	Second Mindanao Power	21.0	Mindanao
1974				Third Mindanao Power	1.0	Mindanao
1975	Power Dist./Transmission	61.0	Luzon	First & Second Mindanao Power (Supplementary)	22.7	Mindanao
1976				Fourth Mindanao Power	52.0	Mindanao
1977	Power Distribution/Transmission	58.0	Nationwide	Fifth Mindanao Power	29.0	Mindanao
1978	Power Distribution ^{3/} /NEA	60.0	Nationwide			
1979				Sixth Mindanao Power	60.7	Mindanao
				Malangas Coal Dev.	14.0	
1980				Negros & Mindanao Power Transmission	60.5	Negros & Mindanao
1981	Energy: Oil Exploration	37.5	Nationwide	Rural Electrification	87.5	Nationwide
1981	Energy: Coal Investigation	17.0	Nationwide	Power System Development	32.8	Nationwide
1982	Coal Exploration	17.0	Nationwide			
1983	Energy: Geothermal	36.0	Manila/Nationwide	Negros-Panay Interconnection	43.8	Visayas

^{1/} Bank Loan
^{2/} IDA Credit
^{3/} Rural Electrification, NEA program.

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(Table A-8 cont'd.)

<u>YEAR</u>	<u>PROJECT</u>	<u>I B R D</u>		<u>A D B</u>		
		<u>AMOUNT</u>	<u>LOCATION</u>	<u>PROJECT</u>	<u>AMOUNT</u>	<u>LOCATION</u>
<u>WATER SUPPLY/SEWERAGE</u>						
1974				Manila Water Supply	\$51.3	Manila
1975				Provincial Cities Water Supply	16.8	Nationwide
1976	Water Supply: 6 Cities & Manila Sewerage	23.0	Luzon & Manila			
1978				Second Manila Water Supply	49.0	Manila
1979	Water - Metro Manila	88.0	Manila			
	Water - Urban Poor in 50 Provincial Cities	16.0	Nationwide			
1980	Water Supply: Metro Manila	63.0	M. Manila	Manila Sewerage	42.8	Manila
1981				Water Supply Sector	46.0	
1983	Rural Water	35.5	Nationwide	Manila Water Supply Rehabilitation	26.7	Manila
<u>SMALL SCALE INDUSTRIES</u>						
1969				First Private Dev. Corp. of the Phils.	5.0	
1970	Industry Phil. National Bank	25.0	Nationwide	Second Private Dev. Corp. of the Phils.	15.0	
1973				Third Private Dev. Corp. of the Phils.	25.0	
1974	DFC: Industrial Imports	50.0	Nationwide			
1975	DFC: Industrial Imports	30.0	Nationwide	Dev. Bank of the Phils.	25.0	
1976	Small Industries	30.0	Nationwide			
1976	DFC: Phil. Dev. Bank	75.0	Nationwide	Fourth Private Dev. Corp	24.2	
1977				Dev. Bank of the Phils.	35.0	

(Table A-8 cont'd.)

YEAR	I B R D			A D B		
	PROJECT	AMOUNT	LOCATION	PROJECT	AMOUNT	LOCATION
1978	Industry: Manufacturing/Finance	\$ 30.0	Nationwide			
	Industry: Dev. Medium	80.0	Nationwide			
	Industry: Finance PISO	15.0	Nationwide			
1979	Industry: Credit Small Ind.	25.0	Nationwide	Phil. Investment Systems Organization	\$15.0	
1980				Fifth Private Development Corp. of the Phils.	30.0	
				Second Phil. Investment System Organization	25.0	
1981	DFC for Industrial Investment	150.0	Nationwide			
1982	Industry: Textile Mill Rehab	157.4	Nationwide	Sixth Private Dev. Corp. of the Philippines	45.0	
	Small Entr: Finance & Fin. Inst.	132.0	Nationwide			

URBAN DEVELOPMENT

1976	Urban: Tondo Renewal	32.0 ^{3/}	M. Manila
1979	Housing Infrastructure	32.0	M. Manila
1980	Urban Dev.: Metro Manila	72.0	M. Manila
1982	Urban Dev.: Regional Cities Dev. Project (RCDP)	8.0	Bacolod, Iloilo, Cag. de Oro, Davao City
1983	Urban Services (RCDP)	67.0	Bacolod, Iloilo, Cag. de Oro, Davao City
1984	Urban Dev. (Premium Proj.)	40.0	Nationwide
	Urban: Supplement to Manila Loan	10.5	Manila

EDUCATION

1973	Education: Technical	12.7 ^{2/}	Nationwide
1976	Education: Textbooks	25.0	Luzon & Visayas

^{2/} IDA Credit
^{3/} Loan plus credit.

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(Table A-8 cont'd.)

<u>YEAR</u>	<u>I B R D</u>			<u>A D B</u>		
	<u>PROJECT</u>	<u>AMOUNT</u>	<u>LOCATION</u>	<u>PROJECT</u>	<u>AMOUNT</u>	<u>LOCATION</u>
1977	Education: Higher	\$25.0	Nationwide	Engineering Education	\$16.0	Nationwide
1978	Education: Radio	2.0	Nationwide			
1980	Education: Fishing Technology	38.0	Nationwide			
1981	Education: Primary	100.0	Nationwide	Technical & Vocational Education	27.0	Nationwide
1983	Education: Technical	24.4	Nationwide			
<u>POPULATION/HEALTH</u>						
1975	Population	25.0	Nationwide			
1979	Population & Health	40.0	Nationwide			
<u>VARIOUS</u>						
1973				Manila Int'l Airport	29.6	Manila
1976	SA			Phil. National Railways	24.2	Luzon
1981	SAL (Structural Adjustment Loan)	200.0	Nationwide			
1983	SAL	302.3	Nationwide			

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