REPUBLIC OF THE PHILIPPINES

REPORT ON THE SURVEY FOR THE CAGAYAN VALLEY REGION DEVELOPMENT PLANNING

February, 1975

JAPAN INTERNATIONAL COOPERATION AGENCY

REPORT ON THE SURVEY FOR THE CAGAYAN VALLEY REGION DEVELOPMENT PLANN

REPUBLIC OF THE PHILIPPINES

REPORT ON THE SURVEY FOR THE CAGAYAN VALLEY REGION DEVELOPMENT PLANNING

February, 1975

JAPAN INTERNATIONAL COOPERATION AGENCY

PREFACE

In response to the request of the Government of the Republic of the Philippines, the Government of Japan decided to conduct a survey for the Cagayan Valley Region development planning and entrusted the Overseas Technical Cooperation Agency (OTCA) with implementing the survey (with the reorganization of the OTCA in August, 1974, this survey project was handed over to the newly-founded Japan International Cooperation Agency).

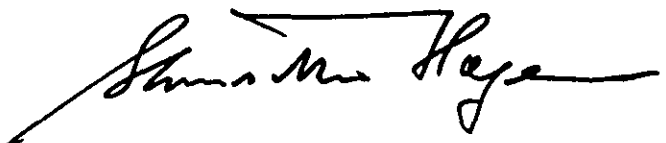
Following consultation with the ministries concerned, the Agency organized a survey team in recognition that Japan would cooperate in a multi-sectoral regional development planning which would integrate sectoral development projects. The Survey Team consisted of ten members, headed by Mr. Koichi Baba, Chief of the International Affairs Division, The Environment Agency. The Survey Team conducted its field survey for twenty days from July 25th to August 13, 1974. During this period, the Survey Team discussed and exchanged opinions on the approach to integrated regional development planning and conducted a field survey with the assistance of a Philippine staff of a dozen members.

Although the survey period was extremely limited, we believe that the cooperation between the Japanese members and the Philippine staff enabled the Team to accomplish its initial purposes almost fully and opened new prospects for technical cooperation for integrated developmental efforts in this region.

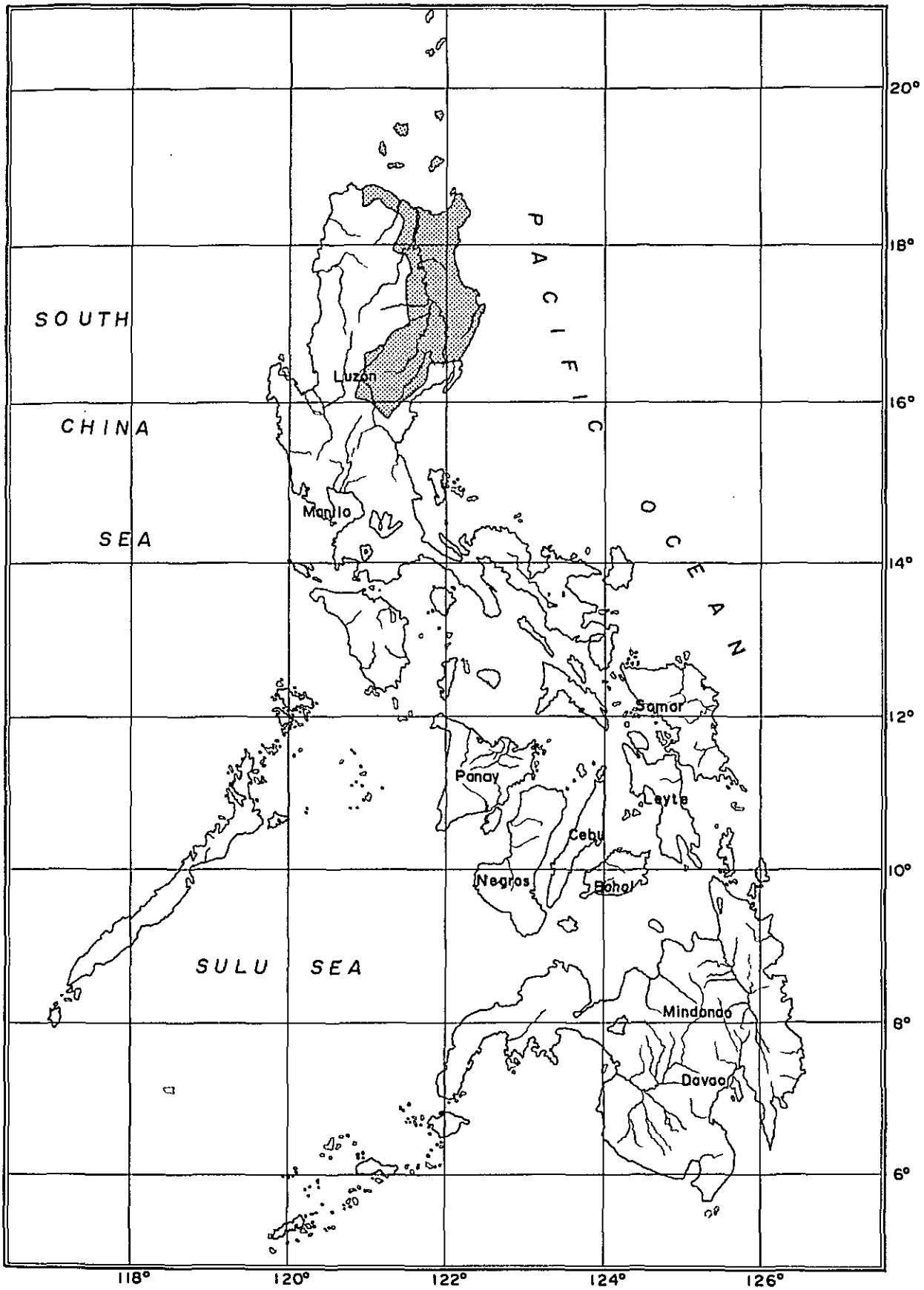
The present report is the product of the field survey of the Team as well as the discussions of the draft report by the Team, the Japanese ministries concerned and with the Philippine staff on November 20th - 25th in Manila. It is our hope that this report will be a useful and helpful guide for the well-balanced development of the Cagayan Valley Region as well as for other integrated regional development and planning.

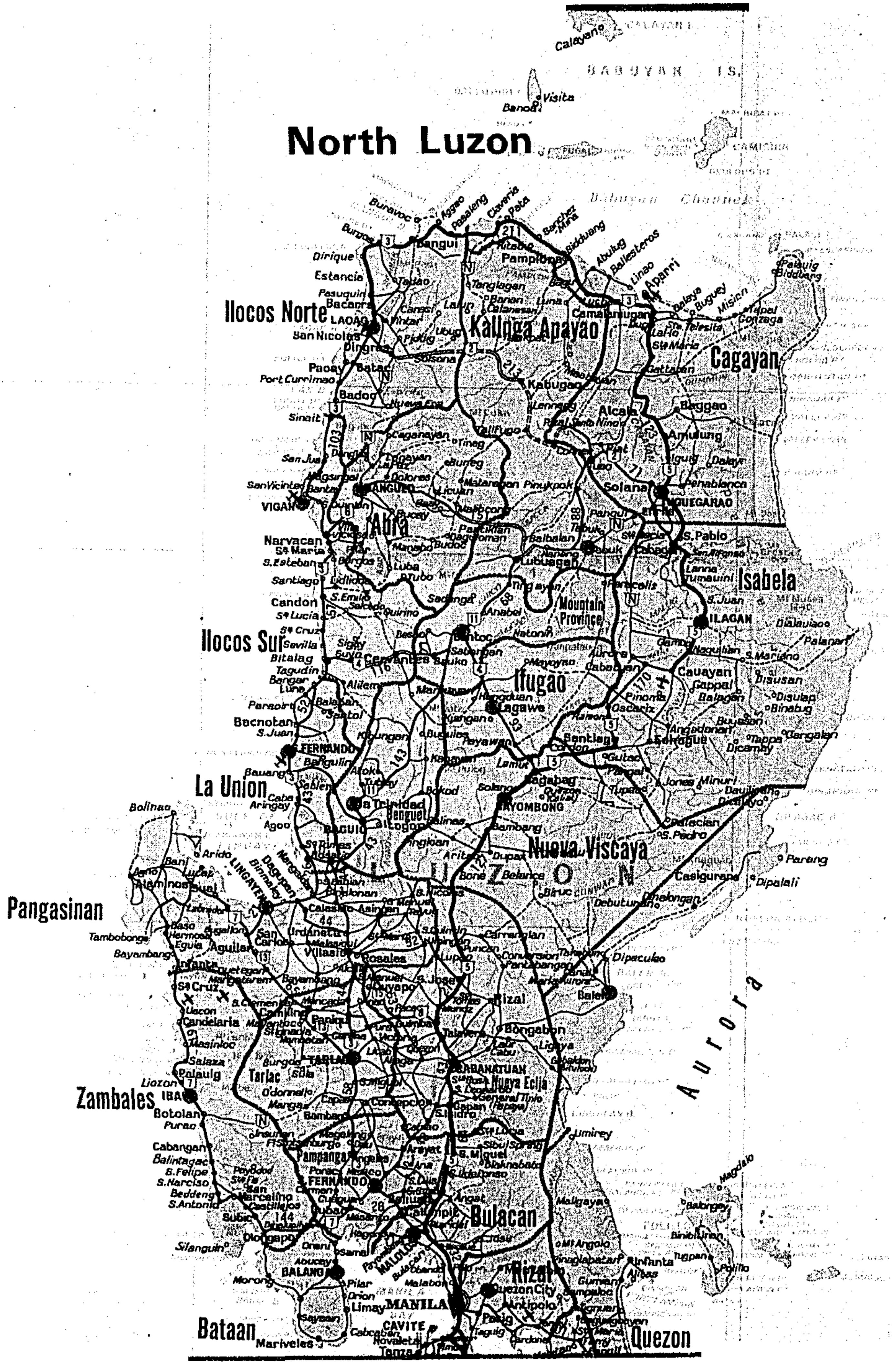
On the occasion of the publication of this final report, we would like to express our deep gratitude to Secretary Arturo R. Tanco Jr., Department of Agriculture, Dr. Francisco Panol and his staff members and all the Republic's departments and agencies concerned who so ably assisted us.

We would like to thank the Ministry of Foreign Affairs, the Environment Agency, Ministry of Agriculture and Forestry, the Forestry Agency, the Ministry of International Trade and Industry, the Agency of Natural Resources and Energy, the Ministry of Construction, the Ministry of Transport, the Institute of Developing Economies and Japan Irrigation and Reclamation Consultants who have offered great help in completing the survey work.



Shinsaku HOGEN
President,
Japan International Cooperation Agency


SOUTH
CHINA
SEA
PACIFIC
OCEAN
SULU SEA
Luzon
Manila
Samar
Panay
Leyte
Cebu
Negros
Bohol
Mindanao
Davao
20°
18°
16°
14°
12°
10°
8°
6°
118°
120°
122°
124°
126°


North Luzon
Ilocos Norte
Kalinga Apayao
Cagayan
Abra
Isabela
Mountain Province
Ilocos Sur
Ifugao
La Union
Benguet
Nueva Viscaya
Pangasinan
Aurora
Tarlac
Nueva Ecija
Zambales
Pampanga
Bulacan
Rizal
Bataan
Quezon
MANILA
Babuyan Channel
BABUYAN IS.
LUZON

Contents

REMARKS

(1) On the Form and Content of the Report

The present survey report was prepared on the basis of the field survey conducted in the Philippines in July-August, 1974. A draft report was prepared at the end of November, 1974 and submitted to the Philippine Government to provide a framework for an exchange of opinions. As a result of these discussions, many points were clarified and the draft report was considerably changed, with its form reworked. Let us take this opportunity to explain briefly the background and the content of the Final Report.

The draft report that was submitted to the Philippine Government on November 22, 1974, was organized as follows:

Chapter I	Summary and Recommendations
Chapter II	Current State and Problems of the Region (including Evaluation of On-going Projects)
Chapter III	Development Potential
Chapter IV	Strategy for Development
Chapter V	Recommendations

It was decided to prepare Chapter I of the Final Report after a full exchange of opinions with the Philippine side. Chapter II 'Current State and Problems' was not translated into English because of time restrictions. Chapter IV and V were devoted not to elucidating a general outline of an integrated Cagayan Valley Region Development Project, but rather to presenting some basic considerations required for drafting projects. In other words, these chapters were concerned mainly with methodology.

The Survey Team had decided to prepare the draft report at that time because of the policies governing the survey at the time of the Team's departure and because of the time restriction on carrying out the survey. However, the Philippine side inquired, at the conference at the end of November, whether a more concrete report approaching a master development plan could be prepared. Meanwhile, considerable information on the Philippine Government's efforts for integrated rural development had been obtained. It became clear that ten integrated rural development projects throughout the Philippines had already been started, while an administrative system had been established.

On the basis of the invaluable idscussions with the Philippine side and the continuing flow of new information, the organization of the Final Report was revised as follows:

Chapter 1	Background and History
Chapter 2	Approach to Integrated Regional Development Planning
Chapter 3	Current State and Problems of the Region
Chapter 4	Development Potential
Chapter 5	Strategy for Development

Chapter 6 Scheduling: Approaches and Selected Examples

The Survey Team's concepts on planning methods are summarized in the new Chapter 2. These concepts underlie the proposals for development made in the report, and constitute the guideline which inform the entire report. The methodology employed in the study of development for the Cagayan Valley is also applicable to regional development projects in other developing countries. The methodology may also serve as a reference for those who are concerned with these problems.

The Philippine Government has accepted the Survey Team's basic strategy, namely, that the development of the Cagayan Valley Region should be planned with due consideration given to consistency and complementarity among all areas of activity. Basically, agriculture should lead development. The facilities and systems for supporting agriculture must be improved. Preventive maintenance for protecting national land from typhoons, floods and other disasters must be improved. The major areas and strategies for development were determined on the basis of this functional policy.

First, it is recommended that model districts for integrated development be selected. The reason for this lies in the fact that detailed planning for the entire region is difficult since information on the current state of regional agriculture and related areas is insufficient. Various facilities and systems that are necessary for economic development, especially for increasing agricultural production and for social development, should be introduced in the model districts. It is hoped that the demonstration of package development in model districts will serve as a powerful stimulus for development efforts throughout the region in the future.

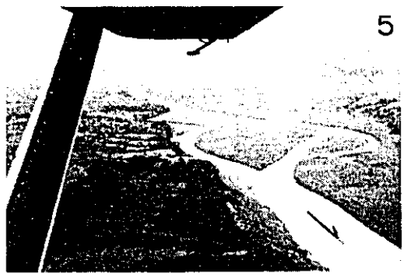
Second, the development of industries, especially agriculture-related industries, must be studied from a long-range viewpoint.

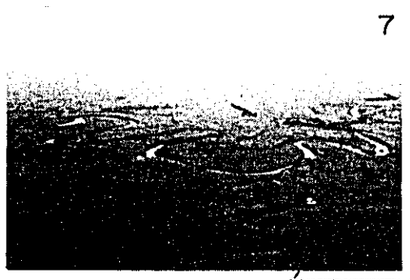
Third, the Cagayan Valley Region is like an isolated island. With regard to transportation and the traffic network, the Survey Team found a need for drawing up a general plan of national and regional trunk lines and promoting construction. The Survey Team prepared and presented a general outline.

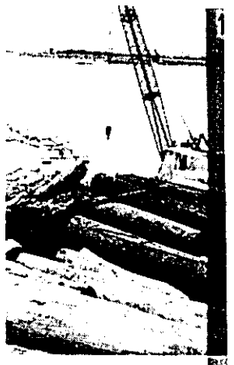
Fourth, the Cagayan Valley Region has been frequently damaged by flooding of the main stream and tributaries of the Cagayan River. The Survey Team is of the opinion that the building up of assets within the region is inhibited not only by direct damage, but also by the possibility of disaster. Their probability must be lowered in order to promote development. The Report indicates the direction policies regarding water and flood control should take.

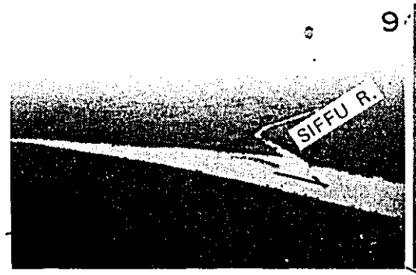
(2) Definition of Cagayan Valley Region and Cagayan River Basin

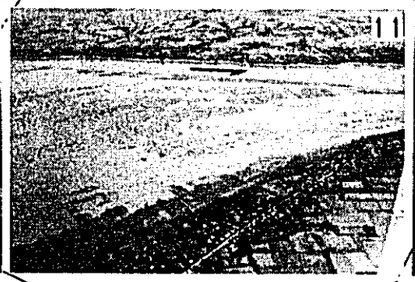
As is noted in Chapter 1, the term Cagayan Valley Region (also called the region) refers to the three provinces of Cagayan, Isabela and Nueva Vizcaya. The Cagayan River Basin is used to refer to a topographical region, the watershed of the Cagayan River. The latter term includes the mountain range to the west (the Cordillera Central) but excludes the east coast.

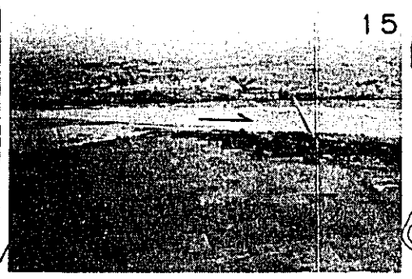












NUEVA VIZCAYA

● Santiago

Cabatuan ● 1

Echague ● 2

Cauayan ● 3

Naguilian ● 4 6

Ilagan ● 5 8 10

Magat River

Siffu River

ISABELA

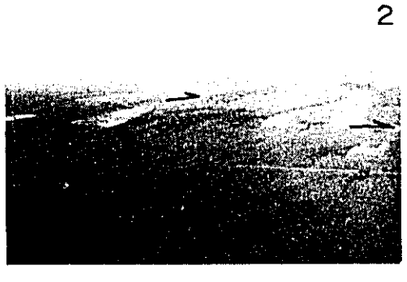
Tuguegarao ● 11

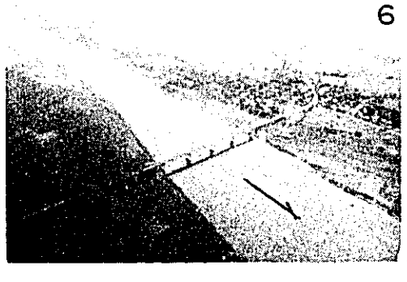
12

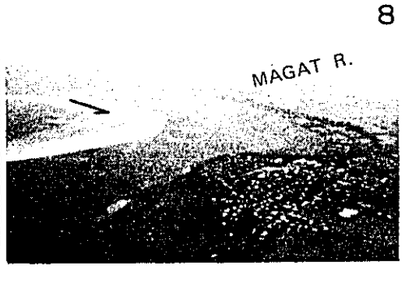
Iguig ● 14

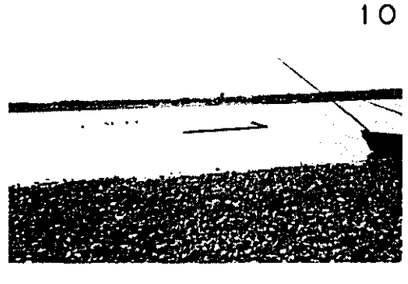
13 15

Chico River

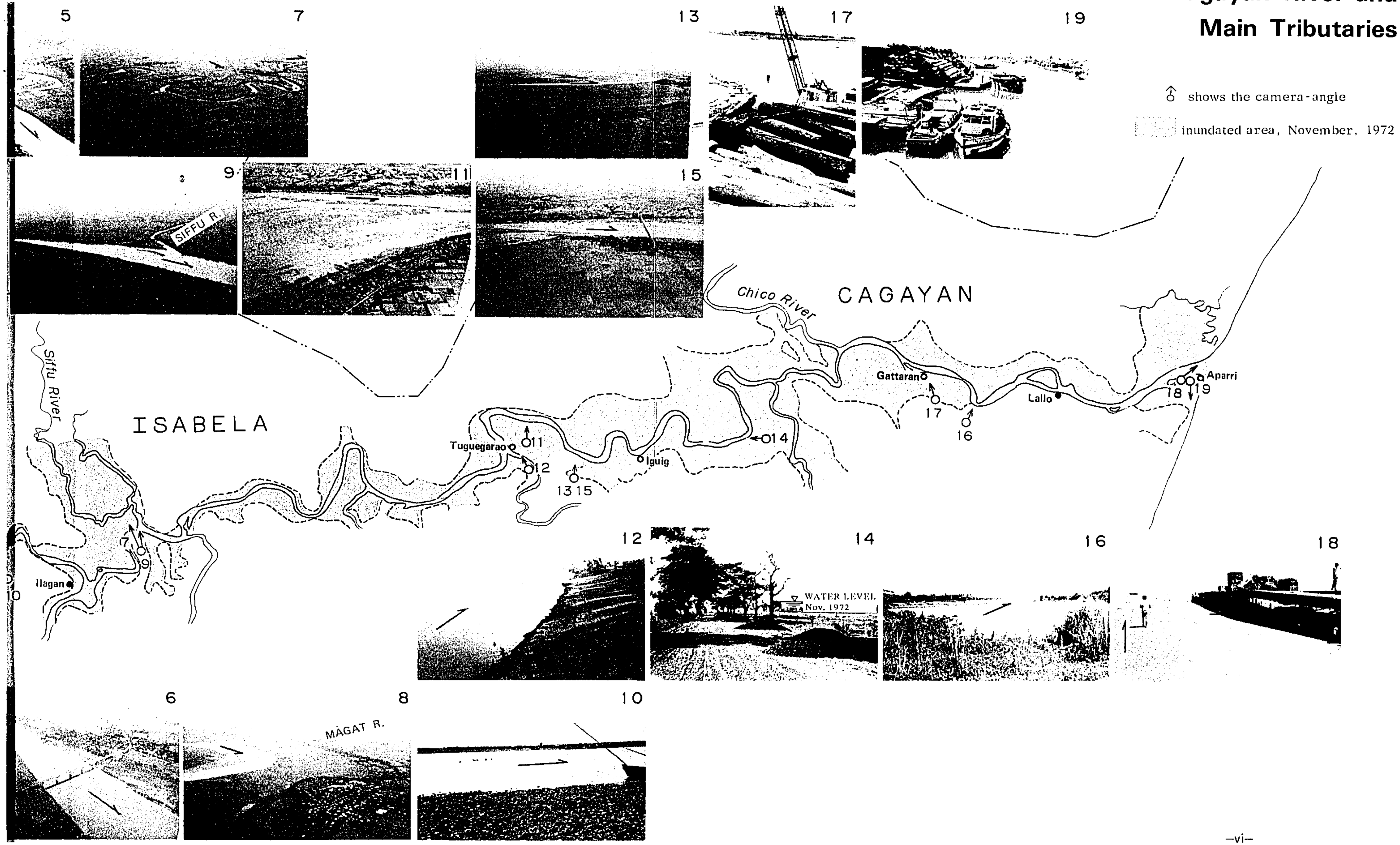








Cagayan River and Main Tributaries



Chapter 1
Background and History

photo : Temporary bridge and trucks for log transport

Chapter 1 Background and History

1.01 President Marcos instructed the Director-General of NEDA to establish a Cabinet-level Coordinating Committee for Integrated Rural Development Projects on July 10, 1973. Membership on the committee would consist of the Secretary of the Department of Agricultural and Natural Resources (Mr. A. R. Tanco, Jr., current Secretary of Agriculture) as the chairman, and the Secretaries of DPWT & C, Fiannce, DLG & CD and DAR.

The regions selected by this Cabinet Coordinating Committee include the Island of Mindoro, the Bicol River Basin and the Cagayan Valley. For the first two regions, development projects are being prepared with cooperation of the International Bank for Reconstruction and Development (IBRD) and the United States Agency for International Development (USAID), respectively.

Secretary Tanco came to Japan in September, 1973, and requested Japanese assistance and cooperation for the Cagayan Valley Integrated Development Project.

1.02 The Ministry of Foreign Affairs, the OTCA and other related ministries of Japan understood that this was a request for cooperation for the preparation of a framework for regional development. The decision was made to dispatch a survey team of about ten members led by a development economist. In February, 1974, these ministries requested the Philippine Government to provide detailed information on the aims of the survey and survey reports and other materials concerning the

region.

Secretary Tanco replied on February 16, stating in his letter that the specialist group, led by Dr. Panol, which had worked jointly with the IBRD Team on the Mindoro Island Integrated Development Project, would be assigned to the Cagayan Valley exercise. The letter also gave the plans and schedules prepared by the Philippine Government.

1.03 Supplied information further clarified that the projects were to cover five provinces in the Cagayan River Basin, namely, Cagayan, Isabela, Nueva Vizcaya, Kalinga Apayao, Mountain Province and Quirino. Later the Philippine Government announced that the projects were to cover only Cagayan, Isabela and Nueva Vizcaya. This change was made during the first preliminary meeting following the arrival of the Survey Team in Manila.

The letter revealed that the Philippine intention was to prepare an integrated development project with a major orientation to agriculture, but including supportive infrastructure.

1.04 The Survey Team was then organized with the following members.

Mr. Koichi BABA	(Team Leader; Development Economist) Chief, International Affiars Division, Environment Agency
Dr. Shiro SASAKI	(Deputy Leader; Irrigation Engineer) Director, Japan Irrigation and Reclamation Consultants (JIRCO)
Mr. Takashi INOUE	(Regional Agricultural Development Planner) Planning Division, Agricultural Structure Improvement Bureau, Ministry of Agriculture and Forestry
Mr. Yoshio HIRONAKA	(Forester) Planning Division, Forestry Agency, Ministry of Agriculture and Forestry
Mr. Takao JINNOUCHI	(River Engineer) Yatsuba Dam Construction Office, Kanto Regional Construction Bureau, Ministry of Construction
Mr. Hiroshi KONO	(Road Planning Engineer) Construction Promotion Division, Planning Bureau, Ministry of Construction
Mr. Shinkichi FUJIWARA	(Electrification Planner) Hydro Power Division, Agency of Natural Resources and Energy, Ministry of International Trade and Industry

Mr. Shinya IZUMI	(Transport Engineer) Development Division, Bureau of Ports and Harbours, Ministry of Transport
Mr. Takashi NOHARA	(Development Economist) Economic Cooperation Research Office, Institute of Developing Economies
Mr. Haruo SUZUKI	(Coordinator) Programming Division, Development Surveys Department, Overseas Technical Cooperation Agency (OTCA)

1.05 During the month preceding departure, the Survey Team held several meetings, studying the materials sent by the Philippines.

Much was learned from Mr. Antonio Laurel, Economic Attaché at the Embassy of the Philippines in Tokyo, about the integrated rural development projects. Mr. Yoshitomo Oguri (Shuto Expressway Corporation), former leader of the Pan Philippine Highway survey teams, Messes. Tokio Jomoto, Tetsuya Fukuda and Azuma Tsunoda (Electric Power Development Co., Ltd.), leader and team members of the Cagayan Valley Transmission Line Project survey team and Mr. Hidekazu Kumano (JOCV/OTCA) who had worked in Mountain Province as a volunteer, also contributed. The Survey Team prepared its "Scope of Work" on the basis of the information that had been obtained, and this was approved at the meeting of the ministries concerned.

1.06 The Survey Team arrived in Manila on July 25th, 1974. After consulting with the Philippine staff, the survey period was divided into three sections. The first week was devoted to making arrangements with the Japanese Embassy, to exchanging opinions with the officials concerned of the Philippine Government and collecting materials in Manila; the second week was to be spent surveying the Cagayan Valley Region, while the third week would be spent summarizing data and exchanging opinions with staff at the Japanese Embassy and Philippine side.

The Philippine side had organized a task force for the Cagayan Valley Integrated Rural Development Project. It was led by Dr. Francisco Panol and consisted of the representatives of the departments concerned. All of its members worked closely with the Survey Team. The major meetings were attended not only by members of this task force, but also by the representatives of the NEDA and the Department of Local Government and Community Development.

The members of the task force are listed below with their field of speciality and post.

Field	Name	Post
(Leader)	Dr. Francisco Panol	Department of Agriculture

Irrigation	Mr. Amado Jugueta (Mr. Felix Labayen)	National Irrigation Administration
Regional Agri-cultural Development	Mr. Francisco E. Villaroman	Department of Agriculture
	Dr. Martin Raymundo	University of the Philippines (Los Baños) (UPLB)
Reforestation	Mr. Celso P. Diaz	Bureau of Forest Development
Road Planning	Mr. Ananias M. Putong	Department of Public Highway
Rivers	Dr. Willie David	University of the Philippines (Los Baños) (UPLB)
Electrification Planning	Mr. Nicacio Baloyo	National Electrification Administration
Transportation	Mr. Orly P. Tuzon	Department of Public Works Communication and Transportation.

1.07 During preliminary meetings in Manila, the Survey Team repeatedly stressed that the present survey was not directly linked with Japanese loans. In response to a question regarding the aims and objectives of the survey project, the Philippine side listed the following expectations:

(1) To reach agreement with the Survey Team on the method of approach to integrated development planning.

(2) To reach agreement on the major components of the integrated development project.

(3) To reach agreement on the level and extent of surveys necessary in order to enter into loan negotiations.

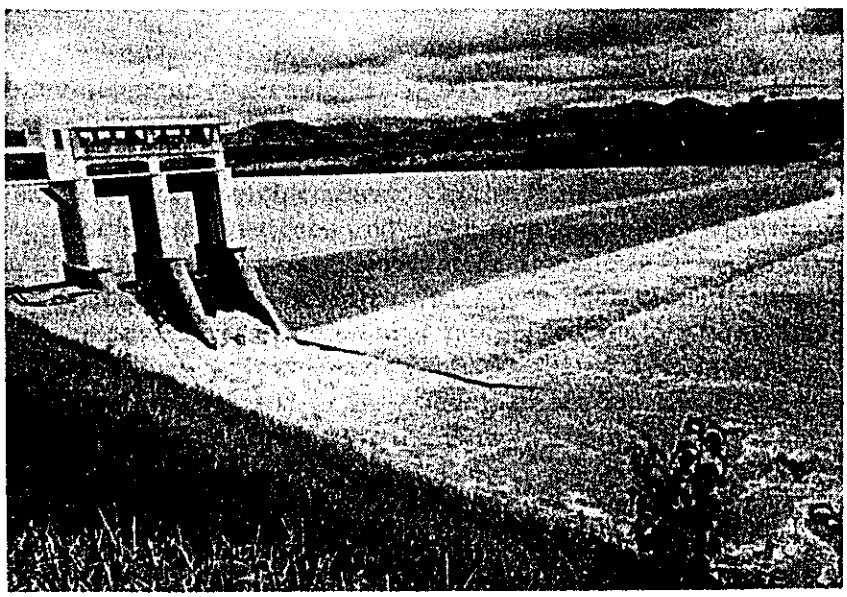
(4) To reach agreement on the time schedule (to be drafted by the Philippine side).

(5) To have the Survey Team provide specialized and technical advice for solving various urgent problems as well as specialized and technical advice for fully activating the development potential of the region.

The Philippine side originally hoped that the Survey Team would indicate how much financial assistance could be anticipated from Japan. But the Survey Team explained that this question did not fall within its scope of activity, and that therefore the Survey Team could not give an answer.

Chapter 2

Approach to Integrated Regional Development Projects



Section 1 A View of Integrated Regional Development

Section 2 A variety of Integrated Regional Development

photo : Magat Head work

Chapter 2 Approach to Integrated Regional Development Projects

Section 1 A View of Integrated Regional Development Projects

2. 01 The integrated development of a region is really a new idea. There is no uniform accepted view, whether academic or pragmatic , of what constitutes integrated regional development. Internationally, projects are designed by trial and error, on the basis of the experiences of each country. In the Philippines, some regional development projects have been designed and are now progressing with the cooperation of foreign countries and international cooperation agencies. However, they differ widely among one another in their basic views. Given such circumstances, the Survey Team must clarify in advance its own view of integrated regional development. This chapter describes the Survey Team's view of integrated regional development, the major considerations related to such development and the prerequisites of development projects. In other words, the Survey Team's basic standpoint is stated explicitly in this chapter.

2. 02 Integrated regional development, as it is intended in this report, refers not only to the development of a certain specific region or a locality but furthermore to development which fulfills the following requisites:

The first requisite is that development in a specific region take place in the context of a national point of view. In other words, since residents of the entire country, regardless of region, are striving to achieve better living conditions, efforts at local development should take this into account. In principle, development should be based on self-reliant efforts and not on special favours for development promotion (e. g. subsidies, national tax exemptions, etc.) rendered from other regions and the state. The no-blank no-prize policy weakens incentives for effort and does not bear good results. Therefore, in order for development in a certain region to take place in a national context, either one or both of the following bases are necessary. One is the existence of special needs for development in the region. Being particularly over-populated or underpopulated in comparison with the national average or with other regional populations may be one reason for developing or redeveloping a region. Regions which have such problems shall be called "Problem areas". The other base is the potential for development: being particularly rich in various resources with the prospect of great gain from development. Areas which possess such potential or prospect shall be called "Resource areas" here. Thus, the opportunity for development will reach its peak when either or both of these two bases exist.

The second requisite which integrated regional development must fulfill is sufficient consideration of the environment as a unity. Without waiting to have ecologists point it out, we may note that the various elements which constitute nature are related in complex mutual interdependence. Therefore, such acts as the artificial changing of a portion of nature, i. e. , development activities, will have greater or lesser effects on the balance of nature and will lead to a shift to a new equilibrium. Of course, development is undertaken with the expectation that this new equilibrium will be better than what existed before. Whether or not it will come about easily cannot be predicted without scrupulous and deliberate investigation.

Moreover, in certain cases, changes which cannot be completely foreseen by today's scientific technology or by given information or data may occur. For example, if the problem of river development is not approached from the viewpoint of the entire river system, ultimately adjustments among parts may not be able to maintain a suitable overall balance. Particularly in countries like the Philippines where natural calamities such as typhoons and floods constantly occur, precautions against the revenge of nature cannot be neglected.

The third requisite is that the method of resource utilization be multi-purpose. For example, land resources can be used not only for farming use but can be used for estates, forest land, pastureland and industrial land or left alone as abandoned land and waste lands. Suitable sites can be considered for each respective purpose, but land use is malleable according to demand and technique on each occasion. Moreover, it goes without saying that water resources can be used for various purposes such as irrigation, power generation, domestic consumption, industry, etc.

2. 03 The integrated regional development project will not be a collection of various projects and moreover will not be a project which only plans the construction of individual physical facilities. The ultimate goal of the development project lies in the promotion of welfare of the region's residents and the contribution to the development of the entire national society.

For this purpose, planning constitutes the entire process of searching for an effective combination of methods, implementing these, studying the results of changes in the environment and in project execution, and amending the project. That is, the entire process of smoothly tieing up the various actions of "plan-do-see" is planning.

However, if the development procedure places emphasis only on the expansion of individual physical facilities and lacks sufficient consideration of consistency and mutual complementarity among projects, development will not progress at a desirable speed, and costs will accumulate, while the relative predominance which the area possesses will decline and would possibily lose priority in the move toward development when viewed from a national context. Moreover, since development is a process of ceaseless effort which aims for endless progress, favorable results cannot be obtained unless suitable actions and working schemes are respectively considered at each stage. For example, the expansion of irrigation facilities requires the development of proper agricultural techniques and management to accompany the expansion.

The improvement of roads concomitantly expands demand from the outside, and increases the supply of commodities for consumption and production. However, without waitng for such expansion of physical facilities, it is also the role of planning to contrive an efficient operational scheme from among the given conditions. To devise a method of efficiently utilizing such productive elements as the labor force, capital and land which are present is the first step toward development.

2.04 Since integrated regional development is undertaken for the purpose of the people, an increase in the capacity to absorb population is indeed the symbol of development and its conclusion. However, since this increase in the capacity to absorb population is determined by a variety of factors, it is necessary to elucidate and analyze the origin of those various factors and properly control for their effects. Over-population must be avoided, as must poor accommodation of the population. Population concentrates in places where there is the opportunity to make a living or where there are material resources.

First, population distribution policies can take two extreme forms: either to let individuals move on their own to areas where it is possible to make a living, or to actively shift job opportunities to areas in which a population increase could be considered. Tentatively, we will call the former the case of "people-to-jobs" policy and the latter the "jobs-to-people" policy. It may be that the actual population policy in many instances will fall between the two extremes. However, the clarifying here of these two theoretical prototypes may provide a good guide for devising a suitable population distribution policy. For example sometimes various projects and producitve facilities are scattered with the aim of dispersing the population, while conversely, there are times when the pursuit of agglomerated economies brings desperate efforts to create even more job and living opportunities for a population flowing into an already developed area, and as a result, over-population occurs. In the former case of "people-to-jobs", the policy itself will be weak vis-a-vis the enormous power of the community. In the latter case of "jobs-to-people", from beginning to end the policy will follow the economic trend in the region and finally will be unable to control the vast agglomerated diseconomies. The point is the same for both cases: inefficiency.

Second, it is also important to recognize that the large and small areas or districts have their own structures, and also that a complicated, functional mutual relation exists between regions. Attention must be paid to the fact that a relationship similar to that of action-reaction in thermodynamics exists among regions. In other words, take community as a mass and represent it by the product (PW), where P is the population scale and W is the economic weight per person. Then the two optional areas which are mutually related shall have the following relation according to the size of the mass: $(P_1W_1) \gtrless (P_2W_2)$

Generally, in such a relation, a favorable economic flow originating from the area which has the larger mass to the area which has the smaller mass is called the "Spread effect". A flow in the opposite direction, from the smaller mass to the larger is called the "Backwash effect". For the uniform development of each area, it is desired that the spread effect be maximized and the backwash effect be minimized. If this does not occur, the larger area will become greater and the smaller area will become all the smaller, with the local concentration of population and economic power becoming all the more intense.

In general, however, if transportation between the larger area and the smaller area is facilitated, it is likely that the absorptive power of the larger area will be increased. This is one of the dilemmas brought about by improvements in the transportation system. In order to prevent this, it is necessary to build up a second area of large mass apart from the original one. By improving the transportation system between the new and old areas, the centrifugal force which drew everything to the original large mass will be dispersed.

2.05 For a regional economy to be an active contributor to the national economy in the Philippines, it will be necessary for it to become self-supporting and a constituent part of the national economy, not just an isolated self-sufficient local economy. In other words, if the area is self-sufficient in terms of resources, possessing the basic productive needs in its land, water, and labor force, products with high production costs will be made and it can be expected that the area as a whole will become relatively disadvantaged in its transactions with other regions. Just because it may have resource potential, it would be precipitous simply to choose among options based on a short-term parochial view of the advantages and and disadvantages of intraregional production.

Basically, the area must also exert efforts in the fostering of certain types of local industries, looking far ahead into the future development of a regional economy even while establishing itself firmly on the principle of comparative advantage. Thus those items which exceed local demand, i. e. surplus products, would be shipped to other areas while materials which are not locally produced or are in short supply would be shipped in from other areas. It would be a desirable aim to balance the area's revenue and expenditure. This economy, in which revenue and expenditure are balanced against other areas, is called a self-supporting economy.

In a self-supporting economy, unless the amount received from exports can cover the payments due for imports, development cannot be hoped for; hence the promotion of export industries or production activities (we refer to these as basic industries) must be planned. Although we refer to these as export industries, it does not necessarily mean that they specialize in shipment only.

Industries or productive activities which mainly meet the demands of the locality are called local industries. Retail stores and barber shops which are individual service businesses are typical local industries. Many of the large-scaled manufacturing plants normally do not rely upon local demand only, so they may be called typical basic industries. However, this classification criterion is not based on the type of industry or the type of product, but depends entirely upon whether or not a certain volume of shipment is made from a certain area. Tobacco for cigars is apparently a typical basic industry of the Cagayan Valley Region. In looking at rice, we find that according to statistics about one-half of the production volume is shipped out from the region, so this too may be called a basic industry. In an open type regional economy which presupposes trade with other areas, the development of the basic industries also stimulates the local industries through its multiplier effect and consequently, it becomes the motive force in leading to the development of the entire local economy.

Generally, the development of basic industries can be predicated upon the prior existence of a considerable accumulation of economic, social and cultural factors as well as various other elements including capital investment capability.

2.06 Generally, productive activities require both mobile elements (such as raw materials and labor power) and immobile elements (manmade infrastructure which cannot be moved once established). Industries which in practice do not require immobile elements are called foot-loose industries. As the words indicate, this is a type of industry which does not require a physical base. Knowledge industries and fabricating industries requiring small volume of resources fall into this category. But such industries tend to cluster in specific areas where information and professionals gather, so in this sense, there are many in this category which cannot be said to be foot-loose.

It may be noted here that agriculture, which is usually expected to play the leading role in the initial stage of development, has the following characteristics:

(1) It produces goods which satisfy the basic needs of people.

(2) It contributes to the solution of the food shortage which confronts the Philippine economy today, and reduces the heavy burden of food imports in the international balance of payments.

(3) It requires comparatively less intermediate input for its output, and its ratio of value added is high. Its production structure is highly self-contained.

(4) It does not require high level professional technical capability and since it can be labor intensive, it serves in providing employment opportunities.

(5) The exertion of individual effort is possible, with the corresponding relation between effort and result comparatively clear. This is due to the fact that agriculture does not require the grouped and uniform labor as seen in industrial production processes, with the exception of such cases as the release of irrigation water, application of agricultural chemicals, etc.

2. 07 From this, we may see that the general importance attached to agriculture during the initial stage of economic development is not only due to the fact that it produces foods which satisfy a basic human need. If the national or international economy is based on free exchange, no matter how important food may be, production will not pay if production costs are much higher than those in other countries or other areas. However, the benefit which accrues to the national economy from agriculture cannot be measured merely by the profit rate seen at the final stage of production. Since agriculture largely depends on natural conditions such as the sun, soil, rain, and labor and does not require many inputs from other sectors, it does not depend on the growth of other sectors or on capital investment. Hence, in terms of the national economy as a whole, it is capital saving.

In primitive subsistence agriculture, where productive activities are undertaken without any purchases being made, the self-supporting nature of agricultural production can be easily comprehended. However, since present-day agriculture uses fertilizers, agricultural chemicals, farm machinery, etc., which have been purchased from others, the dependency rate on other sectors has risen slightly. On the average, however, the intermediate input ratio (the ratio of inputs required per output) in agriculture is extremely small, amounting to about 30%, while the ratio in manufacturing industries is about 70% (in the case of Japan, for instance).

2. 08 The human element, the farmers themselves, is the most important factor in the promotion of agriculture, although the importance of a good location cannot be ignored. The key to production increase lies in the system which sustains agriculture.

At present it is possible to evaluate the activities being pursued under Masagana 99, including the input supply package, the provision of technical guidance and extension of technology, and the formation of such organizations as agricultural cooperatives. However, the establishment of an integrated macro agriculture promotion policy is desirable.

Practically all businesses are evaluated according to their performance on three standards: profitability, stability and growth. Although the priority may vary, these standards are the universal goal of business activity. Agriculture is no exception. Agriculture, as an enterprise, transforms inputs into outputs, trying to achieve profit in the process. In order that this transformation process or production process occur smoothly, it is necessary to have a distribution system for both inputs and outputs with prospects for adequate prices for both. Generally, however, in developing countries, such market conditions are usually insufficient.

It is ironic that countries in which the agricultural population occupies a majority of the entire nation's population have food shortages. Since the agricultural population occupies the majority of the population, non-agricultural sectors do not have the purchasing power or effective demand to absorb agricultural products at a price which would bring profit to the farmers. Thus, the market for agricultural products is small and since conditions which might operate to the advantage of market oriented production do not occur, production is not stimulated by a flow of goods, creating a vicious cycle. These market conditions may explain the paradox that food shortages occur because the agricultural population is excessively large.

For continuous increase in food production, a reasonable and consistent price policy is absolutely necessary. On the other hand, the maintaining of agricultural

products prices at unreasonably high levels not only increases the burden on the consumer but may ultimately become a cause of skyrocketting commodity prices. Hence, the major emphasis of agricultural policy must be consistently placed on the promotion of productivity and the reduction of production costs. In so doing, the advantages and disadvantages of food imports and other policy measures must be deliberately considered and compared. In the execution of any sort of economic policy, the persistent adherence to the achievement of a set physical target or to a certain policy measure will offset the balance of the economy and may result in diseconomies.

2.09 As we have observed above, no matter how great the potential for development may be and/or how many individual projects are planned, such measures alone are not sufficient to promote regional development. Planning in which each respective project and element occupies its proper position within a consistent, coherent and integrated framework for long-term development must be undertaken.

Planning as referred to here is not a single static action, but a dynamic process in which the results and effects of actions are always monitored, evaluated and fed back to the plan, with overall adjustments made.

The secret to planning is not to have some of the planners become self-satisfied, but to involve everyone in the process--Government administrators, the residents, other related concerns and if possible, outsiders, so that all can be enthusiastic and concerned about the realization of the plan. Nothing can be accomplished where there is no participation by the people concerned. For this purpose, it is also necessary to officially announce and submit a logical plan and endeavor to persuade. But since "seeing is believing", it would be better to demonstrate immediately the practicability of the plan and let them see what the effects of the plan will be.

In other words, for the time being, efforts should be exerted toward any project which is consistent with the entire plan and yet from which a quick-return may be expected so that tangible results may be realized early.

Such a policy can be recommended not only for pedagogical reasons but also from economic considerations. In large-scaled projects the gestation period is long and the economic burden also becomes great. Generally, the initial effects of large-scaled projects are often seen in and complemented by medium, small and mini-scale projects or construction work. For example, in an irrigation system, the construction of reservoirs and head works constitute large-scaled projects, while the construction of branch canals and laterals comprise medium or small-scaled projects. Thus the major portion of execution of the project is also on a smaller scale.

This notwithstanding, the importance of small-scaled projects is not minor. The visible result of an irrigation project is seen when the water first reaches the field it is to irrigate.

Section 2 A Variety of Integrated Regional Development Plans

2. 10 In a broad perspective, a regional plan is comprehensive and long-range, encompassing both industry and physical facilities. It is formulated for a region where problems exist in connection with development, conservation and utilization. In some instances, the plan will include rural and urban plans worked out on a lower level. The rural or urban plan per se might perhaps be described as a regional one at least in the sense that it also involves manmade factors (industry and facilities) and will evolve in a "place" which comes in the form of an area.

2. 11 The determination of an area for regional planning depends upon the nature of the tasks to be done, which themselves contitute the raison d'etre of the plan. In the determination of an area, consequently, it is essential that the area be studied in its entirety. An area is an environmental entity, with homogeneity and interrelating parts; hence it should be examined in a comprehensive perspective on the basis of regional sections of the country, jurisdiction, land conditions, and spheres of industrial zones, livelihood, beneficiaries and influences in a manner most suitable for the assigned tasks.

The points to which attention ought to be paid in this instance are: (1) that the area should encompass the districts which are confronting comm on issues, (2) that it should include the districts which are related to the implementation of the most important measures, and (3) that it should contain the districts to which the major effects will extend or the districts in which the influences will have to be adjusted. While giving heed to these points, consideration must also be given to the need to divide the area into divisions of such proportions as will facilitate the planning and implementation of the actual measures determined.

2. 12 To a great extent, the way in which the program period is determined holds sway over the substance of a regional development program. In some instances, the program period or the target year is predetermined, as when it is tied in with that of a higher level program (e. g. , a national development program). Then there are cases in which the plan period or the target year must be determined independently and optionally on the basis of the substance of the plan. There is no generally accepted theory as to how many years should be set aside for a planned period. Judging from the viewpoint of planning technique, it may be appropriate to set it within a period in which the reliability of forecasts may be assured to some extent, or a period in which no basic alterations are considered likely to take place in the targets of the regional plan.

Whether the planned period is long or short is determined by the substance and the degree of precision of a plan. Long-range plans would reach down to projects with gestation periods of three to five years. In substance, the long-range plan is abstract whereas the short-term plan is concrete. In the construction of a mammoth dam, however, concreteness pervades even in the long-range plan. The following are the varied types of plans classified by planned periods.

Table 2.01 Planned Period as Classified by Types of Plans

Period	Classification	Type
More than 20 years	Ultra-long-range plan	Vision, pilot plan
10 - 20 years	Long-range plan	Master Plan
5 - 10 years	Interim plan	Plan Program
3 - 5 years	Short-term plan	Project

As a plan gradually takes on concrete shape from the pilot plan to a basic plan, then to a plan and finally to a project, whatever is incorporated in the plan worked out on the higher level (for a wide area) is progressively subdivided into programs on the lower level (for limited areas). The minuteness of the plan must be stepped up in proportion to this subdivision. As a yardstick for the minuteness of planning, a list of scales for maps for different types of planning is given below. It is to be noted that this list serves as a general criterion, and it does not necessarily mean that this list may serve as it is in actual planning. The scales should be more elaborate in some cases and could be rougher in others.

Table 2.02 Types and Minuteness of Plan (Scales for Maps for Use in Physical Plans)

	National land plans	Regional plans			Local plans	
		Local	Prefecture, etc.	Wide-area city, etc.	Urban	Housing project, etc.
Pilot plan	1/2,000,000	1/1,000,000	1/200,000	1/50,000	1/15,000	1/10,000
Master plan	1/1,000,000	1/500,000	1/100,000	1/25,000	1/10,000	1/3,000
Plan	1/500,000	1/200,000	1/50,000	1/10,000	1/3,000	1/1,000
Project	-	-	-	-	1/600	1/600

With respect to the relationships among the various types of plans in the table, it might be siad that the nature and minuteness equivalent to those of a pilot plan at a city level are required for a master plan (1/25,000) at a wide-area city level, and that the nature and minuteness equivalent to those of a plan at a local level is required for a pilot plan (1/200,000) at a prefectural level.

2.14 When a regional plan is defined as a plan related to a given region or area, it is clear at least from the above classification that regional plans come in various types. What plan should be made the guideline for conduct in the immediate future depends upon the given case, and therefore no sweeping conclusion can be made. In any event, it is anticipated that a regional plan will provide the prescriptions which are to be required in finding solutions to the problems of a given area. Given this anticipation, it is only natural that one target or another ought to

be established. Again, the target comes in various patterns. The various targets are related to one another in the form of a hierarchy. Whatever target is set on the lower level serves as a means to accomplish a target set on the higher level. From the standpoint of character building, for instance, education may be looked upon as an expedient. From the viewpoint of education, however, the school system is a resource.

In a similar vein, the targets in a wide-area program are also multiple. When the targets are classified in the order of conceptual, qualitative targets and concrete, quantitative targets, they fall into three categories of 1) Qualitative Objectives (character of a given area in the future), 2) Policy Objectives (basic measures) and 3) Quantitative Objectives (economic, social, physical, etc.). The targets in these three categories are listed below:

(1) Qualitative Objectives

a) Scale : Large, medium, small, etc.
b) Industry : Primary, secondary, tertiary, and specialization and combination of industries, etc.
c) Function : Administrative, control, production, consumption, welfare, transport, military, etc.
d) Level : International, national, local, district.
e) Form : Cities, farm and fishing villages, etc.
f) Standards : Income, livelihood, culture, etc.
g) Others : Peculiarities based on geographic conditions (coastal, inland, unique meteorological conditions, etc.)

(2) Policy Objectives

a) Resources development
b) Industrial development
c) Urban development
d) Rural development
e) Facilities development (development of major facilities altering geographic or site conditions)
f) Livelihood improvement (redevelopment of living environment)
g) Culture promotion (redevelopment of cultural and educational facilities)
h) Replenishment of welfare and health
i) Protective maintenance
j) Others (military and other special matters)

(3) Quantitative Objectives

a) Population composition (total population, population composition by industries, family composition, etc.)
b) Economic structure (industry, distribution, finance and banking, etc.)
c) Area structure (spatial distribution of population, industry,functions, etc.)
d) Land use pattern
e) Urban pattern (single, combined, wide-area, etc.)
f) Rural pattern (villages, hamlets, land redevelopment plot, etc.)

g) Facilities (systems facilities such as transport, water supply, drainage, communication, electric power, gas; facilities provided for educational cultural, and welfare uses, fixed facilities for land conservation, disaster prevention, protection and use of cultural assets)

h) Others (environment, etc.)

The quantitative objectives provide quantitative indicators for various factors necessary for the realization of the qualitative and policy objectives of an area. It does not necessarily mean, however, that the qualitative, policy and quantitative objectives are clearly indicated in written plans, but it is conceivable that such a classification in the mental planning process would be able to clearly shape images of the future.

2. 15 The survey conducted by our survey team is a preliminary one designed to provide a broad perspective of what issues there will be in the development of the Cagayan Valley Region and what projects are in existence or planned. Attempts were made to make the items under study as comprehensive as practicable, but this survey has not turned out to be "all-inclusive" in nature. Nor was it designed to prepare some of the plans to which reference has already been made. In carrying out this survey, all the members of the team were oriented to planning and paid attention specifically to the following points:

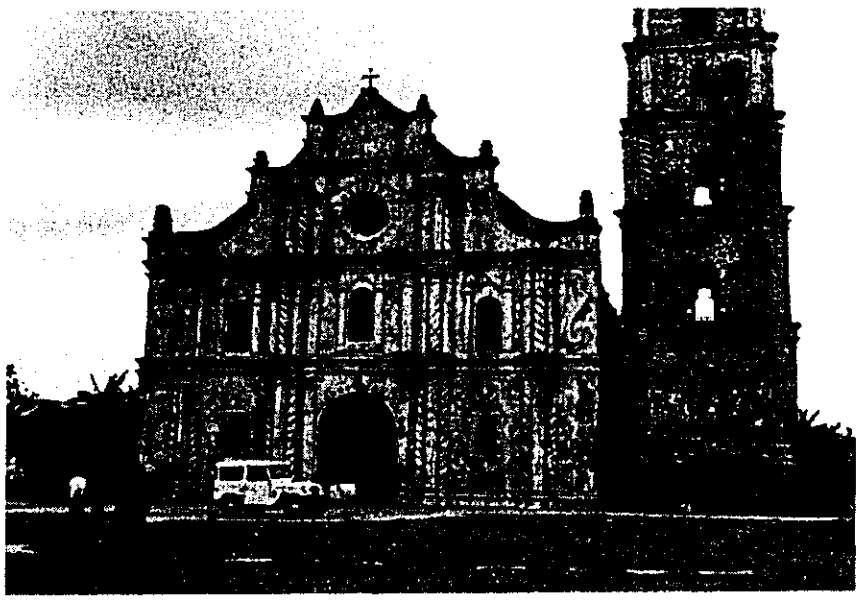
(1) Consistency and complementarity.

(2) Identification of quick return projects as well as projects requiring long gestation.

(3) Discovery and recognition of plans and projects of a nature and dimension suited to the realities of given regions.

Chapter 3

Current State and Problems of the Region



Section 1 General Description

Section 2 Current State and Problems of the Region

photo : Old church by the Pan Philippine Highway

Chapter 3 Current State and Problems of the Region

Section 1. General Description

3.01 The Cagayan Valley Region is located in the northeastern portion of the Island of Luzon, the largest island of the Philippines. It consists of three provinces, namely, Cagayan, Isabela and Nueva Vizcaya Provinces (including Quezon Sub-Province).

The total area of this region is 2.66 million ha. It faces the Babuyan Channel on the north and the Pacific Ocean on the east. Since it is bounded by the Caraballo Mountains on the south, by the Sierra Madre Mountains on the east and by the Cordillera Central Mountains on the west, the Cagayan Valley Region is geographically isolated from the rest of the Island of Luzon.

3.02 The Cagayan River is the largest river in the Philippines. Its basin covers an area of 28,110 km^2 and its length is about 380 km. The Cagayan River flows north, from its source about 1,500 m above sea level in the Caraballo Mountains to its mouth in the Babuyan Channel near Aparri. It is joined by left tributaries, including the Magat, Siffu and Chico Rivers, and by right tributaries, including the Ilagan River.

About 30% (18,300 km^2) of the basin is flat. The remaining part (70%, or 19,800 km^2) consists of mountains. The basin has experienced several upheavals caused by diastrophism. As a result, the river has gradually narrowed the range over which it floods, rages and meanders. River terraces have been formed, and gradually, it has become a relatively stable river.

There is a low, broad alluvial plain which extends from the downstream area to midstream and at the downstream areas of its major tributaries. A mildly sloping alluvial field with low rolling hills is found elsewhere.

About 65% (12,800 km^2) of the mountain zone has good forests and the remaining part has no forests. Bare mountain is found mostly in the west side of the basin. Soil erosion is feared here because water resources do not favor cultivation.

3.03 The Cagayan River Basin has a type 3 climate (in which a wet season and a dry season cannot be clearly distinguished, and the period between May and October is relatively wet, while the period between November and April is relatively dry.) Almost half of the large floods occur in November and December. Annual precipitation has sharp local and secular variations. The records from 1902 to 1963 show a maximum precipitation of 3,413 mm and a minimum precipitation of 935 mm.

The average annual precipitation is slightly above 2,000 mm.

Rainfall is caused mostly by typhoons or tropical depressions. The typhoon season begins in July and ends in November. The basin is hit by about four typhoons each year. Heavy thunderstorms occur along the front where warm and moist winds from the southern hemisphere and the northern hemisphere meet. In August every year, this front moves to the northern shore of the Island of Luzon, and then moves back to the south again.

The mean annual temperature is 26.6°C in Tuguegarao in the downstream plain region, while it is about 23.6°C in Santa Fe in the upstream mountain region. Temperature is generally higher than the annual mean between April and October.

3.04 Surface water and underground water are the two forms of water in the region, and both derive sololy from rainfall.

As Table 3.01 and 3.02 show, the mean annual rainfall is 2,262 mm at the river mouth in Aparri and 1,763 mm downstream in Tuguegarao. These figures are below the average of 2,409 mm for the twenty-nine observation posts throughout the country. The mean rainfall in the Cagayan River Basin shown in the regional distribution map in Fig. 3.01 is 2,066 mm. In other words, the annual rainfall in the entire basin is considerably below the national average. Annual rainfall sharply varies secularly.

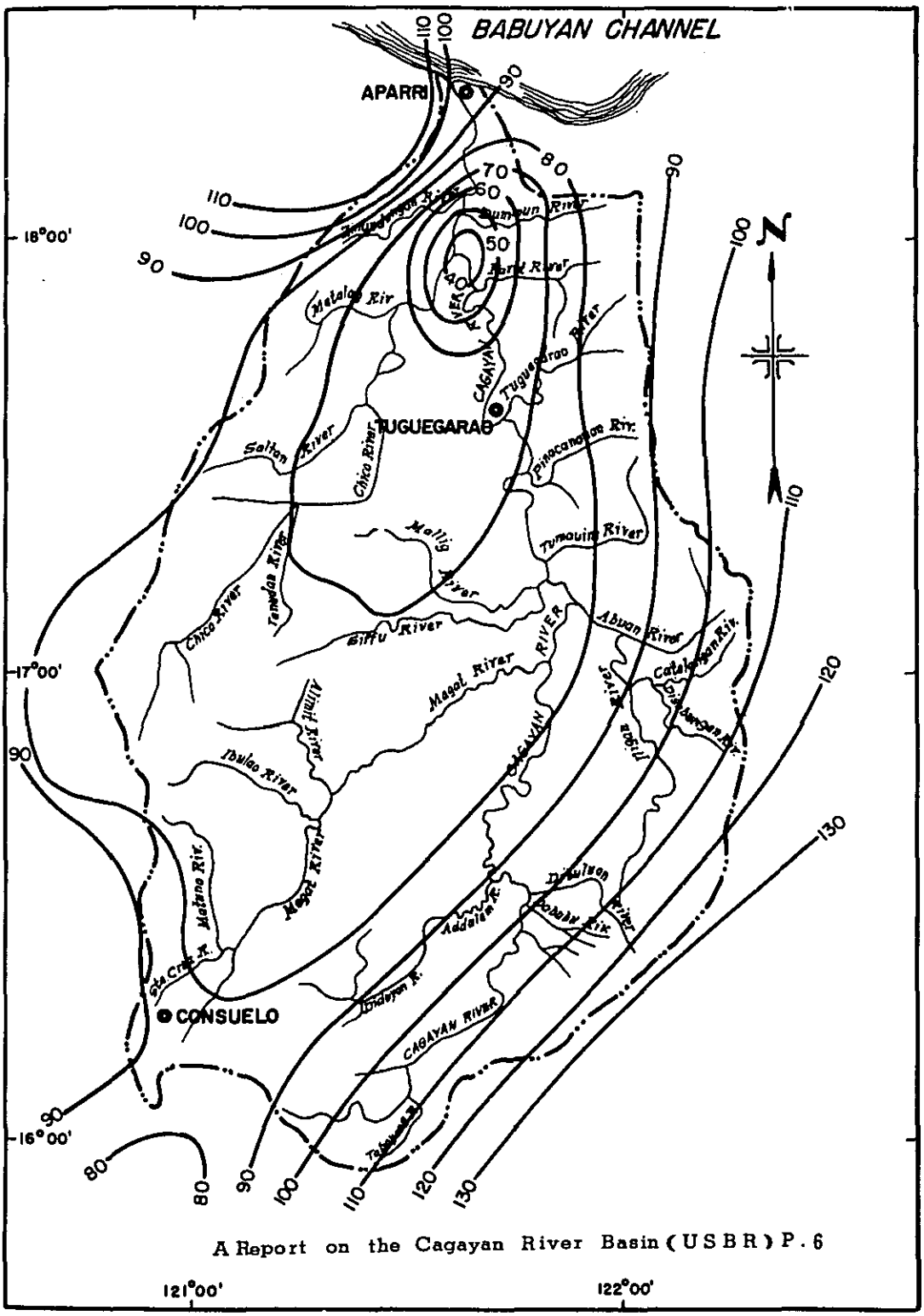


Fig. 3.01 Mean Annual Precipitation

The figures for Aparri, Tuguegarao and Santa Fe in the upstream region are shown in Tables below. Rainfall in Tuguegarao characterized by large fluctuation, with the maximum annual rainfall being 3,413 mm and the minimum 935 mm. Tables 3.01, 3.02 and 3.03 also show that both rainfall and the numbers of rainy days are especially large between May and December.

Table 3.01 Annual Rainfall (River Mouth)

Station : Aparri, Cagayan

Time Period : (1902 ~ 1939, 1947 ~ 1960)

Month	Average		Max. Annual Rainfall (1960) mm	Min. Annual Rainfall (1914) mm	Max. Monthly Rainfall (mm)	Min. Monthly Rainfall (mm)
	Rainfall (mm)	Number of Rainy Days (days)				
1	144	16	465	101	709	5
2	90	11	119	72	250	4
3	55	8	23	25	197	0
4	49	6	15	12	236	1
5	111	11	238	11	451	1
6	173	11	101	90	617	12
7	190	13	161	35	506	20
8	234	15	212	223	600	68
9	295	15	784	209	784	25
10	367	19	485	177	809	63
11	336	19	379	187	882	37
12	218	19	295	73	546	41
Total	2,262	163	3,277	1,215		

Table 3.02 Annual Rainfall (Downstream)

Station : Tuguegarao, Cagayan

Time Period : (1903 ~ 1939, 1947 ~ 1960)

Month	Average		Max. Annual Rainfall (1934) mm	Min. Annual Rainfall (1914) mm	Max. Monthly Rainfall (mm)	Min. Monthly Rainfall (mm)
	Rainfall (mm)	Number of Rainy Days (days)				
1	31	7	26	14	121	0
2	25	5	4	0	108	0
3	34	5	68	0	112	0
4	65	6	73	17	250	1
5	132	11	200	124	482	4
6	156	12	68	159	373	39
7	233	15	119	99	590	76
8	206	15	142	98	631	28
9	236	14	750	182	750	19
10	237	14	512	101	681	10
11	269	14	1,316	82	1,316	21
12	139	11	135	59	375	10
Total	1,763	129	3,413	935		

Table 3.03 Annual Rainfall (Upstream)

Station: Consuelo, Santa Fe, Nueva Vizcaya
Time Period: (1948～1963)

Month	Average		Max. Annual Rainfall (1948) mm	Min. Annual Rainfall (1959) mm	Max. Annual Rainfall (mm)	Min. Annual Rainfall (mm)
	Rainfall (mm)	Number of Rainy Days (days)				
1	31		7	26	80	7
2	33		52	24	219	2
3	58		17	94	114	5
4	100		223	23	260	17
5	172		219	137	312	48
6	212		176	86	629	86
7	329		1,021	170	1,021	100
8	448		549	245	1,053	185
9	317		505	176	513	176
10	239		257	96	712	26
11	179		103	214	445	24
12	111		246	82	309	6
Total	2,229		3,375	1,373		

The average annual precipitation in the Cagayan River basin is estimated to be about 58. 1 billion m^3. According to the report of the United States Department of Interior, Bureau of Reclamation (hereafter USDIBR), 49. 0 billion m^3 of surface water flows annually from the Cagayan River to the sea. More specifically, 6. 93 billion m^3 of this is from the Chico River, 5. 68 billion m^3 from the Magat River, 5. 90 billion m^3 from the Ilagan River, 13. 30 billion m^3 from the upper mainstream of the Cagayan and 17. 19 billion m^3 from the downstream part of the Cagayan River and other tributaries. Table 3. 04 indicates that the minimum discharge of the Cagayan River is relatively large even during a dry season. However, no definitive statement can be made since statistical data covers a relatively short period.

Table 3.04 Droughty Water Discharge of the Cagayan River

River	Station	Time Period	Basin Area	Minimum Discharge	
			km^2	m^3/s	
Cagayan River	NAGUILIAN	1961－1966	6,266	73.0	(30 May, 1965)
Magat River	BAYOMBONG	1958－1966	1,784	4.5	(5～9 May, 1966)
Chico River	TABUK	1963－1966	1,987	18.1	(30 Apr., 1966))

3. 05 Currently, no data are available on net regional products by industry. Table 3. 05 shows the distribution of employment by industry, quoted from the census.

Table 3.05 Distribution of Employment by Industrial Sector and Province (1970)

1,000 persons %

	Total Labor Force	Primary Industry		Secondary Industry		Tertiary Industry	
Cagayan	198.7	148.6	74.8	16.3	8.2	33.7	17.0
Isabela	220.5	171.6	77.8	15.6	7.1	33.4	15.1
Nueva Vizcaya	74.0	56.5	76.3	5.0	6.8	12.5	16.9
Total	493.2	376.7	76.4	37.1	7.5	79.6	16.1
The Philippines	11,622.5	6,372.2	54.7	1,915.1	16.5	3,335.2	28.8

Cagayan Valley Region is a typical agricultural region where about three-fouths of the total labor force is engaged in agriculture. The major agricultural crops are rice, corn and tobacco. It is a net exporter of rice to other regions in the country.

With regard to manufacturing industries, both production (in value) and fixed assets are less than 1% of the national total. The major industries in this region are food processing, tobacco and lumber, but manufacturing industries are not large enough to produce the necessary goods in the region. Therefore, consumer and capital goods are mostly imported from other regions (mainly Manila).
Most of the products of primary industry in this region are shipped to Manila for processing.

3.06 As Table 3.06 shows, the population of the Cagayan Valley was 1.45 million in 1970 with a growth rate of about 3.53% in the 1960's. It accounts for about 4% of the total Philippine population. The study of population trends in the post-war period reveals that the growth rate in this region is far above the average growth rate for the country as a whole.

Table 3.06 Population in the Cagayan Valley Region

	Population			Popuration Growth Rate	
	1948	1960	1970	1948 – 60	1960 – 70
Cagayan	311,088	445,289	580,880	3.05	2.70
Isabela	264,495	442,062	647,428	4.38	3.90
Nueva Vizcaya	82,718	138,090	221,738	4.35	4.82
Total	658,301	1,025,441	1,450,046	4.53	3.53
The Philippines	19,234,182	27,087,685	36,684,486	2.90	3.01

Source: The figures are based on the 1970 Population Census.

Although Cagayan Province shows a slightly lower population growth rate compared with the other provinces and the country as a whole, the Isabela and Nueva Vizcaya Provinces show higher population growth rates than the country as a whole. We can see from this data that there is a trend for population to migrate into the region.

According to the statistics on population migration, this region has the third highest number of immigrants, second only to southern Tagalog comprised of the region around Manila and southwestern Mindanao which has sufficient unutilized land. It is difficult to interpret population migration to this region since no sufficient investigation has been conducted on the subject. It may be assumed that most immigrants are absorbed into the agricultural sector since no other significant industry is found in this region.

Table 3.07 Trends in Population Migration

	Estimated Net Immigration (a)	Average Population in 1960 and 1970 (b)	(a) / (b)
Manila City	−87,708	1,234,699	−0.0696
Ilocos	−68,460	1,651,453	−0.0414
Cagayan Valley	32,335	1,249,236	0.0259
Central Luzon	97,633	4,395,545	0.0222
Southern Tagalog	1,002,684	5,529,675	0.1813
Bicol	−300,768	2,664,794	−0.1129
Western Visayas	−438,384	3,497,685	−0.1253
Eastern Visayas	−597,790	4,988,948	−0.1198
Northeastern Mindanao	44,184	2,564,078	0.0172
Southeastern Mindanao	314,271	4,109,970	0.0765

Source : ILO data

3.07 The average annual household income in this region is 2,390 pesos. The median income of an agricultural household and of a non-agricultural household are 1,527 pesos and 2,288 pesos, respectively. These figures are the lowest in the country, equal only to Eastern Visayas.

Table 3.08 Household Income (1971)

Pesos

	Median Household Income			
	Total	Median for Agricultural Households	Median for Non-Agricultural Households	Mean Household Income
Manila	5,202	7,003	5,184	7,785
Ilocos	1,813	1,516	2,731	3,299
Cagayan Valley	1,652	1,527	2,288	2,390
Central Luzon	3,119	2,514	3,459	4,127
Southern Tagalog	2,960	1,973	3,590	4,332
Bicol	1,874	1,530	2,582	2,784
Western Visayas	2,332	2,209	2,410	3,206
Eastern Visayas	1,651	1,291	2,118	2,548
Northeastern Mindanao	2,186	1,865	2,816	3,062
Southeastern Mindanao	2,549	1,973	3,307	3,577
The Philippines	2,454	1,783	3,174	3,736

Source : The BCS Survey of Households Bulletin, Series No.34

As Table 3.09 shows, the median income of an agricultural household in this region is, with Bicol, the third lowest in the country, next only to Eastern Visayas and Ilocos. According to the 1971 estimate, the median agricultural household income is 1,527 pesos, which is 84% of the national median and only 60% of the median (2,514 pesos) in Central Luzon, which has the highest.

Table 3.09 Trends in Median Agicultural Household Income by Region

	Median Household Income (pesos)			Ratio to National Median (%)		
	1961	1965	1971	1961	1965	1971
The Philippines	871	1,281	1,818	1.00	1.00	1.00
Ilcos	854	952	1,516	0.98	0.74	0.83
Cagayan Valley	752	973	1,527	0.86	0.76	0.84
Central Luzon	1,024	1,449	2,514	1.18	1.13	1.38
Southern Tagalog	1,112	1,997	1,973	1.28	1.56	1.09
Bicol	807	1,297	1,530	0.93	1.01	0.84
Western Visayas	903	1,380	2,209	1.04	1.08	1.21
Eastern Visayas	745	1,002	1,115	0.86	0.78	0.61
Northeastern Mindanao	995	1,293	1,865	1.14	1.01	1.03
Southwestern Mindanao	687	1,302	1,973	0.79	1.02	1.09

Source: BCS

The causes of the low agricultural income the Cagayan Valley Region are examined below by comparison with other regions and the national average. Fig. 3.02 is a radar graph prepared for showing the position of Cagayan Valley in comparison with the national average. The following statements can be made on the basis of the data in the graph.

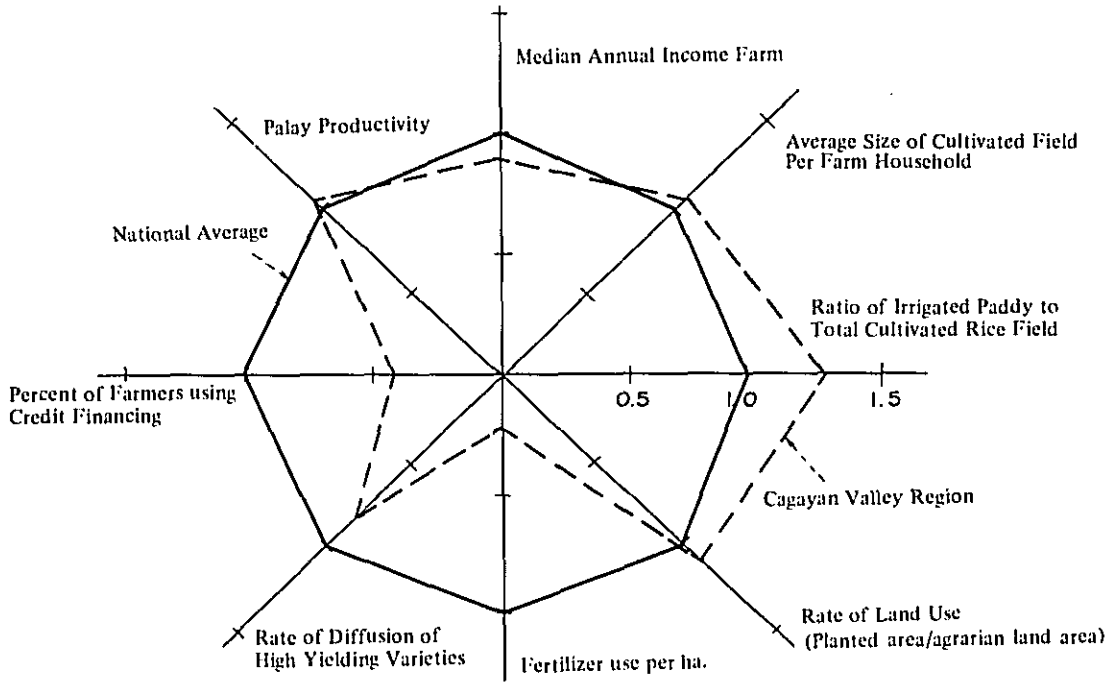


Fig. 3.02 Comparison of Agricural Indices

(1) The area of land under cultivation and the ratio of irrigated paddy to total cultivated rice field are both high, and hence the land utilization rate is also high.
(2) There has been insufficient diffusion of modern agricultural techniques, including use of fertilizers and high yielding varieties.
(3) Farmers are not making use of financing available to them. Two interpretations of this are possible. First, financing which would permit introduction of modern agricultural techniques is not available, or second, the lack of modern agricultural techniques means there is little need for financing.

Use of fertilizers not only progresses with agricultural modernization, but also depends on price conditions. It is important to study the ratio of fertilizer cost to palay price. According to estimates for the 1971 harvest, fertilizers cost 1.51 peso per kg and rice costs 0.57 peso per kilogram. The ratio is 2.6. For Central Luzon, the figures are 1.33 and 0.63 pesos and 2.1 respectively. In other words, fertilizers are relatively expensive and rice is relatively inexpensive in Cagayan in comparison with Central Luzon. This is one of the factors inhibiting the spread of fertilizer use. Regional differences in prices are attributable to unsatisfactory transportation conditions.

3.08 In this region, the primary sector accounts for 79% of total production. This share is far above the national average of 55%. This region has the lowest income level in the Philippines. The average annual income per household is as low as 1,322 pesos, while the national average is 2,541 pesos. Households with an annual income less than 1,500 pesos (about 67,500 yen) account for 46% on the national level, but 72% in this region. This indicates that the living standard of agricultural households in the Cagayan Valley Region is currently extremely low.

The three provinces in this region had 44,000 agricultural households in 1971, or 6.1% of a total of 2.355 million agricultural households.

The scale of management for the region shows less difference with the country as a whole. In the three Cagayan Valley provinces, farmers with holdings of less than 5 hectares account for 88%, as compared with a figure of 84% for the whole country. But the average per household land holding is 2.75 hectares, slightly above the national average of 2.19 hectares.

3.09 Fig. 3.03 compares indices of social capital for the Cagayan Valley Region with the corresponding national averages. In this region, those indices which approach the national averages are irrigation facilities and demonstration stations, which are included among agricultural social capital. The same tendency is found also with educational facilities. However, road, communications and power facilities are far behind the national average.

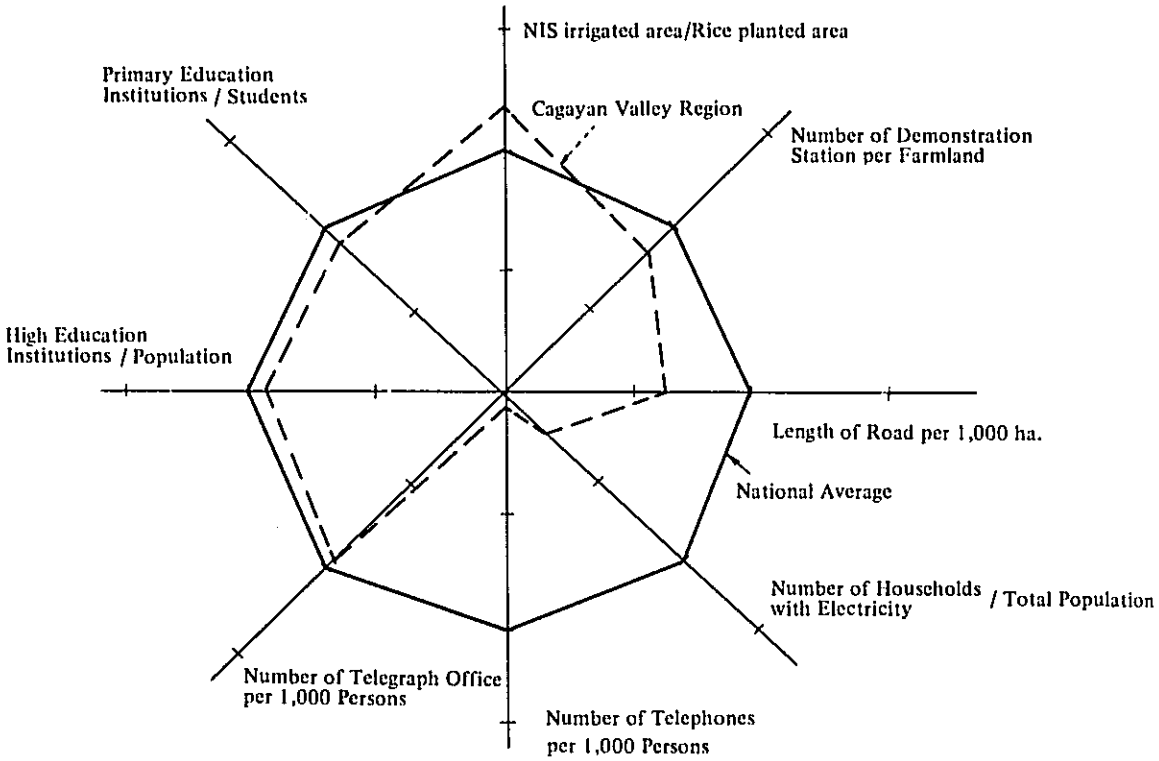


Fig. 3.03 Comparison of Indices of Social Capital: Nation and Region

A study of the regional distribution of the Government's public investments (cumulative total for 1964 to 1972) indicates that 5. 0% of total investment of 1. 66 billion pesos is allocated to this region. Since public investments tend to be concentrated heavily in Southern Tagalog including Manila (17%) and Central Luzon (31%), the amounts allocated to the other regions are low in comparison with their population, land area etc.

As Table 3. 10 shows, the largest investments were made in roads and bridges, followed by irrigation facilities. The investments in flood control and drainage facilities and ports and harbors are small.

Per capita public investment is slightly above the national average since the population in this region accounts for about 4% of the national total. In view of the fact that the region accounts for 8. 9% of the total area of the Philippines, however, public investment is spread thin.

Table 3.10 Public Investment by National Government in the Cagayan Valley Region (1964-72)

	Total Expenditure (1,000 pesos)	Percentage of National Total (%)	Percentage of Total Expenditure in Region
Flood Control and Drainage	586	1.8	0.7
Ports and Harbors	139	0.1	0.2
National Irrigation System	13,178	2.9	16.0
Communal Irrigation	1,007	12.3	1.3
Roads and Bridges	67,641	7.0	81.9
Total	82,551	5.0	100.0

Source : ILO data

3. 10 In Manila, the Cagayan Valley Region is considered to be one of the underdeveloped regions. Historically, however, the Cagayan River Basin was an important tobacco producing region especially under Spanish administration. Lallo is said to have been one of the key points for the Spanish rulers. The ruins of the old churches along the Pan-Philippine Highway and the numerous pieces of old Chinese ceramics at the museum of the Cagayan provincial office indicate the past prosperity of the region.

Since the beginning of this century the construction of roads and transportation facilities from Central Luzon has been studied in connection with the development of this region. One of the examples is the Cagayan Railroad Project, on which construction was begun with Japanese reparation funds but suspended in 1961.

The name "Angat-Magat Project" is known to Japanese. About the former, Angat Project in Central Luzon, Akira Takahashi has described in his work on Land and Peasant of Central Luzon: Socio-Economic Structure of a Bulacan Village (Tokyo: Institute of Developing Economies, 1969) how this irrigation project changed the farmers' life in the area. About the latter, Magat Project (to be discussed in detail later), several sorts of study reports have been prepared. In some of these early prepared reports, there were references to the organization known as the "Central Luzon and Cagayan Valley Development Authority", although such an organization no longer exists.

The representatives on the Philippine side described the present status and problems facing on-going projects in the Cagayan Valley Region to the Survey Team during its July - August site visit. Details of these discussions are touched on late in this report.

Section 2 Current State and Problems of the Region

Rivers

3. 11 The Cagayan River has remained untouched, except for the upstream area of the Magat River. It is in a state of constant transition to a new equilibrium with the ceaseless action of scouring, sedimentation, turbulant flow and meandering. However, this is an extremely slow process with no discernible change to be found in its channel.

Table 3. 11 is an attempt to show the extent of the meandering of the main stream. With the exception of the downstream area near the mouth, it reveals considerable meandering, especially between the Gattaran (Nassiping) Gaging Station and the Tuguegarao (Namabalan) Gaging Station.

Table 3.11 Meandering

Location	Channel Length	Distance in Straight Line	A / B	Remarks
	(km)	(km)		Sites are where observation posts are located.
Aparri	48	42	1.14	
Gattaran (Nassiping)	86	48	1.79	
Tuguegarao (Namabalan)	81	59	1.37	
Naguilian	58	38	1.53	
Echague				

The channels of the tributaries are almost as winding, with the Siffu River channel being exceptionally meandering. The meandering of the channel is one factor contributing to the gentle slope of the river bed and exacerbating flooding.

In comparison with the gently flowing main stream, the main tributaries flow rapidly, except for the Siffu River. Fig. 3. 04 is a profile, showing the river-bed slope of the main stream at midstream and downstream, based on water level data of April, 1966.

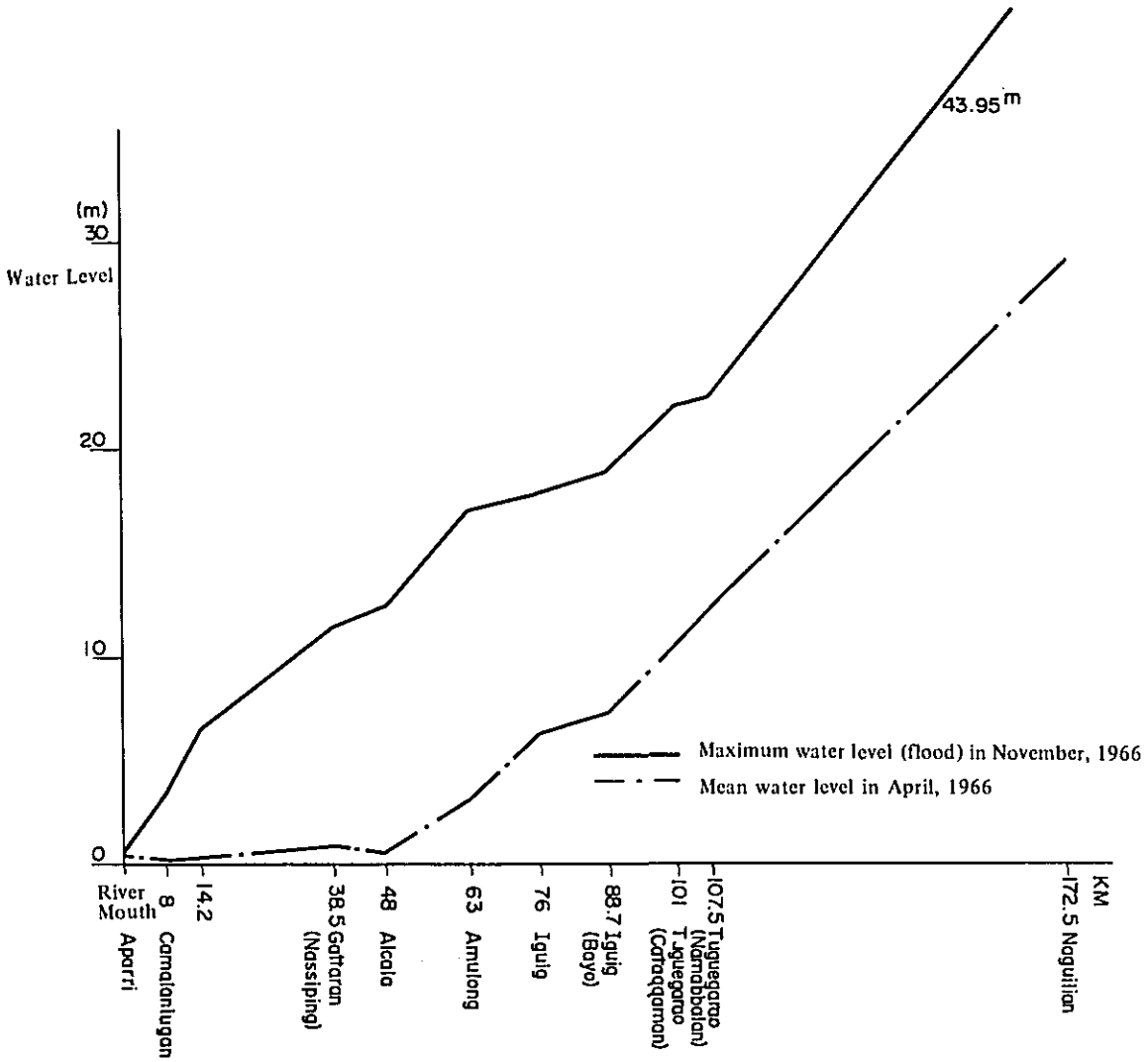


Fig. 3.04 Profile of the Water Level at Selected Points

3. 12 The diagram reveals that the slope is extremely gentle between the river mouth and Gattaran, while between Gattaran and Naguillian the slope is estimated to be as gentle as one in several thousands. Sand sedimentation and subsequent river bed elevation will continue both downstream and upstream at points where the angle of the slope changes suddenly. This phenomenon is undesirable not only for navigation, but also for river bank erosion which is presently occuring between Gattaran and Camalaniugan. In addition, it is also likely that sudden changes in the slope of the river bed will tend to decrease the capacity of areas upstream of the point of change to discharge flood water.

A sand bank has been formed by sedimentation near a quay on the right bank of the river at old Aparri Port. This sand bar was formed when accumulated silt was moved by littoral drift to the front of the quay and then built up on the right bank of the river mouth.

3. 13 The channel of the Cagayan River lacks flood discharge capacity along its entire length. For the reason, floods often inundate the low-lying plains along the river channel, except for a narrow valley zone along downstream. Inundation is usually limited to the well-developed river terrace, but the area of potential maximum inundation is assumed to exceed 2, 000 km^2.

Fig. 3. 04 shows the profile of the maximum water level based on observed data from the 1966 November flood. It indicates that the flood level between Alcala and Tuguegarao (Namabalam) can be lowered considerably by increasing the channel's flood discharge capacity. However, it seems that a further lowering of flood level can be accomplished only by increasing the total flood discharge capacity between the river mouth and Tuguegarao. Some lack of flood discharge capacity is also suspected between Tuguegarao and Naguilian, but the currently available data are not sufficient for accurate judgment.

3. 14 The Cagayan River has often flooded heavily. Table 3. 12 lists the largest floods each year between 1958 and 1970. According to this, the largest mainstream flood occurred in November, 1966, while the largest tributary flood was on the Magat River in October, 1960. The largest mainstream flood of recent years came in November, 1972. A flood of the magnitude of the 1972 one occurs only once in 50 to 60 years.

Inundation by ordinary floods seems to be limited to the low, flat farmland along the channel. But the flood of November, 1972, inundated over 1, 000 km^2 and damaged agricultural crops, numerous houses, fixed assets and public property. It also closed trunk roads, including the Pan Philippines Highway, for a long period. This flood brought inmeasurable visible and invisible damage.

Floods occur between May and December, with mainstream floods coming mostly between October and December. Since this is an important period for the growth and harvesting of rice, this means that floods play a major role in damage to the rice crop. The 1966 report of the USDIBR estimates that the average annual damage from flooding of the Cagayan River amounted to 1. 6 million pesos. On the other hand, the fertile materials brought by the floods are good for tobacco and corn production.

Some water control works for flood prevention were carried out along the Magat River. One of them was the construction of the 320 m long embankment constructed on the upstream left bank of the Magat River. It was to protect the City of Bayambon, Nueva Vizcaya, from the flooding of the rapid and turbulent river. It was built at the beginning of the 1930's and has been reinforced and repaired since. However, this embankment was broken by the flood of October, 1971. As a result, almost one half of the City of Bayambon was inundated and considerable damage resulted.

Another control project is the 18. 6 km long embankment on the downstream right bank of the Magat River. It was constructed between 1956 and 1957 to protect the farmland near San Mateo, Isabela, from floods.

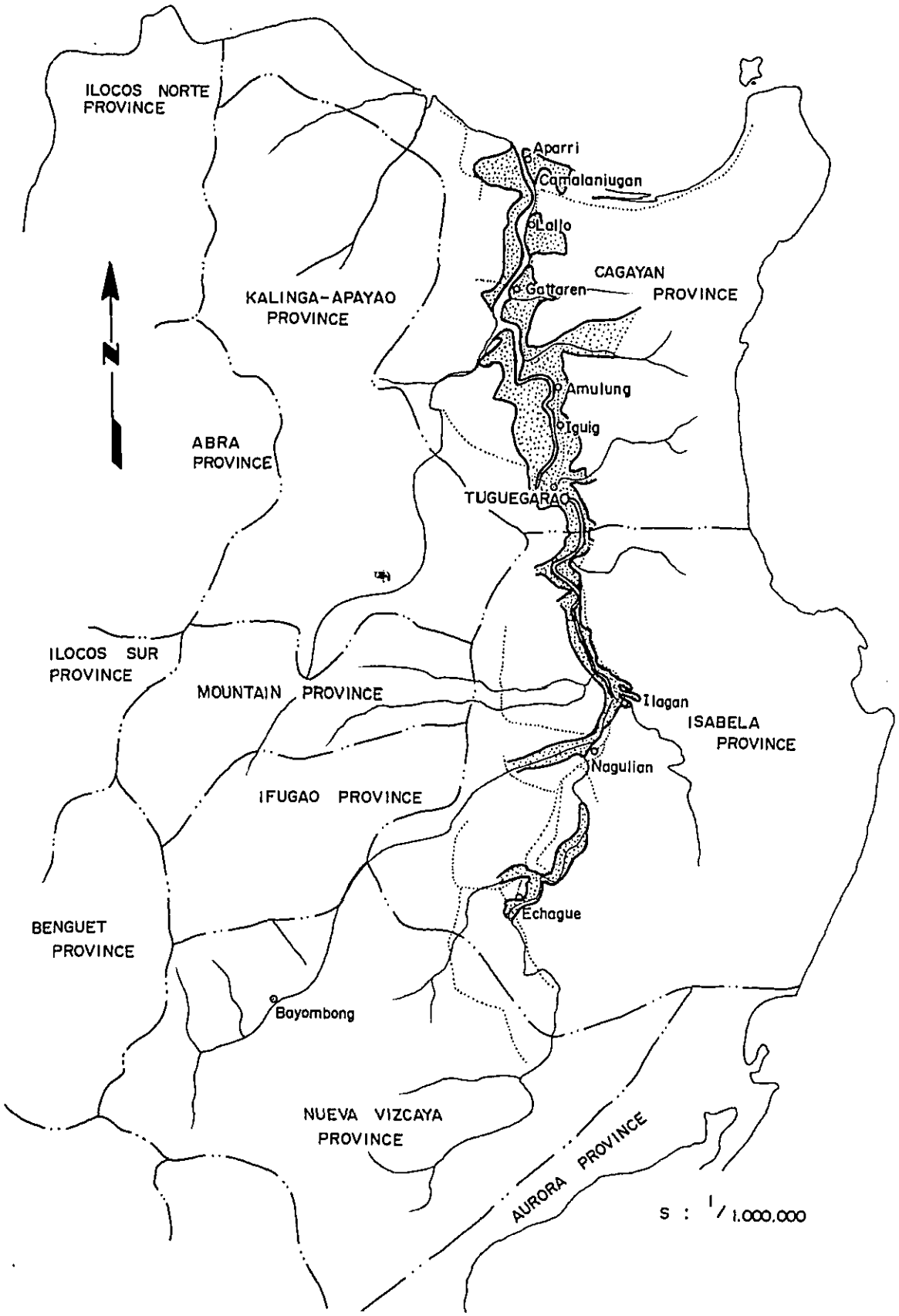


Fig. 3.05 Inundated Area, 1972

Table 3.12 Major Floods, 1958-1970

	The Cagayan River (Naguilian)		The Cagayan River (Tuguegarao)		The Magat River (Bayombong)	
	Date	Maximum Discharge	Date	Maximum water level	Date	Maximum Discharge
1958			10 . 28	18.49		
1959			11 . 19	20.80	11 . 18	1,200
1960			10 . 14	19.60	10 . 14	1,500
1961	11 . 25	6,000	10 . 15	17.06	7 . 14	400
1962	11 . 8	4,800	11 . 19	18.89	11 . 6	700
1963	12 . 13	5,400	12 . 14	17.77	8 . 15	400
1964	12 . 16	8,100	12 . 17	22.21	12 . 15	1,100
1965	7 . 15	4,400	7 . 15	18.64	7 . 14	600
1966	11 . 23	10,500	11 . 23	22.00	5 . 20	1,100
1967	11 . 5	7,600	10 . 17	20.84	11 . 5	1,100
1968	11 . 30	2,800	9 . 29	18.56	9 . 29	600
1969	11 . 26	2,200	11 . 26	16.21	6 . 1	200
1970	10 . 14	7,900	10 . 16*	19.86	9 . 11	1,200

3. 15 The use of the Cagayan River water is mostly limited to irrigation. Mainly, water is taken for irrigation purposes as from the Magat River (22,800 ha), the Siffu River (8,800 ha) and the Chico River (1,712 ha). River water is also used for other small scale irrigation projects, but accurate data are difficult to obtain. Ocean-going ships of shallow draft used to travel between the river mouth and Tuguegarao for commercial transportation in the past. Currently, only lumber boats travel between the river mouth and Gattaran, since sedimentation has decreased water depth.

3. 16 The rich land and water resources of the Cagayan River Basin are either difficult to use or are insufficiently used because the river has been left in virtually natural state.

The damage caused by the frequent floods of the Cagayan River seem to inhibit the improvement of living standards and social activities.

For regional development, however, there must be change in the notion that the present relationship between people and the river will continue to be one of passive unpreparedness. Multi-purpose dam construction projects are, thus, already under study for the Magat River, the Siffu River and the Chico River etc.

It should be emphasized that the water system of the Cagayan River is an organic entity, composed of rivers of differing characteristics. This leads us to anticipate extremely complicated behavior with regard to flood run-off, propagation, flood hydrology, sediment run-out, river-bed change and distribution of water resources. Therefore, plans which harmonize water control and irrigation must be drawn for the entire river system. Individual projects must be prepared in the context of this plan.

Agriculture

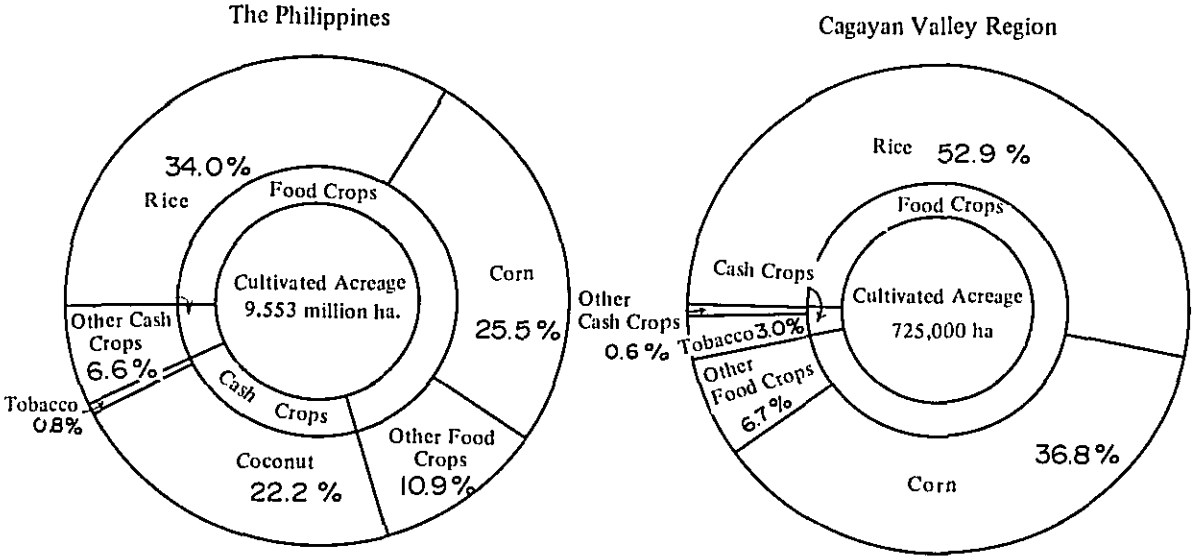
3. 17 The agriculture of the Cagayan Valley Region is characterized by under-utilization of land, low productivity and the small number of crops planted.

The region is richly endowed with unused or under-utilized land. Its land resources are not being effective used because of poor social infrastructure such as roads, ports and harbors, flood contral facilities, and electrification. Besides the region is offen attacked by typhoons.

Most of the flat land is used either as irrigated or rainfed rice field, or as upland crop field. Although some areas look like open fields, they show traces of cultivation in the past.

The hilly areas are used less effectively than the flat areas. Although some parts are used for agriculture and animal raising, considerable areas still seem to be left unused. Rice is the main crop in this region, followed by corn and tobacco. The farming pattern of the Region is simple and no other important cash crop is found.

Agriculture occupies the most important position among the industries in the Philippines. The major products are rice and corn for domestic consumption and coconut, sugar, banana, pineapple, etc. for export. In the Cagayan Valley Region, food production accounts for about 90% of agriculture, as the following diagrams show.



Source : Planted Major Crops by Region, 1972 (B A E con)

Fig. 3.06 Major Crops and Cultivated Acreage in 1972 (Percent)

3. 18 Recent agricultural production in the Cagayan Valley Region has achieved sharp growth. According to the statistical data of BA Econ, the area cultivated for major crops expanded by 8% during the five years between 1968 and 1972 in the Philippines, in contrast, it expanded by 33% in the Cagayan Valley Region.

The production of rice and corn increased sharply in this region. In 1968, rice production in this region was 481,000 tons, accounting for 10.6% of total rice production in the whole country (4.561 million tons). In 1972, rice production in this region was 678,000 tons, or 13.3% of total rice production (5.10 million tons). In other words, rice production in this region made a 41% increase during the five years. The indicates an increase not only in cultivated acreage, but also in the yield per unit area.

Corn production in this region was 117,000 tons (7.2% of the country's total) in 1968, but 252,000 tons (12.5% of the country's total) in 1972. In other words, production doubled during these years.

3.19 Although rice production in this region is large enough for shipment to other regions, its cultivation involves many problems. One of them is low yield per unit area. The average rice yield per ha was 41 cavan (1.8 tons) in the 1972 harvest year. The average yield for the three provinces during the past five years was 39 cavan (1.7 tons). However, these figures refer to unhulled rice. If the conversion rate is assumed to be 60%, the yield of milled rice per ha will be 1.1 ton and 1.0 ton, respectively.

Table 3.13 Rice Yield per Hectare during the Past Five Years

Cavan

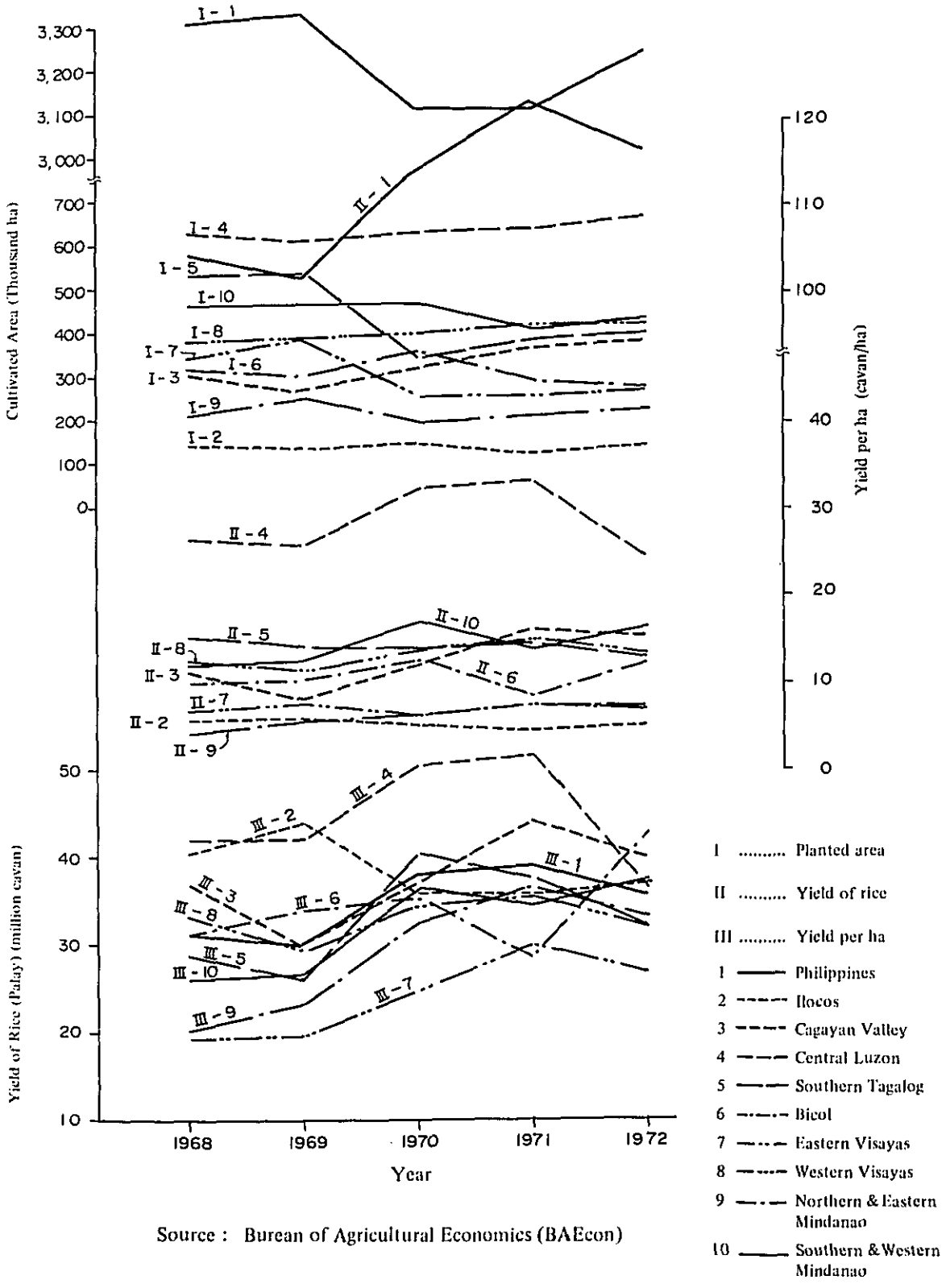
Classification \ Harvest Year	1968	1969	1970	1971	1972	Five-year Average
Wet-season Irrigated Field	45	48	53	50	51	50
Wet-season Unirrigated Field	14	28	30	30	27	26
Dry-season Irrigated Field	45	50	53	46	48	48
Upland Rice	15	16	17	17	18	17
Average	32	38	42	39	41	39

Source: Reconciled figures from the Bureau of Agrecultural Economics(BAEcon) and the Provincial Agriculturist, Bureau of Agricultural Extension(BAEx)

The yield per ha in wet-season irrigated rice fields is 50 cavan (about 2.2 tons) and 48 cavan (about 2.1 tons) during dry season. These figures are far above the yield (26 cavan) in rainfed rice fields during the wet season. However, they are far below the immediate targets for irrigated rice fields, namely, 80 cavan (about 3.5 tons) during wet season and 85 cavan (about 3.7 tons) during dry season.

The second problem lies in the use of unsophisticated farming techniques. High-yielding varieties have been actively introduced to irrigated rice fields. Farming techniques have been improved gradually with the introduction of high yielding varieties to irrigated rice fields, along with the Masagana 99 Drive to increase production. However, the techniques of timely and adequate application of fertilizers, weeding, pest and disease control are still not being thoroughly implemented, and hence, the high yield varieties have still not reached full promise.

The third problem is the high costs involved in obtaining high yields with high-yielding varieties. For example, the recommended standard quantity of fertilizer is two 50 kg bags (costing 75 pesos) for rainfed rice fields, seven bags (378 pesos) for wet-season irrigated rice fields and nine bags (453 pesos) for dry-season irrigated rice fields. This would raise the cost of agricultural chemicals from the



Source : Bureau of Agricultural Economics (BAEcon)

Fig. 3.07 Production of and Area under Cultivation by Rice in the Philippines

current level of 32 pesos to 190 pesos. Since irrigation costs are added on to this, the production cost will increase considerably.

Rice can be grown at anytime as long as water is assured. However, it is usually difficult to plant more than two crops a year in irrigatied rice fields. Currently, double-cropping is not employed in all the irrigated fields because of the insufficient water supply.

3. 20 The Philippine Government started Masagana 99 program in May, 1973, to promote the increase in rice production.

The target area of Masagana 99 in the 1974 harvest year is 1. 20 million ha while the rice planted area in the whole country is 3. 40 million ha.

Although enough data could not be obtained concerning the achievement of the Masagana program in this region, the target area for Phase III (1974 wet-season crop) is 13, 000 ha in Cagayan Province, 38, 000 ha in Isabela Province and 22, 000 ha in Nueva Vizcaya Province. The 1974 target for Cagayan Province is lower than the 1973 target (wet-season crop) because of the shortage of farm technicians (one for 300 ha in the preceding year) and the shortage of funds. On the other hand, the local target for Isabela Province is far higher than the government-set target for the year (18, 000 ha). This is because funds are available for organized farmers in this province through this program. In Nueva Vizcaya Province, about 85% of the fields were used for the high yielding varieties in the last year, but only 35% this year. They switched back to local varieties, despite Masagana 99, because their climate and soil conditions were found to be unsuitable for the high yielding varieties.

It is reported that the yield was 50 cavan in Cagayan Province, 80 cavan in Isabela Province and 100 cavan in Nueva Vizcaya Province. (For irrigated fields) The repayment rate of loans was slightly above 80% in Isabela Province.

This Masagana program has been fruitful, though its target of 99 cavan/ha has not been attained. Better results are expected with improvements in fertilizer application and farm management.

Thus, the Masagana 99 program has been quite successful, but some problems, as listed below, still remain.

(1) Sufficient guidance on farm management has not been given to farmers.
(2) Farmers have not been provided with sufficient agricultural chemicals and materials for pest and disease control.
(3) Farmers do not follow exactly the fertilizer application instructions.
(4) The Masagana program consists of designating specific rice-producing areas and giving the farmers intensive assistance. Therefore, it does not address the problems of an entire rice-producing district, such as water control and pest and disease control.

For solving these problems in the future, it is important not only to improve the current program, but also to study measures for larger districts. Such measures will include the establishment of group farming.

3. 21 Compact Farm is a plan for increasing food production and farm income through cooperative farm management. It has been tried for the past ten years.

Compact Farm is a project for organizing neighboring farmers using similar production methods under one management body for utilization of all the resources (labor, credit, machinery) under the guidance of farm technicians. A compact

farm usually functions as one management body under an elected farm manager. A compact farm has the following functions:

(1) To be a channel for extension of agricultural techniques.
(2) To guarantee credit.
(3) To undertake water management.
(4) To permit cooperative use of small farm machinery (hand tractors, etc.).

Governmental agencies provide guidance for new agricultural production techniques and seeds through farm technicians and give credit for farm operation expenses and for purchasing farm machinery.

In the Magat Project area one chief water master for each main canal, one water master for every 1,500 ha and one ditch tender for every 150 ha are assigned for the effective management of the large-scale irrigation system. However, they have not been able to provide sufficient management for terminal facilities. For this reason, they are attempting to rearrange turn-out based water control body from the unit acreage of 12 - 14 ha to 30 - 50 ha so that the function can be handed over to the member-farmers of the compact farm.

It will be important to transform this organization, from a single-purpose water control association into a compact farm in its real sense.

3.22 In Cagayan and Isabela Provinces, corn is an important crop, next only to rice. Corn production in the 1972 harvest year was 1.7 million cavan (955,000 tons and 5.0075 million pesos in value). About 50% of it was consumed as food, and 10% was used as animal feed within this region. The rest was shipped to adjacent regions or to Manila.

Currently, the native variety (white flint) is mainly grown, but a high yielding variety is also being introduced.

According to the data of BAEcon, the yield per ha in the Cagayan Valley Region was 0.68 ton in 1960, and 0.9 ton at present (16 cavan), which is slightly above the country's average (0.86 ton) but still lower than the average yield in Thailand (2.0 ton/ha).

Although the double-cropping method is used in this region, the cultivated acreage for the second crop is 20 - 30 % of that for the first crop.

There are many who like to eat corn as a staple-food and the demand for white corn is increasing because of the absolute shortage of staple food and its relative low price.

On the other hand, the production of yellow corn and sorghum for animal feed has not met demand. In 1972, 93,000 tons of yellow corn and 68,000 ton of soybean flour were imported.

3.23 The Government started the Masagana Maisan program in March, 1974, in view of increasing domestic demand, the international shortage and price hikes. This program has the following purposes:

(1) To meet the increasing demand for white corn as a food-stuff.
(2) To produce yellow corn, sorghum and soybean to ensure animal feed.
(3) To promote corn processing industries such as corn-starch making and export of its products.
(4) To promote joint investments with foreign capital and carry out necessary

studies on feed grains.
The system of Masagana 99 was used as a guide post for this program.

3. 24 Tobacco is the third most important crop in the region. Tobacco production in this region accounts for 40% of total production of native varieties in the entire country. The fertile alluvial plain adjacent to the Cagayan River is used for tobacco cultivation. It is planted between November and December and harvested between February and March.

In 1972 - 73, the cultivated acreage in the Cagayan Valley Region was 36, 500 ha with production of 35, 100 tons (87. 750 million pesos in value). The tobacco of this region is mainly used for cigars. About two-third of production is shipped to other regions.

Peanuts are among other important crops. Peanuts are usually grown as a catch crop of corn. The land along the Cagayan River and its tributaries is used for peanuts cultivation.

The cultivated acreage was 11,600 ha in 1972 - 1973 and Isabela Province accounts for 62% of the whole. Total production was 7,400 tons.

Sugar-cane was cultivated in the past in this region, but there is hardly any cultivation at present. It is said that about 26,000 ha of land in Isabela Province and about 45,000 ha of land in Cagayan Province are suitable for sugar-cane cultivation. However, they are mostly used for corn cultivation at present.

According to a study by PHILSUGIN, Toao and Gonzaga are suitable sites for sugar refineries.

3. 25 Since the Cagayan Valley Region has no feed mill, all the animal feed is brought in from Manila. As transportation cost makes the price of feed higher, the livestock industry is not developed in this region. Therefore, no positive effort is being made for forage production.

Currently, 238,000 caraballo, 94,000 cattle, 65,000 pigs and 1,598 million chickens are being raised in this region.

Most of cattle are raised in large rancheon. Farms are constructed with loans. Each farm has 150 - 1,500 head cattle.

The cattle that are raised in this region are shipped to Manila each year. Study on feed mill construction for livestock industry promotion concluded that the plan would be feasible.

3. 26 Agrarian reform is one of the most important strategies for agricultural development of the whole country.

In the Philippines, an absentee landowner system was established during the Spanish colonial period. This system has remained even after independence. According to the 1960 statistics, owner-cultivators account for 45%, semi owner-cultivators account for 14% and tenants account for 40%.

The share cropping system under which landowner and tenant farmers share products at a fixed ratio has been widely adopted. This tenant farming system is said to lower farmers' production morale and inhibited the improvement of agricultural productivity.

Martial Law was proclaimed in September 21, 1972, and Presidential Decree

No. 27 on agrarian reform was proclaimed in October. This indicates the serious efforts of the Government toward agrarian reform.

This agrarian reform is limited to only land planted with rice and corn. It applies neither to tobacco, banana or other commercial crops, nor to those landowners who directly manage their land with machines and agricultural laborers.

The Government's intention seems to be to start such reforms among landowners with at least 100 ha and to extend them gradually to the 50 ha class and then the 24 ha class. Much is expected from the reforms.

Irrigation

3. 27 In the entire Philippines, 30% of the rice planted area or about 960,000 ha of 3. 2 million ha was irrigated in 1961. On the other hand, the 1974 plan projects that rice fields and irrigated fields will be 3. 4 million ha and 1. 1 million ha (32. 4%), respectively. In other words, rice fields will have increased by 200,000 ha and irrigated fields by 140,000 ha during the past 13 years. These figures indicate the efforts made for increasing the acreage of irrigated fields.

In the Philippines, irrigation is provided for rice alone. There are a few exceptional cases in which banana and sugar-cane are cultivated in irrigated land. Attempts to cultivate vegetables and corn after double rice crops are being studied in districts which have irrigation systems. But for the time being, irrigation is used for rice, and has not been extended to dry fields.

3. 28 The currently available irrigation systems in the Philippines can be roughly divided into the following four categories. (1) Irrigation system managed by the national government, (2) Communal irrigation system, (3) Private irrigation system, (4) Pump irrigation system.

The pump irrigation system is a relatively new method. A pumping system using small pumps has been adopted by numerous groups of farmers. This method has been spreading rapidly, because of the relative ease with which farmers can be organized; to have a larger scale system involves many difficulties. The Government, however, has been working to extend large-scale irrigation system gradually.

3. 29 The following table shows the existing irrigation systems in the Cagayan Valley Region.

Table 3.14 Irrigation Systems in the Cagayan Valley Region

ha

Type of System	Number of System	Planned Service Area	Actual Service Area (Wet Season)	Actual Service Area (Dry Season)	Per System		
					Planned Service Area	Actual Service Area (Dry Season)	Actual Service Area (Wet Season)
National Irrigation System	5	55,440	51,148	47,766	11,080	10,230	8,953
%		100	92	86			
Commercial Irrigation System	283	40,619	33,634	26,441	143	119	93
%		100	83	65			
Private Irrigation System	64	2,786	2,588	2,028	44	40	32
%		100	93	73			
Pump Irrigation System	(2,143)	26,837	22,089	20,570	12.5	10	9
%		100	82	77			
Total	352 (2,143)	125,642	109,459	96,805	—	—	—
%		100	87	77			

The differences between planned and actual figures for both wet and dry seasons show that even during the wet season, not all the acreage in the planned service area is irrigated. This is due to such factors as damaged facilities, poor canal conditions or insufficient water at the source. The situation becomes all the worse in the dry season.

This problem is common to all the irrigation systems in the Philippines, regardless of their type. The plan for the national irrigation system calls for a uniform rate of irrigation requirement (1.5 ℓ/sec/ha) including conveyance loss. But the sharp fall in acreage actually irrigated during the dry season is attributable to the failure to accurately determine river discharge or measure water duty in depth.

3.30 The following table shows the increase in irrigated acreage during the five years from 1968 to 1972.

Table 3.15 Irrigated Fields in the Cagayan Valley Region

(Area 1,000 ha)

	Irrigated Fields (Wet Season)		Irrigated Fields (Dry Season)		Total	
	Area	Growth Rate '72/'68	Area	Growth Rate '72/'68	Area	Growth Rate '72/'68
1968	74.3	1.00	47.6	1.00	121.9	1.00
1969	77.2	1.04	50.2	1.05	83.9	0.68
1970	93.2	1.25	59.6	1.25	152.8	1.25
1971	93.3	1.25	64.1	1.35	157.4	1.29
1972	99.5	1.34	88.9	1.87	188.4	1.55

Source: Reconciled figures from the Bureau of Agricultural Economics and the Provincial and th Agriculturist. Bureau of Agricultural Extension

Between 1968 and 1972, the area irrigated during the wet season increased by 25,000 ha (34%), while that irrigated during the dry season increased by 41,000 ha (87%). There was especially remarkable increase in dry season irrigation. This indicates the tremendous efforts spent on irrigation during recent years. The fact that dry-season irrigation is still less than wet-season irrigation reflects the special irrigation problems in this country.

The current state of and problems facing irrigation in the three provinces in the Cagayan Valley Region are discussed below.

3.31 The following table shows the types of and areas covered by the existing irrigation facilities in Cagayan Province.

Table 3.16 Existing Irrigation Systems and Area Covered in Cagayan Province

ha

Type of System	Number	Planned Service Area	Actual Service Area in Wet Season	Actual Service Area in Dry Season
National Irrigation System	3	14,640	10,348	6,966
Communal Irrigation System	89	12,889	11,045	6,987
Private Irrigation System	10	2,280	2,180	1,652
Pump Irrigation System	(750)	10,194	10,194	10,194
Total	102 (750)	40,003	33,767	25,799
Percent of Total	—	100	84.4	64.5

National irrigation systems cover the largest areas and are followed by communal irrigation and pump irrigation in that order. The wet-season irrigation and dry-season irrigation account for 84.4% and 64.5% of the planned service area, respectively, in comparison with 87% and 77% for the three provinces together. The percentage of the dry-season irrigation is especially low in this province, even lower than in Isabela and Nueva Vizcaya Provinces. In other words, Cagayan Province has a large area under irrigation, but this irrigation is not being very effective.

3.32 The following table shows the types of and areas covered by the existing irrigation systems in Isabela Province.

Table 3.17 Existing Irrigation Syste ms and Area Covered in Isabela Province

ha

	Number	Planned Service Area	Actual Service Area in Wet Season	Actual Service Area in Dry Season
National Irrigation System	2	40,800	40,800	40,800
Communal Irrigation System	22	8,996	6,103	4,158
Private Irrigation System	54	506	408	376
Pump Irrigation System	(1311)	15,461	10,979	8,697
Total	78 (1311)	65,763	58,290	54,031
Percent of Total	—	100.0	88.6	82.2

As this table shows, irrigation in this province is more advanced than in Cagayan and Nueva Vizcaya Provinces. The large area under irrigation in this province is accounted for by two large national irrigation systems, the Magat River Irrigation System and the Siffu River Irrigation System. It should be noted that both the actual wet and dry season service areas are the same as the planned service area.

In this province, the major problem related to irrigation consists of recent lumbering and subsequent heavy erosion in the basin. This sharply decreases the river's discharge during dry season.

New high yeilding varieties have been introduced into the Magat River and Siffu River Irrigation Systems, with five crops having been raised in two years. However, the shortage of road facilities for transporting fertilizers, other materials and harvests has been a serious problem. Road construction is said to be the most urgent task.

Pump irrigation systems are also relatively well developed in this province. The average area per system is about 12 ha as in Cagayan Province. The problems in this province include pump replacement, pump moving and channel improvement. Some owners have renovated their systems. This indicates the long history of pump irrigation in this province and that the time for making improvements has come. This is reflected in the low efficiency of pump irrigation systems in Isabela Province in contrast with Cagayan Province where they are working as planned during both wet and dry seasons.

3.33 Let us turn now to irrigation in Nueva Vizcaya Province. Nueva Vizcaya Province is located in the southern part of the Cagayan Valley Region, closest to Manila. Its altitude is high, with the upstream part of the Cagayan River flowing through it. This small province consists of a mountain zone and differs from Cagayan and Isabela Provinces in various respects.

As the following table shows, this province has no national irrigation system. The extant irrigation systems are relatively small scale.

Table 3.18 Existing Irrigation Systems and Area Covered in Nueva Vizcaya Province

ha

Type of System	Number	Planned Service Area	Actual Service Area in Wet Season	Actual Service Area in Dry Season
National Irrigation System	—	—	—	—
Communal Irrigation System	172	18,734	16,486	15,296
Private Irrigation System	—	—	—	—
Pump Irrigation System	82	1,182	916	678
Total	172 (82)	19,916	17,402	15,974
Percent of Total	—	100.0	87.4	80.2

The number of and the area covered by communal irrigation systems are larger in this province than in Cagayan and Isabela Provinces. This indicates a long history of irrigation. It is said, however, that 49 districts (6,568 ha) have a

water shortage problem during dry seasons. As necessary improvements, there should be maintenance of the irrigation network along with construction of channels, including repair of half the weirs and gabions, and construction of such components as intake gates, siphons, flumes and roads.

The pump irrigation systems also have various problems, including oper ational difficulties during dry seasons due to the shortage of river water and poor channel network conditions.

3. 34 Future irrigation plans are discussed below. The following table summarizes the plans for irrigation in the Cagayan, Isabela and Nueva Vizcaya Provinces. It is based on the materials provided by the Philippines.

Table 3.19 Future Irrigation Plans in the Cagayan Valley Region

ha

	Cagayan		Isabela		Nueva Vizcaya		Total	
	Number	Area	Number	Area	Number	Area	Number	Area
National Irrigation Districts	12	25,700	5	112,000	2	3,117	19	140,817
Under Construction	2	6,700		—		—	2	6,700
Planned	10	19,000	5	112,000	2	3,117	17	134,117
Gravity Flow Type	4	9,600	5	112,000	2	3,117	11	124,717
Pump Type	6	9,400		—		—	6	9,400
Communal Irrigation System	35	7,419	27	13,050	30	11,655	92	32,124
Pump Irrigation System	44	37,623	24	13,426	11	911	79	51,960
Not Definitely Planned	37	44,305		—		—	37	44,305
Total	128	115,047	56	138,476	43	15,683	227	269,206

Note 1 The total will be 225 districts and 262,506 ha, excluding the two districts under construction in the Cagayan Province.

2 The number of pump irrigation systems does not indicate the number of pumps, but gives the number of operations.

The table indicates that the targeted irrigation area is approximately 270,000 ha, more than one half coming under national projects. The national projects are listed in detail in the following table. It should be noted that nationally managed pump systems are included in the plan. There are some sizeable projects which can be immediately implemented such as Solana-Tuguegarao Project (3,500 ha). In the Philippines, all of the previous pump irrigation systems were small. Systems of larger scale are of course desirable from the view point of irrigation efficiency. Large pump irrigation systems represent a new approach, aimed at effective expansion of irrigation and at the problem of suitable areas for water intake points.

3. 35 In the Philippines today, a heightened awareness of and strong interest in irrigation has spread widely among both the Government and farmers. We must give this high acclaim, since it has only strengthened irrigation policies. However, individual measures involve some problems.

3.36 One of the technical problems, related to the preparation of irrigation projects, is the general lack of data on water quantity, which is the base of any irrigation plan. It has been mentionned above that insufficient water at a water resource sharply lowers irrigation efficiency. It probably accounts for the difference in the areas under irrigation in wet and dry seasons. At the same time, there is a contradiction between having one fixed rate for volume of irrigation water and the differing rates of irrigation requirement according to the nature of the soil. This is another basic factor in formulating an adequate irrigation plan. An effective irrigation system can be constructed only if its plan is based on accurate data on the demand and supply of irrigation water. The most urgent task will be to observe the rate of discharge for accurately determining the water quantity at the source, and to measure water duty in depth for determining correct irrigation requirement.

Another important factor to consider in drawing up a water use plan is how to go about looking for sources of water. The current gravity flow irrigation system depends fully on natural river flow. However, both the main stream and the tributaries of the Cagayan River are characterized by especially large fluctuations in their flows. It goes without saying that irrigation water is constrained by dependence on the droughty water discharge. Together with an incomplete understanding of the volume of flow at the riverhead (dry-season level) noted above, this explains why water shortages occur in the dry season. If the supply-demand relationship can be clarified by accurately determining the volume of water at the source and the appropriate amount for irrigation, it will be possible to draw up in advance a plan to devise measures to supplement shortages in supply. Generally, a reservoir to supply additional water is an effective method. The use of pumps is another possibility.

It will be advisable to adopt a reservoir system or pump system both for new irrigation projects as well as for coping with present water shortage problems, especially for solving the problem of insufficient discharge during dry seasons due to changes in the watershed as seen in Isabela.

Another technical problem related to irrigation is that of facility planning. Even the main facilities in the case of a national project (intake facilities, main canals etc.) are built by the Government. Irrigation projects will obviously be useless unless branch canals and farm laterals are constructed. In order to utilize the facilities, careful maintenance and good management cannot be overlooked.

Such ideas have been adopted in planning the Magat Project and a facility improvement project also seems to have been started for maintenance and repair of canal and laterals of the national irrigation systems. Since those problems of facilities and maintenance are common to most of the existing irrigation systems in the Cagayan Valley Region, more efforts to improve them should be made. In connection with this, an operation and maintenance scheme for irrigation systems will have to be one of the questions treated.

3.37 It goes without saying that the maintenance and management of irrigation facilities have a specially important role. In Japan, a maintenance and control plan is legally required, as is a construction plan. In reality, however, irrigation facilities are often poorly managed and controlled. In such cases, the first step to a solution is to determine who is responsible for maintenance and control. According to the generally adopted rule, a group which constructs facilities should be responsible for their maintenance and control. In the Philippines,

this rule is formally adopted especially in the case of national irrigation systems. However, the Government should not only be responsible controlling trunk facilities. The full effect of an irrigation project can be obtained when an integrated facility plan is drawn and its integrated maintenance and control system is prepared. However, it will be difficult for the Government to maintain and control all of its irrigation facilities directly. The maintenance and control of terminal parts may be left to the beneficiary farmers. This method has already been adopted in the Magat Project.

A problem with farmers arises here. Individual farmers are not organized. However, it will be essential to organize beneficiary farmers in some form under the basic principle of irrigation, namely, that farmers commonly benefit from irrigation water. This applies not only to the national irrigation systems, but also to communal and pump irrigation systems.

The problem of costs (including water charges) plays an important role in the maintenance and control of irrigation facilities. Farmers should be organized with the understanding that they should share costs according to benefits. They will become conscious of their community and willing to pay their share.

The attempt to form a Compact Farm in the Magat Project is being realized effectively. It will suggest future steps for farmers' organizations. This problem of organization is also related to patterns of farm ownership. Problems of widely scattered land holdings and tenant farming are also closely related to farmer organization. These problems must be solved by land reform and land consolidation.

3.38 The proposed projects in the Cagayan Valley Region covers about 270,000 ha of land. According to the Four Year Plan (1974 - 1977), about 166,000 ha of land is to be irrigated during these four years. To accomplish this target effectively, some concrete measures must be taken to solve these problems quickly.

The idea of an electrification-irrigation project can be regarded highly. It is the most concrete short-term project within this region. Since the schedule of a transmission line project is to be determined, the electrification-irrigation project must be further promoted.

Forest Development

3.39 About 70% of the Cagayan Valley Region is covered by forest, accounting for 13.4% of the total forest area of the Philippines. However, the growing stock and timber cut account for only 11% and 7% of the national total, respectively. Forestry and related industries are among the important industries in the region, though not so active as on Mindanao.

3.40 Out of the total area of 2.663 million ha, 908,000 ha are alienable and disposable and 1.755 million ha are public forest. Of the public forest, about 804,000 ha have been classified as permanent forests, which include 623,000 ha of timber land, 180,000 ha of forest reserve and 1,000 ha of other forest. The remaining 951,000 ha are unclassified public forest.

The forest inventory of the Cagayan Valley Region consists of 187,000 ha of forest area, of which commercial forest occupies 106,000 ha.

Table 3.20 Proposed National Irrigation Systems in the Cagayan Valley Region

Proposal

	Name	Service Area(ha)	Cost Estimate(P)	Remark
Cagayen	1. Bawa River I. P.	3,000	6,000,000	Final Survey underway
	2. Dumon River I. P.	3,000	6,000,000	-do-
	3. Solana-Tuguegarao (Pump) Irrig. Proj.	3,500	5,500,000	Plan completed awaiting go signal to start
	4. Prnacanauan I. P.	1,600	3,200,000	Initial survey completed
	5. Pared(Pump) I. P.	1,500	3,000,000	Awaiting go signal to start
	6. Alcala West(Pump) I. P.	600	1,000,000	To be surveyed
	7. Iguig(Pump) I. P.	800	1,500,000	To be surveyed
	8. Chico River East Extention Proj.	2,000	4,000,000	Survey completed
	9. Faire(Pump) I. P.	1,400	-	Occular Survey completed
	10. Enrile(Pump) I. P.	1,600	-	-do-
	TOTAL	19,000	30,200,000	
Isabela	1. Magat Multi-Purpose Project	50,000 (40,000)	800,000,000 (110,000,000)	(1) (40,000) an existing system but is proposed for improve (2) (110,000,000) Foreign Loan US$
	2. Addalam River I. P.	10,000	20,000,000	
	3. Magat West Extention Project	8,000	12,000,000	
	4. Magsaysay(Pump) I. P.	2,000	2,000,000	
	5. Mallig I. P.	2,500	5,000,000	
	TOTAL	112,500	839,000,000	Excluding the foreign loan Fund to come from The NIA bond fund
Nueva Vizcaya	1. Lamut River I. P.	1,021	198,000	New Project
	2. Laneg River I. P.	2,096	80,000	Rehabilitation
	TOTAL	3,117	278,000	
	GRAND TOTAL(17)	134,117	869,278,000	(* ¥43,000,000,000)
	possible project(37)	44,305	-	uninventoried

I.P. : Irrigation Project

Of the 1.755 million ha of public forest, 1.617 million ha have been surveyed using aerial photos. This revealed that the forest area is 1.321 million ha (81.7%) and the remaining area (18.3%) is openland or agrarian land. Of the 904,000 ha of comm ercial forest, 589,000 ha are of old growth dipterocarp. Each of the three provinces has approximately 600,000 ha of public forest, about half of which is commercial forest. But the area of old growth dipterocarp varies among them; 202,000 ha in Cagayan Province, 249,000 ha in Isabela Province and 137,000 ha in Nueva Vizcaya Province. The most advanced stage of forest development is found in Nueva Vizcaya Province, while numerous unexploited forest remains in Cagayan and Isabela Provinces.

Since the Luzon island-wide model of calculating inventory per hectare by forest type has been made, the total inventory of the region can be estimated. According to this, the total forest inventory is 186 million m^3 and that of dipterocarp (old growth) is 143 million m^3.

3.41 Logging in the public forest is done by licensed private enterprises. Licenses can be classified into long-term timber license agreement (usually 25 years), short-term ordinary timber license (1 - 4 years) and the A & D timber license which is granted for forests which will become alienable and disposable in the future. Attempts are being made to change short-term licenses into long-term licenses to facilitate well planned forest management by licenses. Forests are managed for maintaining timber production and promoting multi-purpose uses. As of June, 1972, 36 short-term ordinary timber licenses and 5 long-term timber license agreements had been issued. As of June, 1973, the number of ordinary timber licenses dropped to 14 and that of timber license agreements increased to 13. This reflects the above policy based on the Forest Reform Code of changing a short-term license to a long-term one. For this reason, a selective logging system by regionally specified rotation period has been adopted.

In this region, 34 licenses are issued for 1.017 million ha of forest or 1.541 million m^3 in volume. Volume per license is about 45,000 m^3, which is roughly equal to the national average (50,000 m^3). Per ha is 1.5 m^3, which is lower than the national average (2.0 m^3).

3.42 It is difficult to analyze the trend of log production in the Cagayan Valley Region because of large fluctuations among the provinces and years. Although wood production in the whole region had decreased since 1969, it increased sharply (8.32 million m^3, 169% of the preceding year) in 1972. (Wood production was 493,000 m^3 in 1971.) However, actual logging amounted to only 54% of that licensed.

3.43 Since this region has relatively easy access to Manila via the Pan Philippine Highway, a large portion of lumber is used for domestic consumption, mainly in Manila. This tendency is especially strong in Isabela and Nueva Vizcaya Provinces. According to 1971 statisties, about 40% of the lumber production of the three provinces is exported. According to the explanation of the regional foresters, 60 - 70% of the lumber production in Cagayan Province is exported, but more than 80% of the lumber production in Isabela and Nueva Vizcaya Provinces is locally

processed for local consumption or for consumption in Manila. Log consumption at local saw mills was about 300,000 m^3 in 1971, which accounts for 60% of the total lumber production. Although lumber production increased sharply in 1972, the products from the local saw mills remained almost at the same level. This seems to indicate the increase of exports.

3.44 Turning to wood processing, we see that there were 49 mills as of June, 1973. Their daily capacity is 1,353 M B. F. (27 M B.F./mill) and their annual (250 working days) capacity is 338,000 M B. F.. Annual log consumption capacity is 1.531 million m^3 (30,000 m^3/mill), but lumber production in 1972 was 55,000 M B.F.. In other words, the rate of operation was only 16.3%. Although daily capacity and annual log consumption are higher than the national average. Lumber mills must develop more competitive ability to meet the Government's basic policies of phase-out of log exports and export promotion of processed wood.

There were two veneer sheet mills as of June, 1973. The daily capacity is 220,000 sq. ft., annual capacity (250 working days) and log consumption capacity are 55 million sq. ft. and 42,000 m^3, respectively. Veneer sheet production was 70,000 sq. ft. in 1972 with the rate of operation a high 127%.

There is one plywood mill and its daily capacity is 224,000 sq. ft. of 1/4 inch ply. Its annual capacity (250 working days) and annual log consumption are 5.6 million sq. ft. and 77,000 m^3, respectively. 1972 production and log consumption were 8.5 million sq. ft. and 13,000 m^3, respectively. The operating rate was only 15.2%.

The current plywood and veneer sheet manufacturing capacity do not meet the need for changing log export to processed wood export. Therefore, facilities must be improved and increased so as to develop internationally competitive ability.

3.45 The 3-year Phase-out of Log Exports has been worked out in accordance with the Forestry Reform code. This is to stop log exports and increase the consumption of logs for processing.

In formulating the phase-out plan, basic figures for log supply were determined on the basis of the records of the past three years. When we take into account the fact that log production in the region has been less than half the licensed amount, we see that in the long run it is more important to have the necessary changes in scale of production than to undertake a reexamination of the volume of production or of licensed volume.

No study has been made on consuming districts, transportation problems, or industrial site problems. The phase-out plan itself mentions such supportive infrastructure as roads, ports and harbors but the present position by region has not been studied. In this connection, demand projections and further studies on transportation and location of related industries will have to be made for this particular region.

3.46 To develop an export-oriented wood processing industry in this region, there must be development of mills of adequate scale, designed to balance demand for timber so that supplies for the domestic market are assured. Since off-loading is unsuitable for processed wood, port and harbor facilities and roads connecting wood producing districts or mills with port must be improved. It will be worth-

while to study an adequate coastal wood industry estate for acquiring sufficient competitive ability in the international market.

(Forestry Conservation and Reforestation)

3.47 Some parts of the public forests are designated as "forest reserve" where any use of the forest is prohibited. The Cagayan River Basin comprises 517,000 ha of forest reserve, namely, 180,000 ha in the three provinces and 337,000 ha in Mountain Province. In other words, "forest reserve" accounts for about 20% of the basin area, which is much higher than the national average (10%). This indicates not only that the forests in the Cagayan River Basin have an extremely important role in national land and water resource preservation, and other functions of public interest, but also that this basin is subject to devastation, and that its watershed management faces difficulties.

3.48 In the Philippines, about 20% of the total national land is unproductive and unused. It consists of grasslands abandoned after the hill people's practice of Kaingin, or forests out of which useful trees have been logged. Among these, the area of openland reaches about 1.55 million ha.

The Philippines has recently been plagued by frequent heavy flooding and drought. It has been recognized that these disasters are caused by careless logging and Kaingin, which increases openland. Efforts are being made to promote reforestation in these unproductive districts to prevent disasters and to ensure the lumber supply.

The Cagayan River Basin comprises 287,000 ha of openland, 151,000 ha of grassland with pasture license, and about 800,000 ha of unproductive forests. The unproductive forests include scrub (136,000 ha of in the surveyed public forests) due to careless logging as well as natural openland and bush zone (279,000 ha in the surveyed public forests). These forests must be reforested immediately for effective watershed control, excluding from reforestation potentially arable land and useless land due to topographical or soil conditions.

3.49 The Island of Luzon is not suitable for reforestation because: (1) The soil conditions on the Island of Luzon are inferior to those of Mindanao. (2) It has complicated topography. (3) It is subject to be influence of typhoons. (4) Private enterprises do not have sufficient capital for to carry out reforestation on their own. (5) The soil of the vast openland is poor and presents technical difficulties. (6) There are no funds for large-scale reforestation since logging is not income-producing. For this reason, reforestation work is led mainly by the Government in this region.

Nine governmental reforestation projects have been prepared for this region. They cover 116,000 ha of openland. A large forest (15,138 ha) is being planted as of June, 1973. However, this is only 13.1% of the scheduled work. Reforestation work covered 21,430 ha during the twelve years between 1961 - 1973. New forestation accounted for 8,914 ha while reforestation or supplementary forestation accounted for the rest. The reforestation area for 1973 is 486 ha including 131 ha of new forestation; reforestation and supplementary forestation thus accounted for 60 %. This indicates that as noted above reforestation in Luzon involves various technical difficulties due to natural conditions and that no system for reforestation techniques for openland has been established. Reforestation in openland requires gradual improvements in soil conditions. A long period is re-

quired before obtaining useful lumber from planted forests, and sometimes it takes a generation for forest soil to recover its fertility.

According to the view of foresters in Luzon, the growth period is twice as long as that in the Island of Mindanao even with fast-growing species, such as Albizzia falcata and Gmelina alborerea. In view of the urgent need for basin control, the number of projects should be kept small in order to establish a system of techniques at the same time as proceeding with large-scale reforestation work with due speed. The BFD is presently studying the arrangement of current projects.

Since immediate commercial reforestation (reforestation for lumber production) in openland is difficult, mountain conservation and reforestation techniques, including mountain conservation facilities, must also be introduced in some cases.

This region has 22,000 ha of openland requiring immediate reforestation, but the current planted forest area is only 70 ha. The Government has a project for establishing and conserving forty watershed forest reserves throughout the country. Four of them (totalling 200,000 ha, including the forests lying partially outside the basin) are within this region. This project is intended for the conservation of water resources.

Electrification

3.50 The Cagayan Valley Region is mostly without power supply. Only those towns which are sites of provincial offices and their surrounding districts are supplied with power from small companies. Each power company has a generating capacity of about 240 kw. Since their business is extremely small, their service is characterized by limited service hours, power failures, low voltage etc. and consumers must pay high rates.

The extension of power lines and the improvement of services are among the basic requirements for economic development and the raising of the living standard in the Cagayan Valley Region. However, the present power companies are not powerful and it is difficult to expect them to develop on their own.

3.51 74 municipalities exist in the three provinces in the Cagayan Valley Region. Only about 30% of them are electrified; the remaining 70% are completely without a system of power supply. In terms of population, only about 10% (160,000 people) of the entire Cagayan Valley Region population receives power.

The rate of electrification in the Cagayan Valley Region is considerably lower than the national average. However, it is almost equal to the national average when Manila and other urban areas are excluded from the data.

3.52 The Cagayan Valley Region has generating equipment of 5,800 kw (diesel generators are used exclusively). Ownership is in the hands of municipalities and private power companies; there are also some individually owned generators. All generating equipment is small scale. The average generating capacity per owner is 160 kw. (This rises to 240 kw when individually owned generators are excluded.) Only Santiago Power (generating capacity of 1,293 kw) in Isabela Province and Tuguegarao Power (with a generating capacity of 1,095 kw) in Cagayan Province have generating equipment with capacity exceeding 1,000 kw.

Power services are supplied to extremely limited districts in the Cagayan Valley Region. Furthermore, power rates are high and services are poor. For example, voltage drops or power failures occur occasionally during peak hours. It is also difficult to meet new demand for power.

Table 3.21 Sample Electric Rates

Use	Rate ₱/kwh	Remarks
Upto 15 kwh/month	0.72	This rate is applicable to contracts for less than 250 kw. The minimum charge is 11.50 pesos/month.
Additional 35 kwh/month	0.62	
Additional 50 kwh/month	0.57	
Additional 100 kwh/month	0.52	
Additional 700 kwh/month	0.47	
More than 900 kwh/month	0.42	

Note Cauayan Power Co., capacity 365 kw, 24-hour supply

There is no need to repeat that together with roads and ports power is one of the important forms of infra structure supporting the future development of the Cagayan Valley Region. It is urgent to expand the areas supplied with power, to stabilize the supply, to improve services and to establish reasonable power rates. In reality, however, numerous small power conpanies supply power independently of each other. It will be extremely difficult for them to promote electrification in the Cagayan Valley Region and to create an economic and stable power supply.

3.53 To increase the power supply throughout the country, the Philippine Government set up the NEA in efforts to promote efficiently national electrification. The NEA, being given budgets and the right to approve and permit power franchises, founds electrification cooperatives, for the promotion of electrification on an "area coverage basis". Three electrification cooperatives have been established in the Cagayan Valley Region. The design of their facilities has almost been completed and they are awaiting NEA loan approval so that construction will begin shortly.

A stable power source is among the basic requirements for the promotion of electrification, and in this connection, a transmission line project from Luzon grid and diesel plants establishment project are already in progress.

3.54 The long-term target of the NEA is national electrification. Its mid-term target is to complete trunk power systems throughout the country by 1980, working in cooperation with NPC. Its short-term target is to establish power systems by electrification cooperatives in thirty-six provinces by 1974. The latter include Cagayan Electrification Cooperative, Isabela Electrification Cooperative and Nueva Vizcaya Electrification Cooperative.

Capital funds of 1 billion pesos have been authorized for the promotion of electrification. Electrification projects are promoted under the overall guidance and assistance of NEA.

3.55 One electrification cooperative has been established in each of the provinces in the Cagayan Valley Region. The basic system of power supply employed by these electrification cooperatives has been to install three 6,000 kw diesel generators (total capacity 18,000 kw) at Alicia (proposed site of the headquarters of Isabela Electrification Cooperative) and to have 69 kV transmission lines connecting this with Cagayan Electrification Cooperative and Nueva Vizcaya Electrification Cooperative. For the time being, the three diesel generators are to be used for power supply by the three electrification cooperatives. When the transmission line from Luzon grid is completed, they are to be used as spares or moved to other regions. If these projects make smooth progress, sufficient power will be obtained for the development of the Cagayan Valley Region.

The three electrification cooperatives were to complete detailed plans by the third quarter of FY 1974, with construction to begin in the fourth quarter and be completed by the third quarter of FY 1975. But progress is generally behind schedule.

This project is to establish a backbone system for connecting the major terms in the service districts. No step has been taken for expanding this system to peripheral districts.

3.56 Stable power source and low power rates are among the basic requirements for the electrification of the Cagayan Valley Region. NPC has a project to install a transmission line between Luzon grid and the Cagayan Valley Region. This project has been financed by a loan from the Overseas Economic Cooperation Fund of Japan.

This transmission line project consists of a 370 km long transmission line and six substations. The line will run from Ambklao Generating Statio.. in Benguet Province to Aparri in Cagayan Province via Nueva Vizcaya Province. It is to become the skeleton for the power supply in the Cagayan Valley Region. If a contract to supply machinery is concluded by June, 1975, and construction is begun at the beginning of 1976, the facilities for this project will be completed by December, 1977.

This transmission line project has sufficient capacity to meet the forecast demand of 61,400 kw of 1987. In designing this project, the Magat Hydro-power Station Project (final capacity 300,000 kWh) was kept in mind in determining the voltage and capacity for the main transmission lines.

3.57 A German consultant has made a pre-feasibility study of hydro-power development of the Chico River at NPC's request. We shall summarize here the major points of the Chico River Development Project, which was based on the pre-feasibility study. The Chico River Development Project would consist of four dams to be constructed on this river and to generate 1.01 million kw (total). Although this project was drafted and studied solely with electrification in mind, it could also be expanded into a multi-purpose development project, including irrigation. Together

with the economic effect this could be anticipated to have on the agricultural sector, this will also allow for more economic power generation.

A study should be made on whether it would be appropriate to expand this project, including flood control in line with the water control project of the entire Cagayan River.

3. 58 There is an urgent need for promoting electrification for the development of the Cagayan Valley Region. The transmission line project (from Luzon grid) is already underway. A distribution project is also in progress in limited areas. Future problems will be to achieve sound success in these projects and the rapid planning of specific projects for the other districts.

Electrification is an important foundation for increasing agricultural production and for other developments in this region. On the other hand, the improvement of other infra structure and the growth of industries, services and distribution systems are also important factors for the smooth promotion of electrification. For example, at present local resources, such as lumber, must be shipped to Manila for processing. It may be necessary to use Manila's potential for the time being by assuring road traffic. However, industries using local resources and basic services supporting local activities must be fostered in the future.

Currently, all the electrification schemes are carried out under NEA's overall guidance, supervision and assistance. This seems to be adequate in view of the present social and human circumstances in this region. More efforts, however, should be made to ensure a capable staff to the increasing cooperatives for the smooth expansion of electrification.

Road

3. 59 The road system in the Cagayan Valley Region is shown in Fig. 3. 08. The Pan Philippine Highway is the most important trunk road. Other conceivable inter-regional trunk roads include roads between this region and the east coast and between this region and the western provinces (Ilocos, Abra, Kalinga-Apayao). However, the roads to the east coast are still under study and currently, no road exists. Most of the roads to western provinces are poorly maintained mountain roads. Their traffic volume is a measure of their poor services. In sum, the inter-regional roads from this region are not satisfactory, except for the road to Manila.

Intra-regional roads radiate out from the Pan Philippine Highway, as Fig. 3. 08 shows. Although the road system is satisfactory near the Pan Philippine Highway, it is not so in the remote districts. In sum, the intra-regional road system is still underdeveloped.

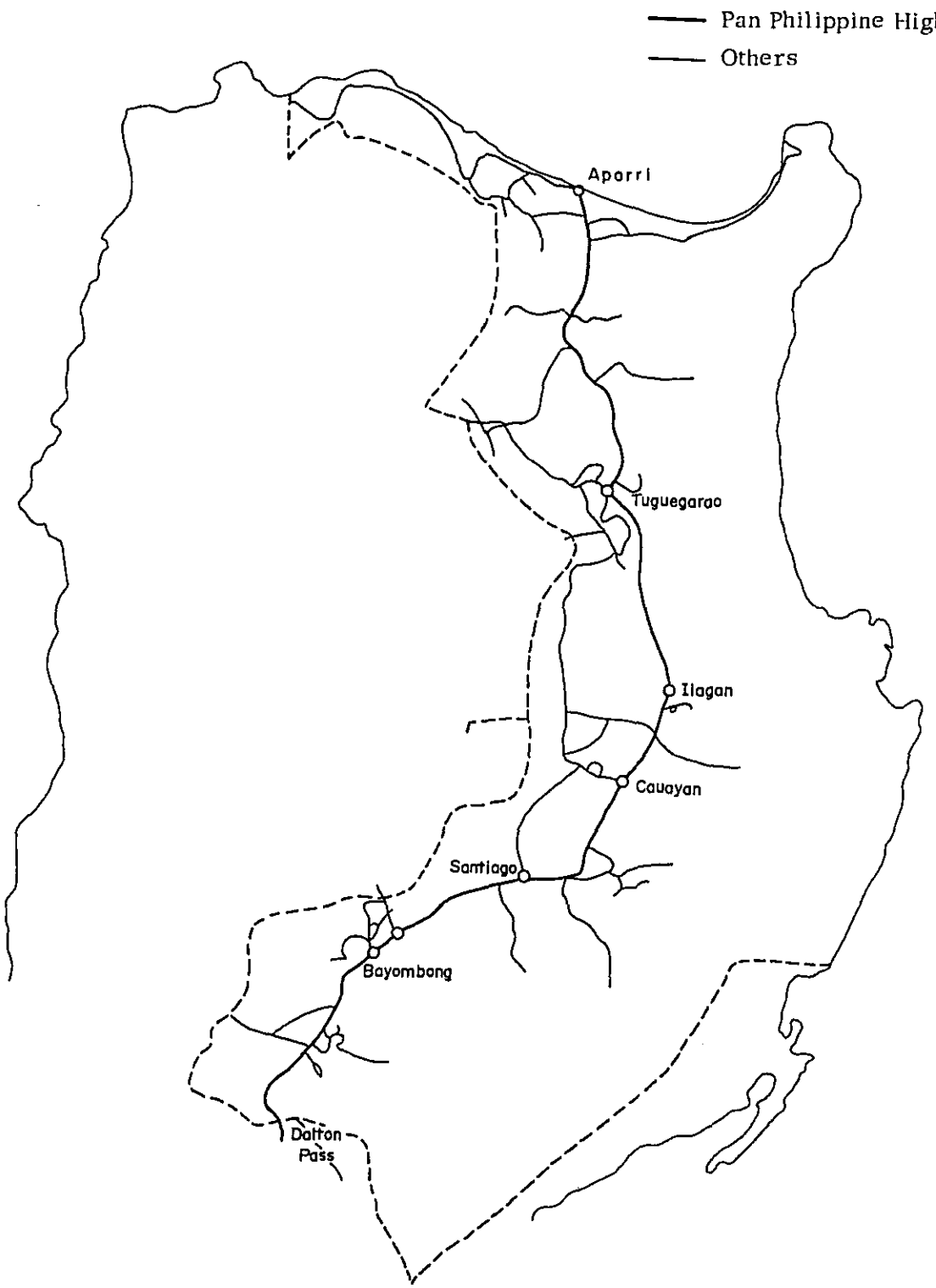


Fig. 3.08 Roads in the Cagayan Valley Region

3.60 In addition to the above roads, there are feeder roads which connect one barrio with another or one barrio with a local center. These are not shown in Fig. 3.08 . Feeder roads are closely connected with the daily life of the local inhabitants. Although extensive in number, their current condition has not been determined precisely, and their levels of maintenance are suspected to be extremely low. Because of their importance to local inhabitants (mostly farmers), development of feeder roads will be a major component in regional development projects.

Table 3.22 shows the length and pavement conditions of roads in the Cagayan Valley.

Table 3.22 Highway Kilometerage of the Cagayan Valley Region

1974

PROVINCE	SYSTEM	UNPAVED	PAVED	TOTAL
Cagayan	National	452	122	574
	Provincial	525	98	623
Sub-Total		977	220	1,197
Isabela	National	147	146	293
	Provincial	441	15	456
Sub-Total		588	161	749
Nueva Vizcaya	National	252	97	349
	Provincial	266	5	271
Sub-Total		518	102	620
GRAND TOTAL		2,083	483	2,566
Philippines		43,105	13,028	56,133

Table 3.23 shows road density (km/1,000 ha). The province average and the national average are 0.8 and 1.9, respectively. In other words, road density in this region is about half of the national average. Since data on bridges of the total region could not be obtained, the data for Isabela Province are given in Table 3.24 for reference. Construction changing temporary bridges into permanent bridges on provincial roads and feeder roads has been slow to take place.

Table 3.23 Road Distribution by Province

Province	Area (Hectares)	Road Kilometerage	Road Density	Percent Distribution
Cagayan	900,267	1,197	1.4	47
Isabela	1,066,456	749	0.7	29
Nueva Vizcaya	696,107	620	0.9	24
TOTAL	2,662,830	2,566	0.9	100

Table 3.24 Bridge Meterage of Isabela

	TYPE	National	Provincial	Feeder Roads
Permanent	Reinforced Concrete	3,545.2	24.0	
	Pre-Cast Concrete	234.6	126.0	30.0
Temporary	Steel Bailey	355.2	195.0	16.0
	Timber-Flooring		300.0	360.0
	Timber-Overflow	302.1	864.0	222.0
TOTAL		4,437.1	1.509.0	628.0
Permanent/TOTAL (%)		85	10	5

3.61 Fig. 3.09 shows the traffic volume observed at the major points in 1974.

Table 3.25 and Table 3.26 show intra-provincial traffic volume (prepared in 1969). Table 3.27 shows trends in traffic volume between 1970 and 1974 at various places. The average four-year growth rate (1974/1970) is approximately 1.5. The figures on traffic volume also indicate the underdeveloped state of this region.

Table 3.28 shows the number of registered motor vehicles in 1968 - 1973 at various places. The ratio of passenger cars to the whole is 57% in Tuguegarao, 44% in Abulog, 47% in Ilagan and 59% in Bayombong. The average is 50%.

3.62 Table 3.29 and Table 3.30 show the progress made in work on the Pan Philippine Highway, which is closely connected with the development of this region.

The problems on this road include the difficulty of early completion, reliability of passage in the wet season, traffic volume near Manila, by-pass roads in cities and a disaster warning system. It is doubtful that the Highway will be completed by 1976, in view of the progress which has been made to date, the present construction set-up (including machinery), and work still to be done. The greatest problems seem to arise in the northern part of Cagayan Province where the rate of progress has been the lowest and much new construction work is required.

Since this is the largest trunk road in this region, it will be essential to ensure year-round traffic. Site visits raised doubts in view of the following two factors. The first factor is the collapse of faces in mountain zones. Disaster prevention measures of considerable scale will be required to permit traffic, throughout year. The second factor is the following. Since the Cagayan River remains without levees at many places, this road is in some danger of being flooded. Once a flood occurs, a large extent of the road will be affected, with a long submergence period.

The road in the south of Cabanatuan is quite crowded even today. The traffic volume will increase rapidly when the Pan Philippine Highway is completed and the Cagayan Valley Region is developed. It is highly likely that this block will then become a traffic bottle-neck.

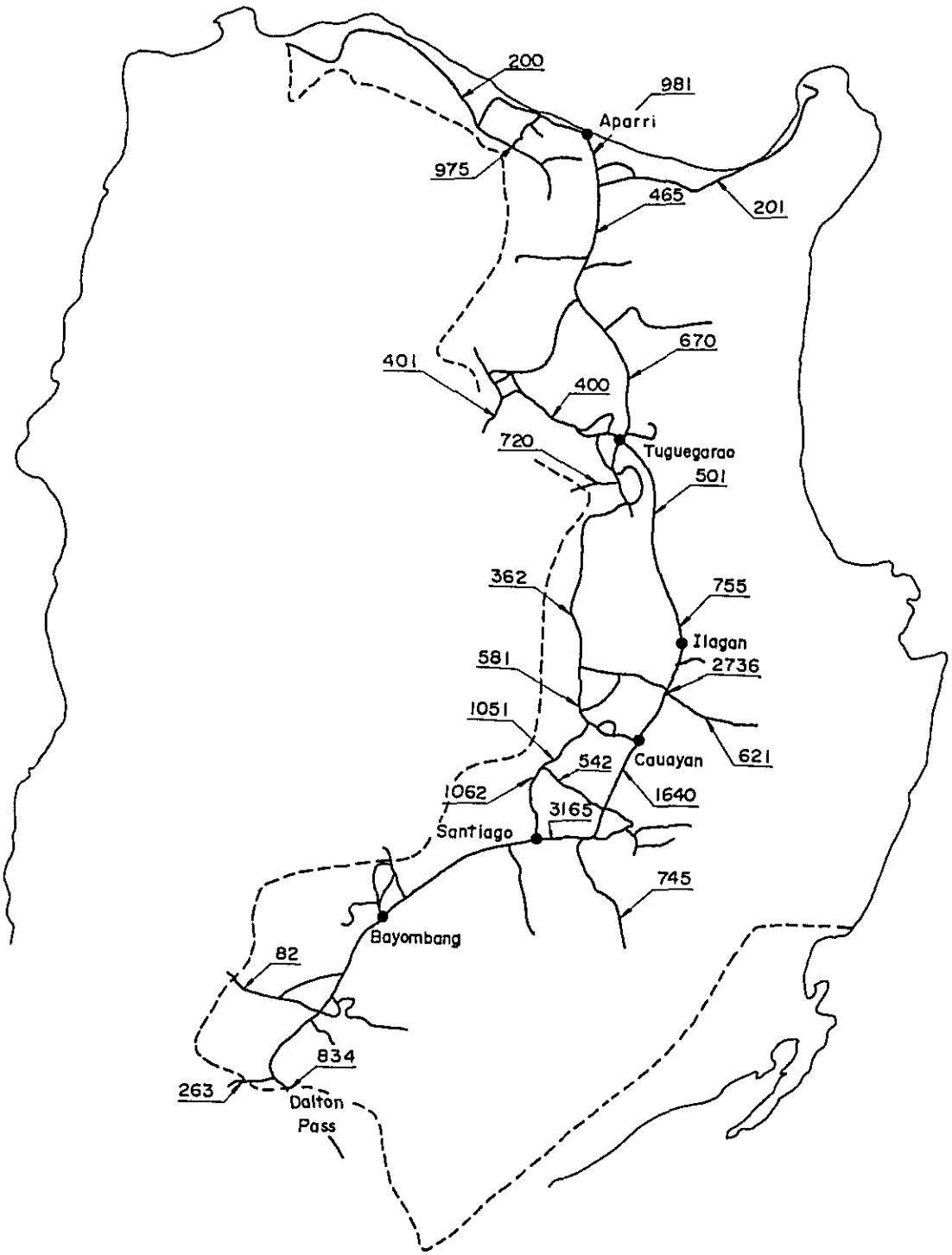


Fig. 3.09 Traffic Volume (1974) car/day

Table 3.25 Interzonal Road Flow of Passengers Traffic

Origin \ Destination	Cagayan	Isabela	Nueva Vizcaya	Panga-sinan	Nueva Ecija	Annual Average Outflow
Cagayan	-	167,400	-	-	-	167,400
Isabela	276,840	-	180,000	15,120	8,280	480,240
Nueva Vizcay	-	350,640	-	-	55,800	406,440
Pangasinan	-	50,040	-	-	451,440	501,480
Nueva Ecija	-	58,320	26,280	316,800	-	401,400
AVERAGE ANNUAL INFLOW	276,840	626,400	206,280	331,920	515,520	1,956,960

Philippine Transport Survey, 1969, Vol. III

Table 3.26 Interzonal Road Flow of Commodities Traffic

Origin \ Destination	Cagayan	Isabela	Nueva Vizcaya	Panga-sinan	Nueva Ecija	Annual Average Outflow
Cagayan	-	21,960	6,840	2,880	24,120	55,800
Isabela	9,000	-	5,040	6,840	26,640	47,520
Nueva viscaya	-	1,080	-	-	-	1,080
Pangasinan	6,120	-	-	-	22,320	28,440
Nueva Ecija	5,400	4,320	-	32,400	-	42,120
ANNUAL AVERAGE INFLOW	20,520	27,360	11,880	42,120	73,080	174,960

Philippine Transport Survey, 1969, Vol, III

Table 3.27 Transition of Traffic Volume

LOCATION	1970	1971	1972	1973	1974	1974/1970
Iguig-Amulung	459	505	560	615	670	1.60
Santiago-Echague	1,979	2,275	2,571	2,867	3,163	1.60
Dalton Pass	504	621	692	763	834	1.66
Tuao-Abbut Road (Cagayan)	272	306	340	374	408	1.50
San Mateo-Cabatuan Road (Isabela)	758	832	906	980	1,054	1.40
Jones-San Agustin Road (Isabela)	1,037	1,214	1,391	1,568	1,745	1.59

Table 3.28 Statistical Data on Motor Vehicle

	1968	1969	1970	1971	1972	1973	1973/1968
Cagayan, Tuguegarao	1,648	1,393	2,071	2,264	3,111	3,950	2.4
Cagayan, Abulog	1,033	937	1,351	846	1,152	1,141	1.1
Isabela, Ilagan	5,371	2,414	4,490	4,777	6,103	6,093	1.1
Nueva Vizcaya, Bayombong	1,571	1,634	987	1,710	1,783	1,801	1.1
Total	9,623	6,378	8,899	9,599	12,148	12,985	1.35

Table 3.29 Status of Pan Philippine Highway

Section	Programmed Length	Work Accomplished (%)
Cagayan Valley Road	410 km	62.5
Manila South Road	456 km	56.5
Samar-Leyte Road	311 km	39.3
Surigao-Agusan-Davao Road	264 km	42.8
TOTAL (AVERAGE)	1,441 km	51.9

PJH : Philippine Japan (Friendship) Highway

Table 3.30 Status of Pan Philippine Highway (Cagayan Valley Road)

Section	Roads (KMS)		Bridges (MS/Brigdes)	
	Programmed	Accomplish-ment	Programmed	Accomplish-ment
Allacapan-Tuguegarao	72.8	15.4	1075/25	324/11
Tuguegarao-Ilagan	69.1	42.9	478/5	73/2
Ilagan-Bayombong	70.8	52.0	617/11	
Bayombong-Cabanatuan	98.8	62.0	314/11	
Cabanatuan-Bulacan	97.9	86.2	1113/18	43/4
SUMMARY	410.4	258.5	3597/70	440/17

From the view point of traffic safety and environmental protection, it is desirable for this road to use by-passes at cities since most vehicles pass cities instead of entering them. Such attempts have been made. It is recommended that a by-pass system be more positively adopted in the future.

3. 63 Let us turn to the road disaster warning system. For the time being, this highway will have to be closed temporarily during the wet season for the reasons given above. When this happens, this information must be transmitted to users quickly to stop them not near the site of a disaster, but at a city of adequate size for the sake of safety and convenience. Since the Pan Philippine Highway is the largest trunk road, such a disaster warning system must be installed.

3. 64 It is obvious that the other inter-regional and intra-regional roads are quantitatively short and qualitatively unsatisfactory, as discussed at the beginning of this section.

The quantitative shortage is found not in particular regions, but in the entire region. Therefore, the problem of ensuring traffic is common to the entire region. Measures include the use of gravel for dirt roads, the paving of gravel roads, the use of permanent materials for temporary bridges and protection of slopes on mountain roads.

3. 65 No data on feeder roads was obtained except for Isabela Province. The total length of feeder roads in this province is said to be 1, 172. 53 km (268 feeder roads ranging from 1 km (shortest) to 28 km (longest)).
The average length is 4. 4 km. Their density is 1. 1 km per 1, 000 ha, which is far below the generally accepted density necessary for cultivated land in the Philippines, namely, 0. 02 km/ha. The density of feeder roads must be increased along with progress in agricultural development in the future.

Most of the feeder roads are dirt and their bridges are temporary. Many of them become impassable during the wet season. Present feeder roads must be improved sufficiently to raise the living standard of local residents.

3. 66 As noted above, there is great interest in roads in this region. Numerous projects have been proposed in addition to the Pan Philippine Highway. Projects other than the Pan Philippine Highway have been proposed by the regional offices of the central Government in individual provinces and by provincial Governments. However, most of them have not reached the stage of construction. They are summarized in Table 3. 31.

Table 3.31 Road Kilometerage and Bridge Meterage of Proposed Projects

Province	Roads (km)		Bridges (m)	
	National	Provincial	National	Provincial
Cagayan	258	290	1,120	514
Isabela	370		170	243
Nueva Vizcaya	190	180	585	185
Total	1,288		1,875	942

The main motives for the projects are:

- Promotion of development of the areas along each road (agriculture, forestry, mining, fishery).
- Connecting roads to specific regions (ports and harbors, remote villages, large cities).
- Building alternate routes for times when the Pan Philippine Highway has been flooded by the Cagayan River.
- Ensuring traffic flow between farms and markets (feeder roads).

The technical details of the projects are:

- Construction of new roads.
- Straightening, widening, paving and making other improvements on present roads.
- Anti-disaster measures, including construction of drainage facilities, slope protection, raising the road surface.
- Measures for ensuring traffic flow during the wet season, including permanent bridges and gravel roads.

The major projects for individual provinces are listed below. (See Fig. 3. 10 for reference.)

Cagayan Province

The Loop Road ① (New road construction and improvement of current roads)

- This will be a loop road in the plain district of the province. It will promote development of the districts lying along it and will be an alternate route for the Pan Philippine Highway during floods.

Magapit-Gonzaga Road ② (New road construction)

- This will be a short-cut connecting the Pan Philippine Highway with Port Casambalangan (to be discussed later). It will not only be an access road to the port, but also will promote development in the district along its route.

Feeder Roads

- Called "farm to market roads". They are to connect villages and presently existing roads in the vicinity. Fifty-five roads (total length of 643 km) are included in the project.

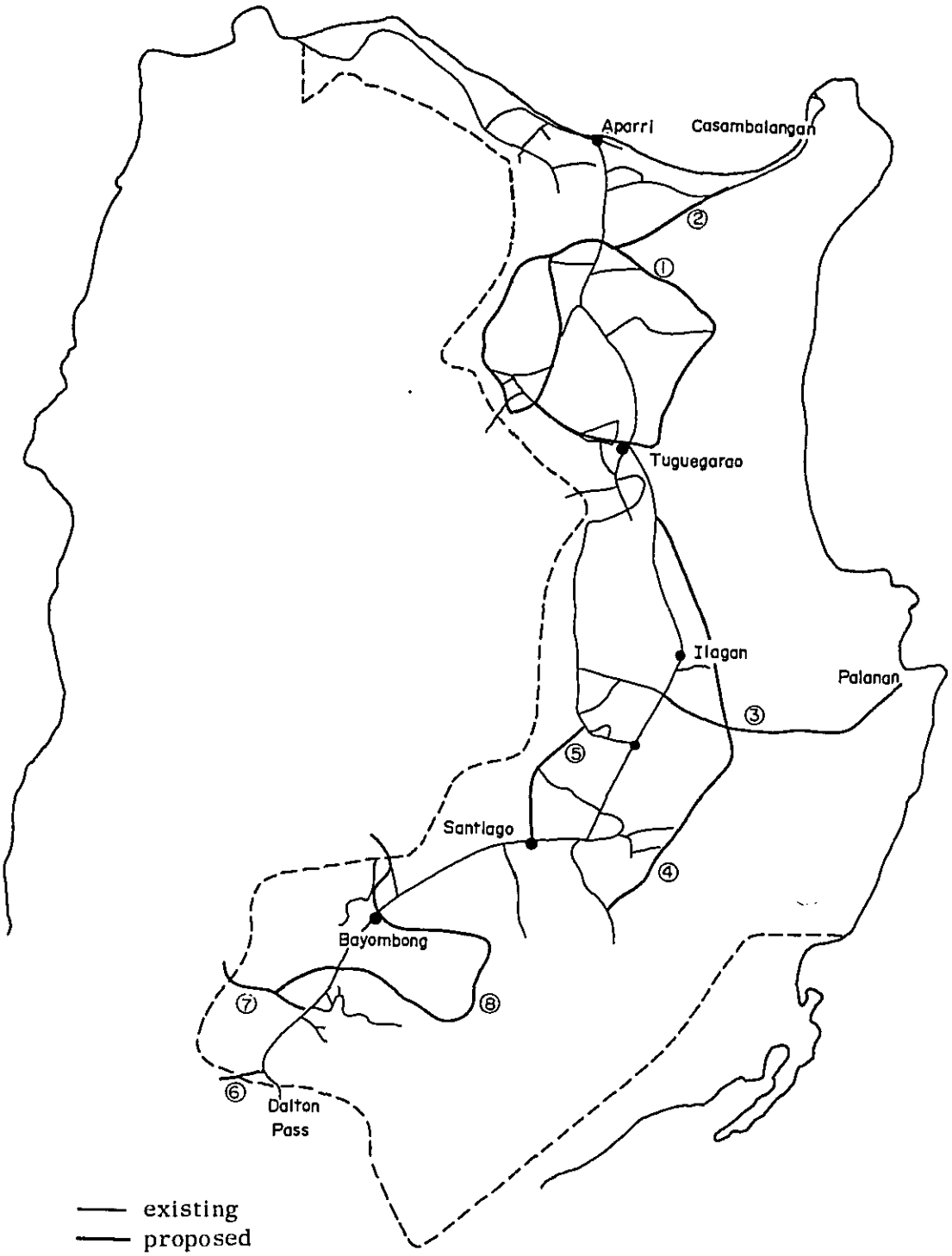


Fig. 3.10 Major Proposed Road Projects
(Note: Figure in ○ corresponds to that in the text)

Isabela Province

Naguilian - San Mariano - Palanan Road ③ (New road construction)

- This connecting road will link the center of the province with Palanan (one of the proposed sites for port facilities), and serve as an access road to the port. It will also promote the development of the district along its route. It will also provide access to remote villages in the east coast region.

Jones - San Guillermo - B. Soliven - Tumauimi - San Pablo Road ④

- This road runs in the eastern region of this province from north to south. It is to promote the development of the district along its length and be an alternate route for the Pan Philippine Highway during floods.

Santiago - Cabatuan Road ⑤ (Inprovement of current road)

- Currently, a gravel road exists in this block. But since is heavily trafficked plans call for concrete paving.

Nueva Vizcaya Province

Nueva Vizcaya - Pangasinan Road ⑥ (Improvement of current road)

- This road is to connect this province with a sea port in Pangasinan Province and also to promote the development of the district along it. Plans to build Marcos Highland City along it are under consideration.

Nueva Vizcaya - Benguet Road ⑦ (Improvement of current road)

- This road is to connect this province with Baguio in Benguet Province. It is not only to promote the development of the district along its length, but also to promote economic activities in the province through linking the province with the Philippines' largest tourist city, Baguio.

Bambang - Kasibu - Quezon - Solano Road ⑧ (New road construction)

- This will be a semi-loop road passing through the eastern part of this province. It will mainly promote the development of the surrounding district.

The total length of the roads under consideration is 1,288 km, or 50% of the total length of current roads (2,566 km). This indicates the zeal of the drafters of the road plans.

The motives underlying the projects include the development of the surrounding districts, access to ports and harbors and large cities, access to remote villages, alternate routes for times when the Cagayan River floods, and benefits to local residents from feeder roads. It may be concluded that the projects have been drafted after full consideration was given to the uniqueness of this region and its need for roads.

The remarks on current projects are listed below.

- Both national road and provincial road plans are drawn by the provincial governments, and as a result, there is a certain lack of continuity.
- Differences in project standards are found among the provinces. For example, the total length of bridges under contemplation is 1,634 m in Cagayan Province, but only 413 m in Isabela Province.
- Each project was not necessarily drafted on the basis of a demand study. It is important to have a quantitative understanding of demand in order to study the relative urgency of each project and determine priorities.

- The need for feeder roads is fully recognized. However, their current conditions have not been studied, except in Isabela Province. It is important to understand current conditions, to consider the relation with other projects (mainly agricultural projects) and to draw a plan from an integrated view point.
- Although a road exists between the center of Nueva Vizcaya and Port Casiguran (in Aurora Province), it is not open to public use because of the problem of right of way. This road must be opened to public use for access to Port Casiguran. This road will also have to be improved along with the development of the port, though it is not included among the roads under project.

Ports and Harbors

3.67 The port facilities in Aparri today are extremely poor. There are a 420 m long marginal wharf and a 360 m long rock jetty at the tip of the right bank of the Cagayan River. However, they are partially broken down and sand sediment from the Cagayan River makes it difficult to maintain the required water depth at the wharf. Therefore, they can hardly function as mooring facilities. The waterway is in similar condition. All incoming and outgoing vessels are obliged to load and unload at least 1,000 meters off shore. Except for some privately owned facilities there are virtually no port facilities at all. There are no roofed sheds or warehouses backing up to the wharf and jetty.

Caltex and two other companies have oil tanks of considerable size on the right bank of the Cagayan River. Oil is apparently transported from Manila by tanker, but no information has been obtained on the scale or type of oil berths.

It is worth attention that about 300,000 tons of cargo are handled annually at Aparri port, although it has no facility for handling international cargo. In this we can see that Aparri's long history saw the rise of its function as a lumber collection point. The city of Aparri is comprised of an aggregation of facilities to support development, including lumber mills, a customs house and a shipping company.

The development of Aparri and its environs will depend on the degree to which its urban facilities can be systematically developed. The river mouth of the Cagayan River is buried by sediment, no flushing effect by a training wall is expected. Therefore, it will be extremely difficult to rehabilitate the port and harbor facilities. In order to make best use of the existing urban resources, there should be a site selection survey, undertaken from this new point of view.

3.68 Port Claveria and Port San Vicente have only limited hinterland. Port Claveria has several cities with a certain level of urban resources, while port San Vicente embraces Sta. Ana with a population of some 10,000. The volume of transactions handled at the two ports is uncertain. Port Claveria has neither mooring facilities nor any other port or harbor facilities. Port San Vicente is a good port, protected by the Island of Palaui. It has a 28 m long wharf (under repair). The water depth in front of the wharf is -12 m. This port is used as a refuge during typhoons, but as a port for normal use it remains undeveloped since both production and aggregate urban facilities in the surrounding area are on a low level.

3.69 Port Casambalangan is currently under construction in the Cagayan Valley Region.

Currently, no port on the coastline facing the Babuyan Channel permits direct handling of cargo from large vessels. For this reason, lumber is exported entirely by offshore loading which requires additional cost, lowers cargo-handling efficiency and increases the demurrage cost of vessels. These additional costs lower the international competitive advantage of lumber. It is in this sense that it would be useful to promote construction of a Port Casambalangan. Its completion would stimulate the development of the adjacent districts.

3.70 However, the construction of this port faces several problems. From an economic and social point of view, it is doubtful that the harbor has the qualifications for growing to an international trading port (or commercial port).

It is essential to have a supporting urban infrastructure to develop into an international trading port. If no urban infrastructure is available, port construction and city improvements must be undertaken in tandem. Commercial facilities and capabilities are essential for buying and selling goods. An international port often requires oil and water supply facilities for ships, ship-repairing facilities, a customs house and official agencies for plant quarantine. (A so-called port city has all these functions.) Therefore, considerable time and vigorous city planning will be required in order for Port Casambalangan to serve as an international trading port.

From the technical point of view, the durability of a road which projects out into the harbor to ward off the onslaught of waves must be studied, and necessary counter measures, such as a breakwater, must be devised.

A study is being made in regard to the construction of a port in the Palanan District on the east coast of the Cagayan Valley Region. It is said that its primary purpose will be to ship the forest resources of the Sierra Madre Mountains. Currently, private enterprises are doing their own transporting of lumber resources in this region. Means of transportation must be improved for the well-organized development of these resources.

There are several problems to be solved before some specific component projects are undertaken. First, a basic policy decision between having one large port, as where road conditions are extremely poor, or many small ports. A second problem involves whether lumber will be processed at the port or shipped elsewhere for processing.

Selection of sites for port construction must be based natural conditions, but also on a broad range of conditions such as the distribution of timber resources and collection methods. Careful investigation is recommended since a new port will be a stimulus to the development of this region.

3.71 There are four main airports in this region. They are Aparri, Tuguegarao, Cauayan and Bagabag. The numbers of users of these main air fields have not necessarily been increasing. This is partly because highway bus services have started on Pan Philippine Highway between Manila and Aparri.

In view of the demand for air transportation in this region, there seems to be no need for immediate extension or moving of these air ports. The air service network linking Manila and the four main air ports seems to require no immediate change. However, stable air transportation services must be provided in view of the area's proximity to Manila and future rises in personal income. In other words, there must be provision of such facilities as instrument landing systems in order to increase airport efficiency. Moreover, airport buildings should be designed and managed not only for passengers, but also as multi-purpose halls for local residents.

Magat River Development Project

3.72 The Magat River Development Project is a multi-purpose development project oriented mainly to irrigation and power generation. Service water supply, fishery and recreation are considered as secondary functions. Water control is considered as a by-product of dam construction.

The core of this project is the Magat Dam, which is to be constructed 6 km from the existing Magat Head work.

The specifications of the dam project are given below.

Type	:	Concrete gravity flow type (Both wings - fill-type dam)
Height	:	114 m
Height of dam crown (above sea level)	:	200 m
Total storage	:	1,254 x 106 m^3
Effective storage	:	668 x 10^6 m^3 (100 years sedimentation)
Dam volume	:	Concrete 2,031 x 10^3 m^3
		Fill 3,500 x 10^3 m^3
	:	4,174 km^2

3.73 Construction of this dam is expected to have a significant effect on development. Anticipated results include new irrigation of about 50,000 ha, 30,000 kw of hydroelectric generation, fishing and recreation etc. It is expected to make great contributions to the social and economic development of the Cagayan Valley Region, especially Isabela, especially in regard to agriculture. In addition, it will be a major source of electric power for Manila at peak demand hours.

But the formulation of the final plan must await completion of feasibility studies, and further surveys and studies must be undertaken prior to actual implementation. Flood control is only a by-product of this project. The assumption is that it will mitigate damage from floods by storing as much water as possible for irrigation and power generation during the initial part of the wet season. However, considerable flood control effect can be derived from storing water for the dry season during the latter half of the wet season. The discharge of such stored water would be disadvantageous for power generation, but advantageous for flood control. It will be worthwhile to weigh the two. In this case, a scheme of reservoir operations must be based on an integrated water control plan for the entire Cagayan River system.

Chapter 4
Development Potential

photo : Rice field in the Magat Project area

Chapter 4 Development Potential

4.01 The first matter to be considered is related to the appropriateness of selecting the Cagayan Valley Region for promoting development within the framework of integrated development. This is briefly discussed here in reference to the criteria listed in 2.02.

First, this region is a "problem area" since the income level is far below the national standard, large population is flowing into this region, and it is plagued by disasters almost every year due to the lack of facilities for preventing natural disasters, including typhoons. This region is also a "resource area" since it has a large area of arable land per capita and rich water resources.

Second, three provinces in the Cagayan Valley Region meet the second criterion of being an environmental entity. The administrative unit of these three provinces should be expanded slightly from the view point of basin management. There is no need to repeat here that this region requires those multi-purpose and multi-sectional development efforts which can be called integrated development. Since the Cagayan Valley Region meets these criteria fully, the Survey Team agrees to select this region for an integrated regional development planning.

4.02 As the second step, we have studied some basic factors (water resource, land, labor force, energy) to determine the major fields for development and their development potential. Since, however, it is difficult to study this without any

knowledge, potential is examined here in terms of agriculture (especially, rice production), which was tentatively assumed to be the major sector of development since mineral resources and primary raw materials are not especially rich in this region.

4.03 As we have previously stated, the Cagayan River Basin has a water volume of 49 billion tons. Since hardly any problems of water quality exist in this basin due to the absence of industrial wastes, urban sewage, etc., which become sources of water pollution, the river basin can be considered to have sufficient qualitative and quantitative utilization feasibility given improvements in the hydrological regime of its surface waters by dams and high level developments for such purposes as irrigation, urban water supply, electric power generation, etc.

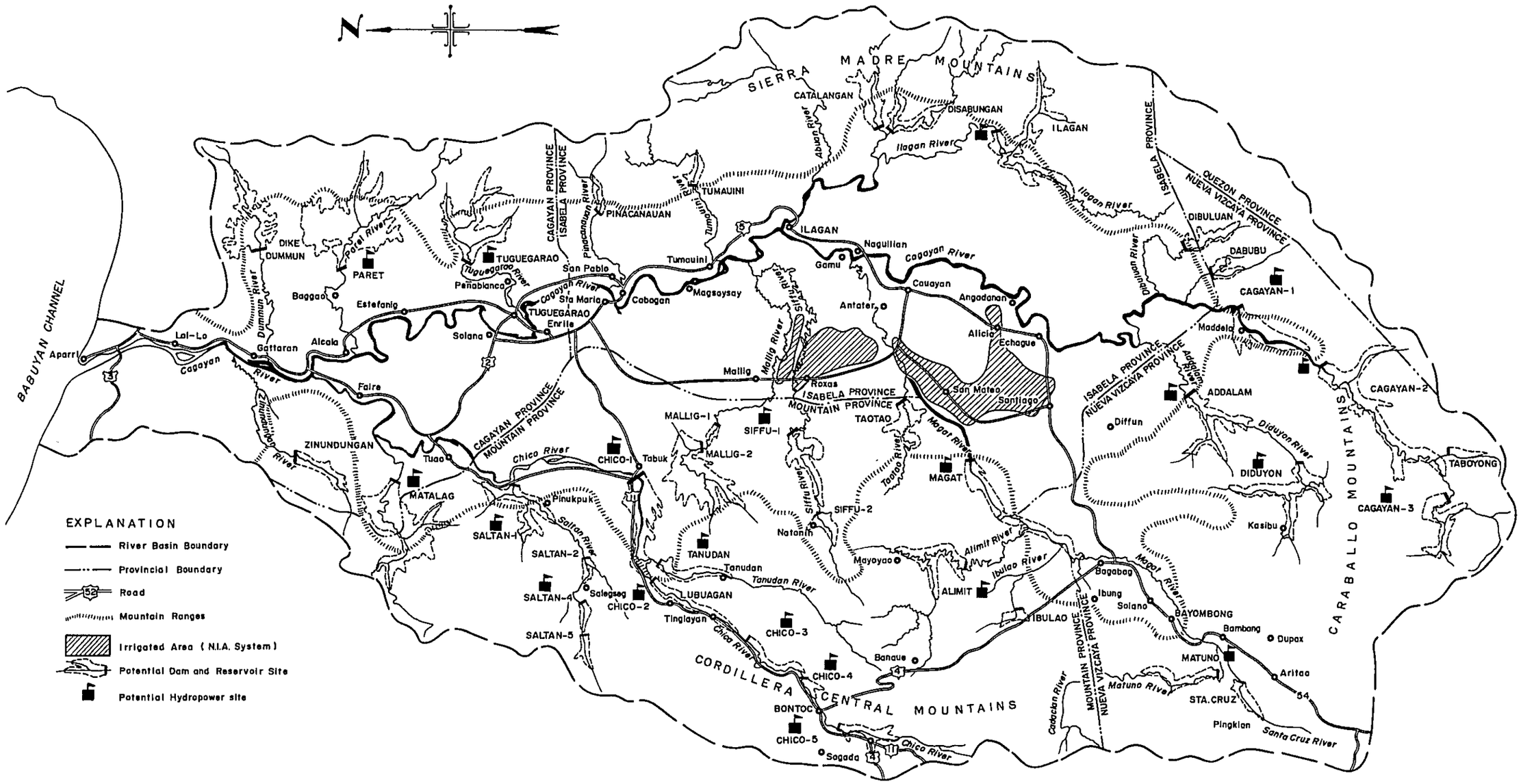
Moreover, 38 places have been selected as possible dam construction sites within the river basin, as shown in Fig. 4.01 prepared by the United States Department of the Interior, Bureau of Reclamation (US DIBR).

Furthermore, survey data are scarce on underground water. The actual situation has barely been grasped in districts such as those shown in Fig 4.02, where the US DIBR has indicated the potential of underground water development. In districts where the utilization of surface water is a handicap, underground waters become a serviceable water resource. Investigation of this is progressing. The current use of water in the Cagayan Valley Region seems to be less than 1% of the river's run-off.

4.04 Generally, in any area of any country, not all of the river discharge volume can be drawn upon as a water resource. Naturally, there exist limitations on possible utilization. Whether or not the degree of possible utilization is high or low is greatly controlled by the discharge pattern of river water. Moreover, this pattern greatly depends on the annual distribution of rainfall. In addition to this, besides such factors as topographic features of the river basin, geography, planimetric features, etc., the local rainfall intensity within the river basin may also have an effect. In places where the rainfall distribution is uneven throughout the year and the expansion of the river basin, topographic features and the condition of forests maintain a suitable balance, it is a matter of course that the utilization potential of river waters is great.

In view of the current state of use, it is not conceivable that water will inhibit development in the Cagayan Valley Region if adequate facilities are constructed.

4.05 As the third step, the possibilities of land utilization are studied. Among the total area of 2,663,000 ha in this region, an area of 1,755,000 ha is occupied by national forests. Among these national (public) forests, 908,000 ha are alienable and disposable. Among the national forests, forests which have been set aside as permanent cover 804,000 ha. The balance of 951,000 ha is unclassified public forest in which future land use (mainly for agriculture and forestry) has not yet been determined.



source : A Report on the Cagayan River Basin (USBR)

Fig. 4.01 Potential Hydropower Sites in the Cagayan River Basin

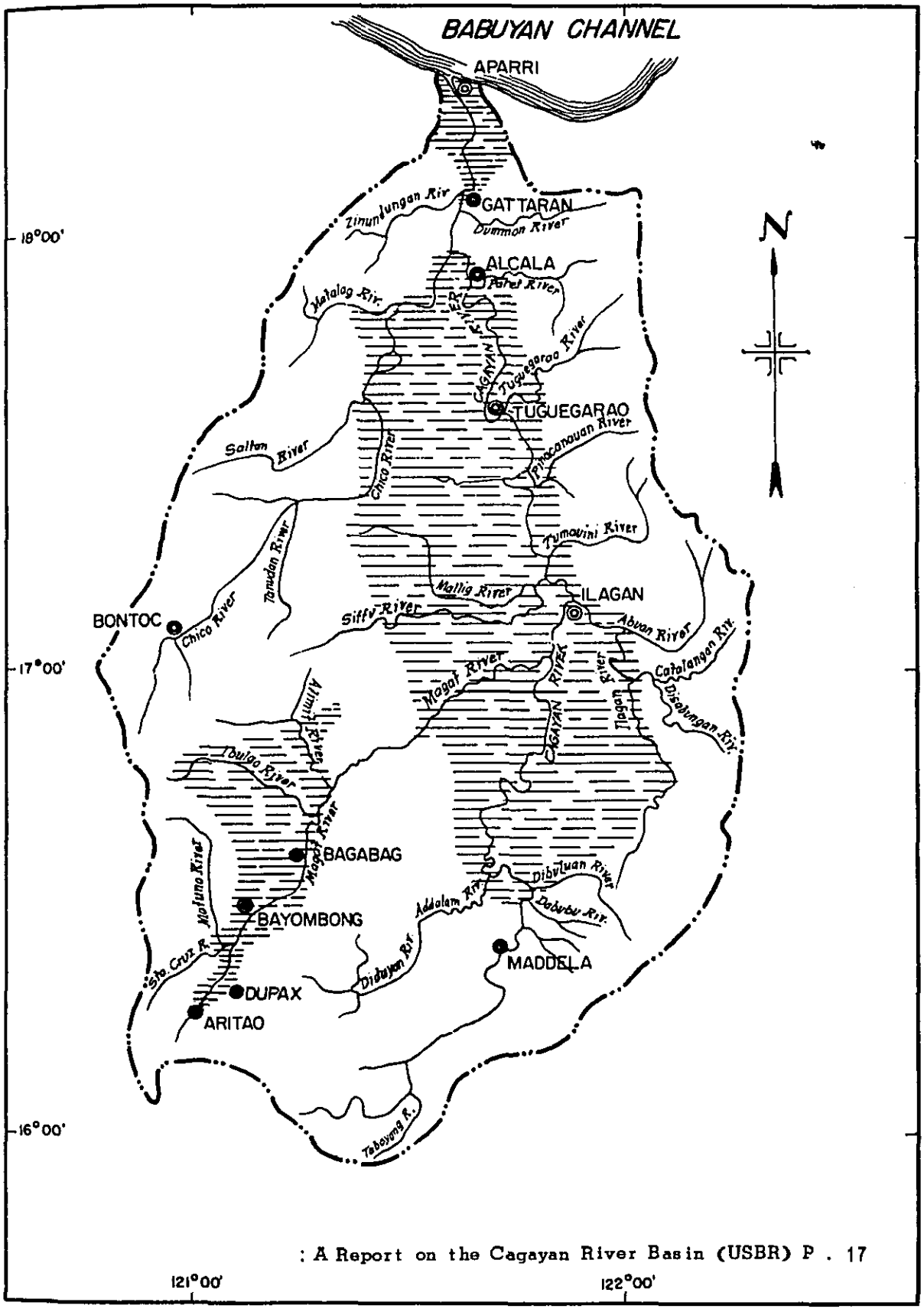


Fig. 4.02 Potential of Underground Water

The Government has enacted the Forestry Reform Code (Presidential Decree dated February 5, 1974) and intends to promptly undertake the land use classification of unclassified public forests of about 8 million ha throughout the nation. On principle, it intends to maintain lands with a slope of more than 18° as permanent forests, and aims at making about 42% of the entire national territory into permanent forests.

When considering the fact that there are a good many mountainous forests in this region, it is considered necessary to reserve about 60% as permanent forests. Thus, permanent forest in this region would amount to about 1,600,000 ha, while about 150,000 ha of the unclassified public forests may be utilized as farming land, pasturelands, etc.

4.06 Current state of land utilization is shown in Table 4.01. About 150,000 ha of forest land which is categorized as alienable and disposable area and about 600,000 ha of openland including the grassland approved as pasture remain unused or are used only primatively.

Table 4.01 Land Use in Cagayan River Basin

(Unit: 1,000 ha)

	Area	% of Basin Area
Productive Forest	1,059.7	39.7
Unproductive Forest	792.5	29.4
National Parks	3.0	0.4
Reforested Areas	13.4	0.5
Total Forest	(1,869.6)	(70.0)
Grass (Pasture license)	151.0	5.7
Other Openland	286.9	10.8
Total Grassland	(437.9)	(16.5)
Cultivated Crops	318.3	11.9
Plantation Crops	1.0	0.1
Total Cropland	(319.3)	(12.0)
Marsh & Ponds	13.3	0.5
Urban & Others	27.9	1.0
Grand Total	2,668.0	100.0

Source: Demonstration and Training in Forest, Forest Range and Watershed Management.
FO:SF/PHI16, Technical Report 6 UNDP/FAO UN, ROME 1971

According to data based on the soil survey performed in 1962, among the total area of 2,660,000 ha of the 3 provinces in the Cagayan Valley Region, the A-D classes include 829,000 ha which may be utilized as either agricultural land or pastureland.

Table 4.02 Land Capability Classification

(Unit: 1000 ha)

	Cagayan	Isabela	Nueva Vizcaya	Total
Class A	98.8	67.6	37.1	203.5
B	98.8	116.6	28.8	244.2
C	1.1	42.6	49.9	93.6
D	17.0	222.2	48.1	287.3
Sub-total	215.7	449.0	163.9	828.6
Others	684.4	604.7	516.5	1,805.6
Total	900.1	1,053.7	680.4	2,634.2

The nature of soils according to classes is as follows:

Class A : Very good land; can be cultivated safely.

Class B : Good land; can be cultivated safely; occasional overflow is the problem.

Class C : Moderately good land; moderately sloping; erosion and fertility are the main problems.

Class D : Moderately to strongly sloping or beach sand; erosion, fertility and high salt content are main problems; if land is to be cultivated suited for pasture, etc.

Others : Very steep, excessively eroded, shallow, rough or dry for cultivation.

Source: Bureau of Soils

A land use plan prepared on the basis of soil survey indicates that 577,000 ha are suited for arable land while 506,000 ha are suitable for grazing land.

Details are shown in the table below.

Table 4.03 Land Use Plan

(Unit: 1000 ha)

Use	Cagayan	Isabela	Nueva Vizcaya	Total
Rice	116.5	140.6	51.4	308.5
Corn, beans, vegetables, etc.	67.4	146.3	10.1	223.8
Coconuts, fruits, coffee	30.8	8.1	6.0	44.9
Sub-total	214.7	295.0	67.5	577.2
Pasture land	106.9	249.5	149.7	506.1
Forests	551.1	508.3	458.6	1,518.0
Fish hatcheries	6.4	0.8	-	7.2
Wild animal ranges	21.1	-	1.2	22.3
Total	900.2	1,053.6	677.0	2,630.8

On the other hand, there are 514,000 ha of suitable arable land in the 3 provinces of the Cagayan Valley Region according to The Four-Year Plan.

Table 4.04 Land Use Plan in the Four-Year Development Plan

(Unit: 1000 ha)

	Land Suited to be Arable land	Actual Arable land	Balance
Cagayan	249	143	106
Isabela	212	204	8
Nueva Vizcaya	53	40	13
Total	514	387	127

Estimates mentioned above of agricultural land use are shown with the ILO mission's estimate in Table 4.05, for the sake of comparison.

Table 4.05 A Comparison of Estimates of Agriculturally Usable Land

(Unit: 1,000 ha)

	I	II	III	IV	V
Land with Potential for Agricultural Use	1,000	830	1,090		1,700
Land not in Use	680				1,070
Land in Use	320				630
Arable Land			580	510	
Land in Use				390	
Land not in Use				130	
Pasture Land			510		

Note: I : Estimate by Survey Team based on forest survey
II : Soil survey
III : Estimate based on map of land use (utilization plan)
IV : 1974-77 Four Year Plan
V : Estimate by ILO Mission

No accurate data on the area of currently used land is available. If it is assumed to be 390,000 ha, about 130,000 - 190,000 ha of land will be usable in the future. The area of pasture land is also estimated to be 400,000 - 500,000 ha.

4.07 As the fourth step, the labor force potential of this region has been evaluated. Labor force potential must be evaluated on the basis of the currently available labor force data classified by occupation and on estimates of future demand. However, such a method cannot be used here because of the limited data available. Therefore, only total labor force data are analyzed here.

Table 4.06 below indicates the size of the labor force, participation rate, etc., in this region. As compared with a national average of 49%, the labor force participation rate for the three provinces in this region exceeds 50%. The unemployment rate is more than 10% for Cagayan Province and more than 8% for both Isabela and Nueva Vizcaya Provinces, surpassing the national average.

Table 4.06 Labor Force Indicators by Province

	Cagayan	Isabela	Nueva Vizcaya	Philippines
Population of those over 10 years old	395, 254	430, 080	150, 986	25, 115, 063
Size of Labor Force	211, 958	232, 420	78, 604	12, 296, 583
Labor Force Participation Rate	53. 6%	54. 0%	52. 1%	49. 0%
Number of Unemployed	22, 199	18 703	6, 505	941, 708
Unemployment Rate	10. 5%	8. 0%	8. 3%	7. 7%
Literacy Rate	80. 8%	81. 9%	80. 2%	83. 4%

Source: Computed from Population Census of 1970.

The unemployment rate does not include disguised unemployment (or under-employment). Presently, there are no data of this type for this region. But we can perform some analyses based on a sample survey on a nation-wide scale.
Table 4. 07 indicates the employment conditions of the agricultural sector of the entire nation during a week's period in November, 1971. According to this survey, the unemployment rate is 3. 7% and is thus lower than the national figure. Among those employed, however, those desiring additional employment opportunity are 14. 9% of the total labor force. When these persons are included, it means that about 19% of the labor force is seeking for some employment opportunity.

Table 4.07 Employment in the Agricultural Sector

	1000 persons	%
Labor Force:	9, 084	
Employed:	8, 553	94. 2
Wanting additional work		14. 9
Working: under 20 hours		1. 1
20 - 29 hours		1. 7
30 - 39 hours		2. 2
40 hours and over		9. 9
With a job not at work	192	2. 1
Totally Unemployed	339	3. 7

Source: The BCS Survey of Households Bulletin No.31.

4. 08 Table 4. 08, on the other hand, shows the working hours in the 1 week survey period for persons engaged in agriculture. forestry and fishery. There are about 17% who work less than 30 hours and about 42% who work less than 40 hours. This shows that there are many persons who are still in the category of the under-employed.

Table 4.08 Weekly Working Hours of Those Engaged in Agriculture, Forestry & Fishery (November, 1971)

Less than 20 hours	8. 4 %
20 - 29 hours	8. 7
30 - 39 hours	12. 8
40 hours	12. 4
41 - 48 hours	22. 0
49 Hours or more	38. 8

Source: The BCS Survey of Households Bulletin No. 31

It is thus clear that this region has a sufficient supply of unskilled labor. There is no need to anticipate a labor shortage in this region so long as the demand for labor comes from agriculture.

4. 09 In the field of energy, water power is among the most important development potentials in the Cagayan Valley Region. Water power is a domestic renewable energy resource. Although it requires large initial investment, it has high potential as a long-term and stable source of power. The economic value of water power has increased in these days when the cost of thermal power generation is rising sharply with the swelling price of crude oil. No sufficient investigation has been made on the total water power potential within the region. A rough estimate of potential water power generation based on the 1/50, 000 topographical map is more than 2 million kw. The proposed Magat River and the Chico River Projects have potential water power development of 300, 000 kw. The demand for power is not so large in the Cagayan River Basin. Its demand will be met easily until 1989 with a proposed diesel plant in near the future and with electricity supplied from the Luzon grid after a transmission line is constructed. For this reason, the potential water power in the Cagayan Valley Region can be used not only for meeting the demand within the region, but also as a supplementary power supply for the Philippines, especially the Luzon grid which includes Manila. It should be noted here that the demand for power is rising at an annual rate of at least 10% in the Philippines.

The mineral resources in this region are not sufficient to play a leading role in the development of the entire region. Although there are rich forest resources, they are not large enough to support further increases in timber operations.

4. 10 In view of the development potential of water resources, land resources, energy resources and human resources, the Survey Team has concluded that promotion of the development of this region should direct major efforts at agricultural production, especially rice and corn. This region could become the granary of the Philippines in view of the facts that a considerable portion of the current rice production is shipped to other regions, and that there is considerable potential for agricultural development. Increasing food production is enormously important in the Philippines and must be solved immediately. Agricultural development in this region will not only contribute to solving the urgent food problems in the Philippines, but also lead to further development in the region.

4. 11 The development of flat land, especially through the promotion of irrigation, will have the quickest effect on increasing food production. Production will increase immediately as long as water is secured. For even better results, various measures must be taken at the same time. They include on agricultural management extension service, along with road maintenance and improvements, further expansion of farm.

The development of hilly areas will contribute to expansion of arable land for staple food and feed grain production. To increase the yield of these crops it seems important to begin with the preparation of a land utilization plan and other basic studies which give consideration to natural conditions (soil conditions, slope classification etc.) and socio-economic conditions (land ownership, farmers' financial conditions etc.).

It is essential not only to have extensive land use through cultivating 130, 000 - 190, 000 ha of unused arable land, but also to have intensive use of farmland already cultivated. The rice yield can be at least doubled by irrigating unirrigated districts and improving farming techniques. (It is said that there is still 300, 000 - 500, 000 ha of land available for pasture. However, the Survey Team was not able to make a full study of the future of a stock-raising industry.)

But it is necessary to do more than implement those measures which directly expand agricultural production. The ancillary facilities and industries that support agricultural production must also be developed at the same time.

4. 12 This region has hardly any manufacturing industries, except saw mills and related wood processing industries. The region depends on Manila for the supply of consumers' goods and intermediate goods. Improvement of road traffic will make this condition continue for the time being. To increase employment and value added, studies should be made to promote both those industries that use locally produced resources and meet large local demand as well as the basic service industries which would support various activities in the region. These studies should be made in tandem with the construction of infrastructure, including power roads, ports and harbors.

Chapter 5
Strategies for Development

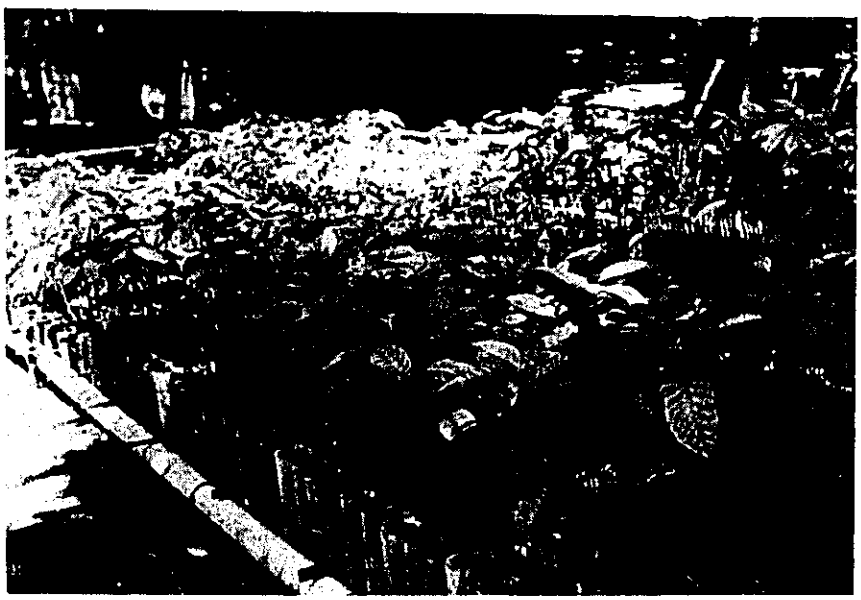


photo : Nursery at a reforestation project, Cagayan

Chapter 5 Strategies for Development

Section 1 Strategies for Development

5.01 Strategies for development of the Cagayan Valley Region will take as their main target the development of agriculture and the increased production of rice and corn. They may also center on adopting proper measures for the development of primary industries such as forestry and fishery and related industries (i. e. , lumber and food processing industries, etc.). In content, the policy may become multifaceted including hardware and software. Here, we will examine the main physical projects. Just because the major target of planning is concerned with agricultural production, it does not necessarily mean that priority in time sequence and investment coincides with the proclaimed target. From the standpoint of integrated regional development, it is a principle that the various projects be executed in the best order and funds used in the most effective way for realization of the entire plan. In order to promote an interdisciplinary approach and to free project formulation from disciplinary constraints, it is convenient to classify the sectoral projects into the following three categories, and then to define their significance and roles, respectively.

The expansion of both gravity-flow irrigation and pump irrigation, supplied with electricity and offering immediate results, is considered most important for increased rice production. In the Cagayan Valley Region development, irrigation and electrification projects are classified as leading projects which belong in the first category. In a word, the Cagayan Valley Region integrated development project is centered around agricultural development and particularly, irrigation. However, to implement leading projects only would not bear fruit. They must be accompanied by supportive measures which belong in the second category and are of supplementary nature, such as technical extension services and transportation systems such as roads, harbors, etc.

Projects in the third category are disaster and damage prevention measures. The entire Philippines lies in the path of typhoons and is constantly subject to the fear of storms and floods. Due to this, to the annual fluctuation in rainfall and to regional deviations, floods and droughts are suffered periodically in certain areas. Projects such as soil conservation, flood control, flood prevention, and the like are necessary for preventing and eliminating such disasters. Such measures are called preventive maintenance (abbreviated as PM). In places where there are many natural disasters such as the Philippines, a production promotion policy is important; but it is particularly important to adopt a production reduction preventive measure which contains a braking effect preventing the retrogression of an achieved level of wealth and income. However, the idea of economical PM is not one which envisions construction of facilities which will absolutely prevent disasters on any scale.

The more fixed and large-scale the maintenance facilities become, the greater the expenditure increase per period (normally, a year) required for construction and maintenance. Against this, the expected value (mean value) of losses measured by the frequency probability and degree of the disaster decreases as the scale of the maintenance facility gets greater. It is most economical to decide the scale of the maintenance facilities so that the total value of such expenditures and losses becomes minimal. In actual soil conservation and flood control projects, however, planning must not disregard land use and water utilization. Just because we have classified the various projects into categories here, the basic notion that a regional plan gives consideration to the unity of nature and multipurpose uses of resources must not be abandoned. Regional planning is nothing but a plan which comprehensively coordinates various sectoral projects in a given geographical area, and efficiently implements these projects.

Section 2 Model Integrated Development District

5.02 What is the best strategy to employ, if irrigation is to assume a leading role in the integrated Cagayan Valley Development? Let us study the proposed irrigation projects in this region to get some ideas for working out a strategy.

As discussed in Paragraph 3.43, the irrigation projects in three provinces cover 225 districts (262,506 ha). They include various types of systems, ranging from large national irrigation systems to small pump irrigation systems. The Team has not obtained sufficient information concerning, for example, the time factor and the progress of each project. Table 3.20 shows the progress status of the national irrigation systems, but among those projects listed, some are ready for immediate construction, while some have not completed preparation. However, it would be most realistic to draft development strategies on the basis of these proposed projects.

5.03 Proposed projects can be categorized into gravity flow and pump systems. Pump systems have been proposed for six national irrigation projects. As already mentional pump irrigation has been limited to small scale projects in the Philippines. But recently large-scale national pump irrigation projects are planned. Among these projects there are some projects which, like Solana-Tuguegarao Project, have completed the preparation stage and are ready to be constructed. It is generally thought that gravity flow irrigation should have priority over pump irrigation. However, this general formula is not always followed because of topographical and hydrographical conditions. There is no need for saying that large-scale pump irrigation facilities are not used individually the larger the irrigation system becomes, the less the sense of community will be. Sometimes this is the greatest constraint on irrigation planning. It must be one of the reasons why the standard area of a pump irrigation system has been set at 60 ha and that numerous small pump irrigation projects have been implemented.
planning. It must be one of the reasons why the standard area of a pump irrigation system has been set at 60 ha and that numerous small pump irrigation projects have been implemented.

5.04 Large-scale national irrigation systems of gravity flow type have been operated for many years and will be planned in the future. This suggests that pump irrigation can also be adopted to the larger area. This is why such large-scale pump irrigation project as Solana-Tuguegarao project have been studied. However, pump irrigation, unlike gravity flow, requires various maintenance costs, including electricity charges for water intake from water sources. Therefore, its scale must be determined on the basis of careful advanced studies. In some cases, it will be effective to combine the two systems for one project without limiting an entire district to one system alone. It should also be remembered that a project of a considerable scale can be divided into some blocks and adequate system can be adopted for each of the blocks.

5. 05 The Survey Team does not have detailed information on the position of each of the proposed projects in said list. Anyway, the entire region should, most desirably, have some irrigation facilities from the long-range view of the region's integrated development. In this sense, the Magat Multi-purpose Project, the Chico River Irrigation Project and other projects of gigantic scale should be drafted as long-range projects.

5. 06 It is understandable that diesel engines have been used for pump irrigation in the Philippines where power supply to rural areas is still limited. However, the use of electric power is, of course, far more advantageous, even in terms of maintenance, even without the current oil crisis. A transmission line construction project has been studied recently for the Cagayan Valley Region. Since abundant power supply is thus assumed, it will obviously be advantageous for the future pump irrigation strategy to replace diesel engines with motor driven engines. This idea of electrified irrigation opens the way to a large-scale pump irrigation project, and must be a base for the planning of large-scale pump irrigation projects.

Since the motor power for irrigation depends on the transmission line project, which aims at electrification of households at the same time, due consideration should be given to the power supply system planning. In other words, it must consider how to share the power with towns' or barrios' electric consumption. Generally, power will be used for irrigation during daytime and for households during night. It will be important to study the need of electric power for irrigation and different conditions from diesel engine irrigation should be taken into consideration.

5. 07 In accordance with progress in the construction of irrigation facilities using motor driven pumps, agricultural extension work related to rice culture techniques must be intensified. Research on improvement of varieties is promoted by the IRRI, the Agricultural College of the University of Philippines, etc. Although results of this research are highly acclaimed, the present theme is to consider in what way the results should be diffused and thoroughly taught to the farmers.

Since high yielding varieties are highly resistant to fertilizers but weak against droughts, it is necessary to secure necessary irrigation water, apply fertilizers in proper amounts at proper periods, and do sufficient weeding and pest and disease control. Only after these conditions are met will it be possible to obtain high yield harvests. Since it is not clear whether or not the distributed fertilizer is actually being effectively used, it is necessary to offer guidance including this point.

5. 08 Since qualitative changes in management can be expected with the transfer from low yield and low cost management to high yield and high cost management, the perfection of farm management for the farmers should not be limited only to extension of and training in crop cultivation techniques, but also include consideration of farm management and economy.

Taking the above situation into account, the Philippine Government has already begun the "Masagana 99" Program. Since Masagana 99 is applied to restricted and widely scattered farmlands, the effects of agricultural chemicals are sometimes not as planned or fertilizers are not properly applied. Since one farm technician must cover about one hundred farm households, it cannot be said that intensive guidance is being given. Masagana 99 would be more effective if it improved in these two areas.

5. 09 The organization of farmers will also become an important theme. Presently, in certain places, compact farms have been organized and the maintenance and supervision of terminal water utilization facilities and the centralization of farming policies are being devised. With the expansion of the area under irrigation in the future, the universal spread of such organizations must be planned and it will be necessary to promote the efficient use of irrigation water and to raise the level of farming techniques.

It is said that Philippine farmers lack a sense of community. It will be possible to foster the sense of community through such experiences and grow business-minded farmers.

5. 10 In this region, there is an area of about 52, 000 ha which needs irrigation under the pump irrigation set up. But if this area is to be irrigated by small-sized pumps for example, about 870 units will have to be introduced. (One pump will irrigate 60 ha.)

Moreover, small-sized tillers, tractors, threshers, etc., have recently been introduced into this region and it is believed that the mechanization of agriculture will progress in the future.

Presently, since Manila is relied upon for the supply of spare parts, it takes about one month for repairs. In the future, in order for this equipment to be able to operate efficiently, the establishment of repair facilities will be necessary.

Furthermore, turning to the shipment and processing of agricultural crops, if a transmission line is constructed in this region in the future and the supply of electricity is assured, the introduction into the rural community of an on-site processing industry may be feasible.

(Model Integrated Development District)

5. 11 The Survey Team has discussed various factors that are important for improving agricultural productivity, especially, the productivity of rice plants. It also discussed the need for attaining close mutual linkage among these factors.

Although developmental efforts based on this idea are being tried in other regions, the experience gained there will not be directly applicable to the Cagayan Valley Region because of regional differences in socio-economic and environmental conditions.

Therefore the Survey Team suggests the carrying out of a "Model development experience" while continuing the on-going policy measures, before launching development plans for the entire region. Through this experiment, information on

the characteristics of the region and inter-regional differences will be gathered and would help in planning the development policy for the whole region. This model development experiment is called as "model integrated development district".

A model district should be at least 3,000 ha in area. It is equivalent to a small municipality in the Philippines. The population will be approximately 8,000 - 10,000. The district of this scale (about 5 - 6 barrios) is preferable since it must have at least all the functions that are necessary for a society and it should be almost self-sufficient for daily life.

5.12 The following conditions must be considered for the selection of a model district.

(1) The farmers in a district must be enthusiastic about agriculture and must be settled there. (An unexploited district is also satisfactory as long as suitable immigrants are willing to move in.) In the case of farmland already in use, a district with many farmers under Masagana 99 or Masaganan Maisan is preferable. Since farmers are to participate voluntarily in their programs, the number of such farmers at least reflects willingness of a district to have development. Furthermore, a model district will be developed smoothly if farmers are already used to the modern agriculture techniques recommended under the above programs.

(2) Integrated development is intended to achieve not only increased income in rural areas, but also fair income distribution. This should also be considered fully for the selection of a model district. In other words, a district to be selected should not have a social system such that only a small number of people may benefit from developments. At the least, a district to be selected must have possibilities for improvements in this respect. In other words, concerning the land tenure system, it is desirable to select a district with many owner cultivators or a district with many potential owner cultivators under Agrarian Reform.

(3) It should be possible to apply the concept of a compact farm system.

5.13 When such a district is selected, various measures for agricultural development are to be applied. The components of the project are listed below.

(1) Irrigation facility.
(2) Guidance on management.
(3) Group farming.
(4) Electrification of barrios.
(5) Inter-barrio roads and barrio-market roads.
(6) Agricultural service center.
(7) Agricultural credit.
(8) Measures to multiply income sources for farm households (vegetables, stock-raising, etc.)

5.14 A compact farm type of farming group is recommended as the unit of agricultural production. It seems adequate to set one turn-out service area for group farming within an irrigation system. Farm machinery, threshers and driers etc. are to be bought for common use through compact farms. The timing of farm

work including application of fertilizer and agricultural chemicals, should be coordinated. Farm technicians should provide technical assistance in the performance of these tasks, while financial assistance should be provided by supervised credit for operation expenses similar to the credit used for Masagana 99 or by farm mechanization credits (similar to the credit supplyed through the Central Bank of the Philippines - International Bank for Reconstruction and Development (CB-IBRD) Project). During this process, a judgment must be made on whether even further concentration of machines (a rice-hulling mill for an entire barrio, for example) would be advantageous.

Barrio electrification not only becomes the power source for pump irrigation and various machines, but also improves residents welfare through household use. It is highly likely that a district within a planned service area of an existing electrification cooperative should be selected. Since remote barrios are not covered in this project, a distribution system must be extended to them.

At the same time, inter-barrio roads and barrio-market roads connecting barrios to an adjacent town must be constructed or improved to allow smooth flow of agricultural products and inputs.

Since the project is oriented to heavy use of machines and materials, an agricultural service center for supporting such activities must be established. Its services are to include the supply of fertilizers, agricultural chemicals and the repairing of agricultural machines. Guidance on the cultivation of vegetables and other crops must be given for raising farmers' income and for their home consumption.

5. 15 These experiences of the residents in the model district will be the first step for promoting the development of the entire Cagayan Valley Region in the long-run. It will also be necessary to establish a development center in a model district, which will give technical and organizational guidance to other districts when they are about to adopt this system.

Section 3 On the Direction of Industrial Development

5. 16 Industry is one of the essential factors for the future development of the Cagayan Valley Region.

Two approaches are possible for the industrial development in this region. The first approach is to follow the framework set for industrial development in the entire Philippines, while the second approach is to orient industrialization to the processing of locally available resources. The second approach should be taken at first in view of the existing infrastructure and the status of progressin other development. The industrial and economic foundations of the region must be improved through the growth of industries using locally available agricultural, forestry and fishery resources. These include rice-mills, feed mills, and sugar refineries; saw mills and veneer and plywood plants; and a marine products canning industry.

5. 17 A rice-milling industry has the greatest importance. Most of the rice mills in the Cagayan Valley Region are small, and unhulled rice is currently shipped to other regions. The development of a rice-milling industry in the region not only would increase directly the value added of rice cultivation, but would have wide ramifications. It is also related to feed industry. Currently, this region has no feed mill, though it has considerable corn production. Therefore, corn is shipped to Manila and then shipped back to this region again in the form of compound feed. The main raw materials of feed are corn and rice bran. Therefore, the growth of a rice-milling industry will promote the development of a feed industry as well as a stock-raising industry. No sugar cane is planted at present. However, a sugar industry should also be considered since a fairly large part of this region seems suitable for sugar cane plantation.

These agriculture-related industries must be developed in the context of the following factors. It is important not only to increase the efficiency of individual industries, but also to consider their mutual linkage relations, and to establish a sound and wide-spread distribution system. This means that feeder roads and other infrastructure at terminal points of the distribution system must also be improved for the development of agriculture-related industries in this region.

Log export is to be prohibited after 1976 in the Philippines. An internationally competitive wood processing industry must be fostered. However, the current capacity of the veneer and plywood plants in the region is not sufficient for switching from log export to export of processed products. Their capacity must be increased by adding and extending facilities and their productivity must be improved by expansion of scale. The capacity exceeds production in this region. Since numerous small mills are in operation, they must be consolidated. The development of these wood industries presupposes the establishment of a well-planned system for supplying mills with logs, and the securing of stable demand including export. It is important to improve infrastructure, including roads and ports, for efficient and economic shipment of logs and wood products and to study the construction of an adequate coastal wood industry estate for increasing international competitive ability.

Fishery resources still remain unexploited in the Cagayan Valley Region. Canning industry is a typical fishery-related industry. Canning industry gives large value added to fishery products, increases employment, and improves nu trition. It is also expected to improve the Philippines' balance of payments. On the other hand, it must add cattle or fruit processing to absorb seasonal fluctuations in the catch. There must be loading and storage facilities, such as refrigerators, at ports and harbors for the development of fishery-related industries.

These industrial developments must proceed together with the improvement of various services for supporting industrial activities. Industrial production can be maintained and increased only by basic services, including the supply of materials and the maintenance of manufacturing equipment. Considerable demand is required for fostering services of this type. Some effective approaches include the construction of an industrial estate near a port and the construction of factories in those districts which already have some services as the core of agricultural production.

In sum, the industrial development of the Cagayan Valley Region requires selecting industries using local resources, taking into consideration linkage effects and complementarities among industries. Sufficient investigation must be carried out on development steps, the scale of each industry, adjustment with an infrastructure improvement plan, site selection, the use of economic and technical resources in Manila and ancillary measures. A concrete industrial development plan must be prepared on the basis of these investigations. The main thrust of development in the Cagayan Valley Region will be the improvement of infrastructure and the increase of agricultural production. However, preparations for industrial development must be made so that it will start without delay after certain conditions are met.

Section 4 Transportation System

5. 19 The traffic system of the Cagayan Valley Region should be designed to support the establishment of a self-supporting economic sphere

Any plan for a regional transportation network for the Cagayan Valley Region must bear in mind, however, the pattern of traffic flow to and from Manila. In short, any plan must start from the assumption that Manila is always the origin and destination of all types of transport. It is always dangerous to have an entire traffic system depend on solely one transportation means. Such a system is not a complete traffic system. A traffic system must be planned by fully considering the tempo and the nature of regional developments. It is also important at the initial stage of development to select suitable means of transportation for those goods for which transportation costs of the total costs could relatively be high.

The outline of the future transportation system in northern Luzon will consist of the Pan Philippine Highway as a trunk road, east and west coast roads for North-South traffic, and north coast and central roads for East-West traffic. An international port will be constructed on the coast facing the Babuyan Channel and ports for domestic trade will be constructed on the east coast to supplement land transport.

A railway, according to the previous studies, will be extended from the Nueva Ecija Province along the Pan Philippine Highway in accordance with the increase in the traffic demand. The air service network will also be changed from the current system of connecting Manila with some cities in the region into a new system, to be formed with feeder lines connecting the main airports in the region and lines connecting Manila with these main airports.

5. 20 In regard to the road network, those on-going and proposed roads will be constructed or improved and, with the existing roads, form a road system for the region. The Dinapique - Palanan - Divilacan - Maconacon Road along the east coast, though part of which passes through another region, has significant economy and social effects in the Cagayan Valley Region. Therefore, further studies may become necessary. The improvement of feeder roads is one of the prerequisites of various projects in the region, and must be promoted in harmony with the progress of other projects. Roads for transporting agricultural products to market are especially important.

Marine transport network planning does not simply mean to construct more ports. In order that the marine transport network can function to supplement land transport, careful consideration should be given to the level of organization and the progress of road construction and improvement. How the marine transport network should be formed as one part of an entire regional transportation system should further be studied. Basically the marine network in this region must decrease the load on the Pan Philippine Highway and promote regional development.

Road improvements and port construction are essential for the development of Cagayan Province and the east coast of Isabela Province. However, the construction

of Port Palanan for instance, does not ensure the development of the adjacent districts, since its construction alone will be insufficient for successful commercial transactions. For the sound growth of the Port Palanan, Port Lampon or Port Baler must be improved as the east gate to the Manila area and be connected with other proposed east coast ports. Port Palanan should thus be considered as a part of the marine transport network.

When one gives concrete consideration to ports, it is difficult to observe an organic relationship between the present three ports and other transportation means. Let us look, for example, at Aparri. The present function of Aparri Port can be defined as a partial substitute for Manila Port. But it cannot be said that marine transportation is serving as a substitute for roads. In order to have marine transportation serve all these functions, and to match them with the tempo of development, a new consolidated port becomes necessary.

The coast line which confronts the Babuyan Channel faces directly onto the open sea, necessitating such facilities as breakwaters and thus requiring enormous expense in port construction. Moreover, since the littoral drift phenomenon due to sediment flow is conspicuous near the river mouth of the Cagayan River, a reasoned selection is demanded in choosing the site for construction of the port. On the other hand, if the relatively shoaling beach and the flat, broad neighboring land can be utilized, the construction of a new type of harbor may become possible.

On the eastern coast, it is possible to utilize harbor-shaped coast line as the harbor in certain places, while the construction of a relatively low cost harbor may be possible. However, since the improvement of roads which would link the harbor with the hinterland is extremely delayed, it is necessary to have active construction of roads connecting the harbors, as has been mentioned above.

Section 5 Preventive Maintenance

5. 21 All these development efforts will be meaningless if this region is frequently battered by typhoons or other disasters. The Cagayan River must be controlled and, based upon basin-wide river control and reforestation plans, watershed management of the Cagayan River and its tributaries should be conducted. Quick return projects or priority projects of related fields should be implemented in line with these plans.

5. 22 The basic policy in the design of this comprehensive rivers plan will be rooted in a plan to integrate the Cagayan River system and in a comprehensive plan for water control and utilization. A balance will be struck with other rivers, based on the view on the national level which supports having agricultural development initiate development of watershed areas. Major economic results will be emphasized.

In this regard, the following points must be studied in sufficient depth:

(1) To retard as much run-off of flood waters and silt likely to cause flooding as possible after heavy rains, not merely to prevent damage downstream, but also so that the waters held back may have constructive use as a supplement in times of water shortage.

(2) With economy in mind, to reserve and regulate via dams some of the surface run-off which cannot be retarded and flows downstream. This would be useful in increasing the reserves of utilizable water at the same time as lessening downstream damage.

(3) In downstream areas, to drain flood waters to the river mouth as safely and expeditiously as possible.

(4) To improve discharge so that the largest possible amount of the required volume of irrigation water which depends upon rivers is guaranteed for times of shortage or drought. In so doing, rational and effective distribution should be kept in mind.

(5) To maintain a stable river course from upstream to the river mouth, and to achieve a harmony which is stable and contains no hydrological paradoxes.

(6) As a principle, there should be the greatest possible harmony between the water control and utilization plans. The two should be mutually compatible, so that the water utilization plan does not obstruct water control; likewise, to keep in mind when water control bears significantly on water utilization.

(7) To give overall consideration to the uses of lowland reclamation, land improvement and dredged earth and sand.

(8) The comprehensive rivers plan should be integrated with the development of the riparian region. Again, it must be a plan which will become the basis for development.

(9) The plan should strike a balance on a national scale, in proportion to the importance of the river and with regard to safety.

(10) The plan should be as effective as possible with respect to the necessary costs of implementation.

5. 23 It is necessary, moreover, to obtain the data required to design a comprehensive rivers plan, and to devise an arrangement for surveys and measurements which will permit collection of data according to plan, as well as to consider improvements in the maintanance of facilities, in expansion, and in technology.

5. 24 The land in areas ravaged by the regular inundations of the Cagayan River has low as well as unstable productivity, with a lack of accumulated assets. For this reason, if for the present the economic effect of water control is restricted to amounts spent on direct damage relief, then we will be unable to look for appropriate investment in water control in the foreseeable future.

When attempting the strategic and comprehensive development of the Cagayan Valley Region, then, it is necessary to take a position which values economic results among the effects of flood control. This includes direct development results accompanying a rise in the utilization level of land which gets its first potential from flood prevention and extends to other indirect effects.

At the present stage, when a comprehensive rivers plan has not been formulated, we can only offer speculations. But an effective and appropriate strategy for water control would be the vigorous construction of multi-purpose dams to include flood control in districts like the tributary Magat River, where relative progress has already been made in irrigation facilities and land use has reached a fairly high level, so that from now on priority there should be given to the improving of irrigation and power generating facilities. The Chico and Siffu Rivers display similar potential.

Likewise, the implementation of river training, such as dikes and dredging for local disaster prevention in such areas as Bayombong, where there is an accumulation of both people and assets, has been judged to be a high-priority policy for water control.

Furthermore, in order to mitigate flooding in the downstream section of the main river from Amulung to Tuguegarao, a short-cut should be made where the river winds most, from Alcala to Tuguegarao, and both new and old courses should be used simultaneously. Such a policy, which both preserves the necessary and sufficient flood water drainage capacity and is implemented in stages based on a long-term plan, would be highly desirable.

Moreover, part of the Pan Philippines Highway is under construction on the right bank of the Cagayan River from Tuguegarao to Aparri. Since the method of construction uses banks with drainage ducts, it is possible for the Highway to serve simultaneously as a dike in this region where the confluence of tributaries is subject to control.

5. 25 Among the points raised by a comprehensive rivers plan, however, there are the following problems. Their existence necessitates particular care in the design of a comprehensive rivers plan. First, rainfall, itself a subject of the water control plan, has characteristic disadvantages from the point of view of dam planning. Not only are there times when the rainfall is extremely heavy; there are also times when the next heavy rainfall comes immediately after the preceding rain. For this reason, the capacity of the dam to control flooding must be fairly large. During the wet season, the water level of a multi-purpose dam built to serve under these conditions must be lowered considerably. As a result, this leads to lowering

the head for power generation, and decreases the economies of such generation. Again, the time when flood control is most important is the latter half of the wet season, from October to December, which is when the greatest flooding occurs. Since emergency discharge measures are difficult to adopt, however, it is probably inevitable that the flood waters be stored as is in order to assure irrigation water for the dry season. For this reason, there is some concern that at this stage, it is not possible to look forward to the anticipated results of flood control. A second concern is that unless an integrated water control plan for river system is drawn up, and unless tributary dams are planned and improved on the basis of this integrated plan, then the effects of poor flood control will extend to the mainstream. Since the annual fluctuation in rainfall is severe, it is inevitable that dam capacity be relatively large in order to maintain the necessary safety level for both control and utilization. Economically, this is a disadvantege.

Let us turn next to dikes. Open levees on fast flowing rivers present few problems. In the case of continuous dikes, however, if sufficient consideration is not given to the elimination of backwater where the river topography is meandering, then the dike will have been of no avail. Since along the Cagayan River it is possible for much of the peak discharge of flood water to escape due to the retarding effect of flooding, it is of concern that the construction of dikes might lessen the retarding effect in that area and might increase flooding both up and down stream. The slope of the dike must be studied from the point of view of economy and ease of future maintenance and management.

Finally, a plan to dredge the river channel must give sufficient consideration to such points as(1) whether or not easy maintenance of the river channel will be possible in the future;(2) whether or not drainage capacity in the particular dredged area will offset that in the downstream area; and(3) whether or not dredging would have an effect on the river level and/or on the watertable.

5. 26 For the prevention of disasters, land conservation based on a forest plan is important for the economic development of this region and for the improvement of the residents' welfare.

The current state of land utilization in the Cagayan Valley Region may be summarized as follows. Forests account for 70% (1. 87 million ha) of the total area. About 1. 45 million of forests are national. (This figure is an estimate based on the percentage of the forests (81. 7%) within the districts surveyed by air photos (90. 8%) Cultivated land accounts for 12% (320, 000 ha), grassland with pasture rights accounts for 5. 7% (150, 000 ha), openland (including previous fields) accounts for 10. 8% (290, 000 ha) and land used for other purposes accounts for 1. 5% (40, 000 ha).

The national forests include about 150, 000 ha of scrub where only useful tress have been felled. In sum, about 600, 000 ha of land (including such scrub, grassland and openland) has been left unused. The unused land has poor soil because of a lack of carefull control and many years of use. It has led to such natural disasters as sediment run-off, floods, etc. For the conservation of the unused land, a land utilization plan must be drawn up quickly. The land that can be used for agricultural purposes must be used and managed adequately for its conservation. The rest must be restored to forests by reforestation.

This land originally had potential for becoming highly productive forests. However, its soil conditions have been extremely poor because of careless use for many years. Since reforestation by private enterprise would be difficult in the

immediate future, mountain conservation must also be carried out where necessary. In short, basin control must be improved by reforestation for preventing sediment run-off and slope collapse, for preserving water resources and for preventing floods.

It will take a long period of time and be technically and financially difficult to prepare a reforestation plan for the entire Cagayan Valley Region. Furthermore, the reforestation of openland involves a variety of technical problems that still remain unsolved. It is desirable to start with a pilot project (about 50,000 ha), in representative basin districts. The districts for such pilot projects must be selected from the downstream area where dam construction and irrigation projects are in progress and the need for basin control is high. The selected districts must be surveyed for reforestation planning. Experimental and research work must be carried out for establishing locally suitable forestry techniques.

One of the possibilities is to expand the Magat River Basin reforestation project that is in progress under the supervision of the BFD. The Magat head works have been constructed and about 35,000 ha of the Magat River Basin is irrigated. This district is said to have urgent need for upstream forest control for decreasing sedimentation and increasing dam efficiency. Several thousand ha of forest have been planted by the reforestation project of the BFD. Technically, these forests can be the basis for future developments.

Section 6 Recommended Guidelines for Project Formulation

On the basis of the said strategies of development, the following principles and considerations are to be kept in mind when preparing and selecting various projects by sector and/or by components of a plan.

(1) While ascertaining the actual course of long-range development of the nation at all times, there is a need to correctly assess and position the meaning and role of each region in the long-range national development program.

(2) Being a member of the world community, any nation is influenced by changes in international, domestic, natural and various other conditions. Therefore, a flexible posture must always be retained in promoting regional program.

(3) With respect to the determination of an area and the way in which a regional program should be devised, reasonable judgments must be made while paying heed to the issues involved and the circumstances. The lower the level in which a regional program is worked out, the more concretely the program is worked out. Consequently, care must be exercised so that there will be no changes in any detailed technological programs.

(4) The development of the region will presumably evolve, more than anything else, around agriculture and forestry. In this event, it will be of the utmost importance to raise productivity in addition to outward expansion. Raises in productivity will have to be seriously studied from the standpoint of labor, land and capital productivity. For unless every production factor is put to effective use, it will not eventually result in an improvement of the economic integrity of local farm households.

(5) The farmers themselves play a leading role in farm production. It therefore is necessary to identify beforehand what are the perpetual incentives to spur farmers into raising productivity. Their ultimate aim must be to improve and step up their households' economic integrity. The lack of data is too great at present to study the way in which a raise in productivity will influence the economy of farm households. It is to be hoped that data on the economy of farm households will be made available.

(6) The development of any region will become feasible only with the positive participation of local inhabitants. It will be advisable to encourage voluntary participation by individuals through co-ops or by some other means. It is to be noted, however, that an organization will be able to function in an effective manner only when it has existed over a long span of time and when it respects the intentions of individuals and also is respected by them. Attempts must be made to avoid making things intricate by creating one organization upon another in a hierarchy and also making repeated alterations under the influence of convention.

(7) The integrated achievements from various related projects will pave the way for the materialization of a primary objective. In the text of this survey report, the various projects are classified into leading projects, supportive measures and preventive maintenance from the standpoint of development targets, before a description of projects classified by sectors. This classification is a reflection of the necessity of taking an integrated approach, instead

of being influenced too much by each sector. This classification, however, must not be taken as a denial of the possibility of each project serving more than two objectives. On the contrary, it should encourage a search for many purposes at the project level.

Chapter 6
Schedule of Development

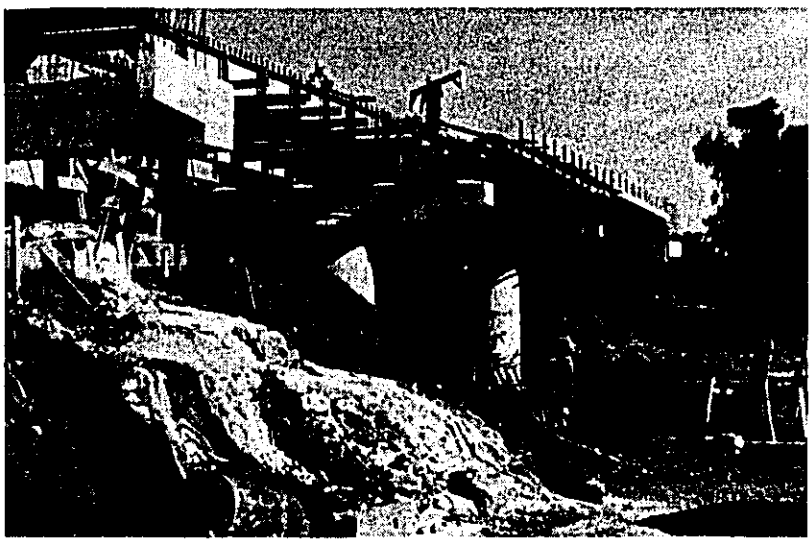


photo : Changing temporary bridge into permanent one

Chapter 6 Schedule of Development

On Scheduling

6.01 An integrated development plan consists of various projects. The implementation of each project requires that various activities be carried out in a fixed sequence. Various resources (staff, funds, materials, machinery, equipments etc.) are required for these activities. For the implementation of one project, various activities must be planned according to a time sequence based on practical limitations considering the project's position within the entire plan and relations among projects. Then, various resources required for the activities must be adequately distributed and used at the right time. Such adjustments are called scheduling.

6.02 The nature of the schedule depends on the stage of the development plan. Various conditions must be met with regard to the collection of information and data on related items. Even basic materials pertaining to the Cagayan Valley Region for preparing an approximate overall plan seem insufficient. For this reason, the present study is limited to a rough and hypothetical schedule of a basic survey of water resource conditions that are absolutely essential for a grasp of the natural conditions of the region, as well as for an irrigation project and a supporting electrification project which, under current conditions, will bring about quick results. Proposed schedules for rivers and electrification are shown in the form of

Gantt Charts for reference. Concerning roads, rough order of their improvements is described on the basis of Japan's experiences..

6. 03 A study of water resource conditions is taken up first for the following reasons. Water is the most important and basic natural resource in the Cagayan Valley Region. Water is not a specifically located resource like soil, plants, or ground resources, which can be thoroughly studied within a short period if sufficient funds and personnel are available. It heavily depends on time series data, which necessarily require chronological time. Furthermore, a satisfactory study of water resources requires special data collection since water is distributed everywhere in various forms.

The Cagayan River Basin has abundant water resources. The fate of the Cagayan Valley Region is that water resources change sharply by time and region. This not only inhibits their effective utilization, but also occasionally causes serious disasters. Therefore, a thorough study of water resource conditions is the first requirement for the development of this region.

The following investigation items are essential from the viewpoint of river engineering. They are river survey, meteorological observations, hydraulic observations, water quality observations, river-bed change study, etc. A test schedule for these observations and investigations is shown in Fig. 6. 01. It is not a development schedule itself, but a schedule of preparatory investigations. Therefore, it should be started as soon as possible.

6. 04 It is also desirable to investigate the basic conditions (site factors) which form the potential of development, namely, land, plants, existing transportation facilities, labor force, etc. However, it is sometimes more effective to improve surveys and collect data gradually since the purposes of surveys are determined by the progress of development.

Rivers

6. 05 The Cagayan Valley Region must be improved and developed in compliance with the integrated river-basin development plan and in harmony with the regional society. Such a project must promote harmonious relations between water conservancy and water utilization and improve the entire water system.

A feasibility study of a multi-purpose dam at Magat River has already been made. A water resource development plan for the Chico River and Siffu River is also being studied. An integrated river-basin development plan, which is to be the basis for the improvement and development of the Cagayan River, must be prepared quickly to accomplish both long term and short term targets of these projects more efficiently.

6. 06 The following steps are recommended for the preperation of an integrated river-basin development plan. At first, a tentative plan should be drawn on the basis of currently available data and supplemented by the minimum required data. This tentative plan should be modified when sufficient data are available in

the future. These steps seem adequate in view of the conditions of the development tempo, budget and staff.

Fig. 6.01 shows the recommended schedule for the preparation of an integrated river-basin development plan

(1) River surveying

This survey is carried out to make profile and cross sectional drawings of a river to provide basic materials for a river plan. This survey should be made at intervals of 1 km along the center line of the stream. In width it should cover the entire flood area and the major sections of the main river and the tributaries. They are shown in Fig. 6.02.

Profile and cross levelling of the river channel should be conducted once every four years even after the preparation of a tentative plan to investigate river-bed change. In Japan, profile and cross levelling of a large river is usually carried out yearly at intervals of 100 - 200 m.

(2) Meteorological observation

The rainfall observation network must be improved to grasp flood discharge characteristics and available water resources with high accuracy. For this reason, fourteen weather stations must be newly opened or reopened in addition to the fourteen existing stations as shown in Fig. 6.02. This would mean one weather station per 1,000 km^2. In Japan, one weather station is in operation per 500 km^2 along the Tone River (drainage area 16,840 km^2).

(3) Hydraulic observation

Water level and discharge observation must be improved and expanded and their observation accuracy must be improved to analyze river characteristics, including flood discharge, propagation and flooding, etc., as well as to plan dams for water resource development. For this reason, six ordinary stream gaging stations and three self-recording stream gaging stations must be newly constructed, as shown in Fig. 6.02. Eight of the existing ordinary stream gaging stations are to be changed to the self-recording type. When this is completed, a stream gaging station will exist at intervals of 10 km in the major section of the main river and near the confluences of major tributaries. Furthermore, automatic data recording will become possible at the major stations. Currently, a water level-discharge curve is used for estimating discharge. To improve the accuracy of flood discharge observation, direct discharge measurements are recommended at Naguilian station (Naguilian Steel Bridge) and Tuguegarao station (Steel Bridge at National Highway No. 2) of the main river, as well as at Bayombong station (Bato Steel Bridge) of Magat River, Malalam station of Ilagan (newly constructed steel bridge on the Pan Philippine Highway), Roxas station of Siffu River (concrete road of Cabatuan-Maria National Road) and Tabuk station of Chico River. Additionally, the stations proposed by USDIBR in 1966 must also be constructed.

Along Japan's rivers, excluding small rivers, self-recording observatories exist at intervals of about 10 km, while discharge observatories for direct discharge measurement during floods exist at intervals of about 50 km. Since the rivers in Japan have corrected channels, they rarely flood. Since the Cagayan River is assumed to show extremely complicated hydraulic behavior, the observations system must be improved.

Fig. 6.01 Schedule for Preparation of Integrated River-basin Development Plan

Plan	Survey Items	Year											Remarks
		1st	2nd	3rd	4th	5th	6th	7th	8th	9th	10th	11th	
Tentative Plan	River surveying	———											Installation of distance marks, profile levelling & cross-levelling
	Flood disaster survey	———											Survey of flood-marks, flood disasters & adequate investments, etc.
	Collection & analysis of available data	———											Collection & analysis of meteorological & hydraulic data & various damands etc.
	Preparation of tentative plan				———								
Modified Plan	Meteorological observation	Construction of additional observatories ———											Observation of rainfall, evaporation, atmospheric temperature
		Observation ———										Continuation ———	
	Hydraulic observation	Construction of additional observatories ———											Observation of water level & discharge
		Observation ———										Continuation ———	
	Water quality observation			Observation ——— (Continuation when necessary ———									Observation of water quality & water temperature
	River-bed change survey			River-bed material survey ———			Cross-levelling ———		River-bed material survey ———		Profile & cross levelling ———		Survey on of river-bed evolution, sediment & river-bed materials.
		Sediment observation ———										Continuation ———	
	Flood disaster survey			———								Continuation ———	Survey of flood area, flood damage & adequate investment.
	Various demand surveys								———				Survey of land utilization plan, demand for surface water, demand for ground water, demand for hydro-electric power generation, ship transportation & river products etc.
	Dam site selection study								Paper study, Field geologic survey ———				Survey on geology, reservoir capacity, dam type, construction cost, sediments etc.
	Collection & analyses of data			———								Continuation ———	
	Preparation of modified plan									———			Revision of tentative plan.

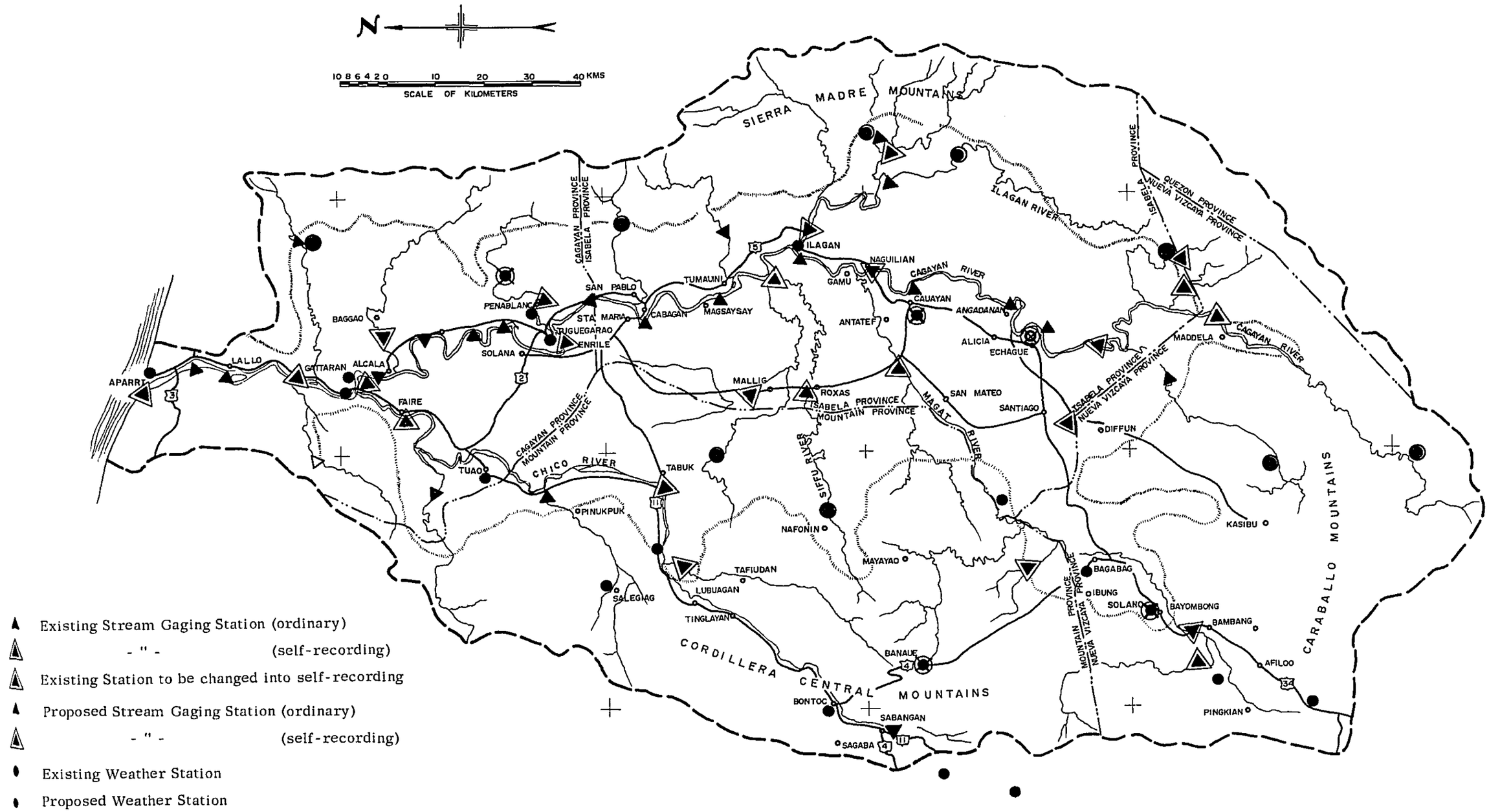


Fig. 6.02 Observation Facility Improvemement Plan

(4) Water quality observation

In 1966, the USDIBR proposed to carry out a 2-year survey of water quality at 43 places. Since the current water quality is unknown, this proposal should be followed for the time being. In Japan, polluted river water around cities has presented serious problems since the load of pollutants discharged from plants and households to rivers has increased suddenly along with the recent regional development. Furthermore, increased utilization of river water has decreased low flow and river improvements near the river mouth has increased the counter flow of salty water, presenting difficulties for water utilization in the downstream area. For this reason the water quality observation system has been rapidly improved during recent years in Japan for water quality control and water pollution control measures. The new Japanese system does not seem to offer much directly to the Cagayan River.

5) Investigation of river-bed change

A stable river channel plan requires observation of river-bed change, river-bed materials and sediment load. The extent of river-bed change should be determined by cross-levelling to be carried out once every four years. River-bed materials should be studied by taking samples twice every ten years for each water level, discharge and observatory. Sediment load should be observed at each flood discharge observatories.

Additionally, it will be important to investigate river-bed materials for estimating the quantity of sand running down at the dams proposed by the USDIBR in 1966. In Japan, river-bed evaluation is observed once a year (as well as after each large flood) not only for collecting data for river planning but also for carefully ensuring river management.

Electrification

6.07 Fig. 6.03 summarizes the information which the Survey Team obtained concerning the electrification plan of Cagayan, Isabela and Nueva Vizcaya Provinces. The transmission lines under the responsibility of NPC (National Power Corporation) are to be completed in 1977, but some uncertain factors exist because of various circumstances. The backbone of a distribution network is under construction in those regions with an electrification association. It is planned to be completed in 1976 in all of the three provinces, but the details are unknown.

Table 6.01 shows a hypothetical electrification schedule. However, it is only a rough schedule prepared in consideration of the items given in the Remark column. The estimate of current and future demand for power, the maintenance and management of a supply system, etc. must be studied carefully before starting construction of a power supply in completely untouched regions. In particular, ways to secure engineering and management staff after the completion of power supply facilities must be considered in advance.

Roads

6.08 The road network will require the following improvements and expansion:

(1) Construction of new roads (including bridges)

a) Construction of new trunk roads (National and provincial highways) within the region.

Fig. 6.03 Assumption of Electrification Time Schedule

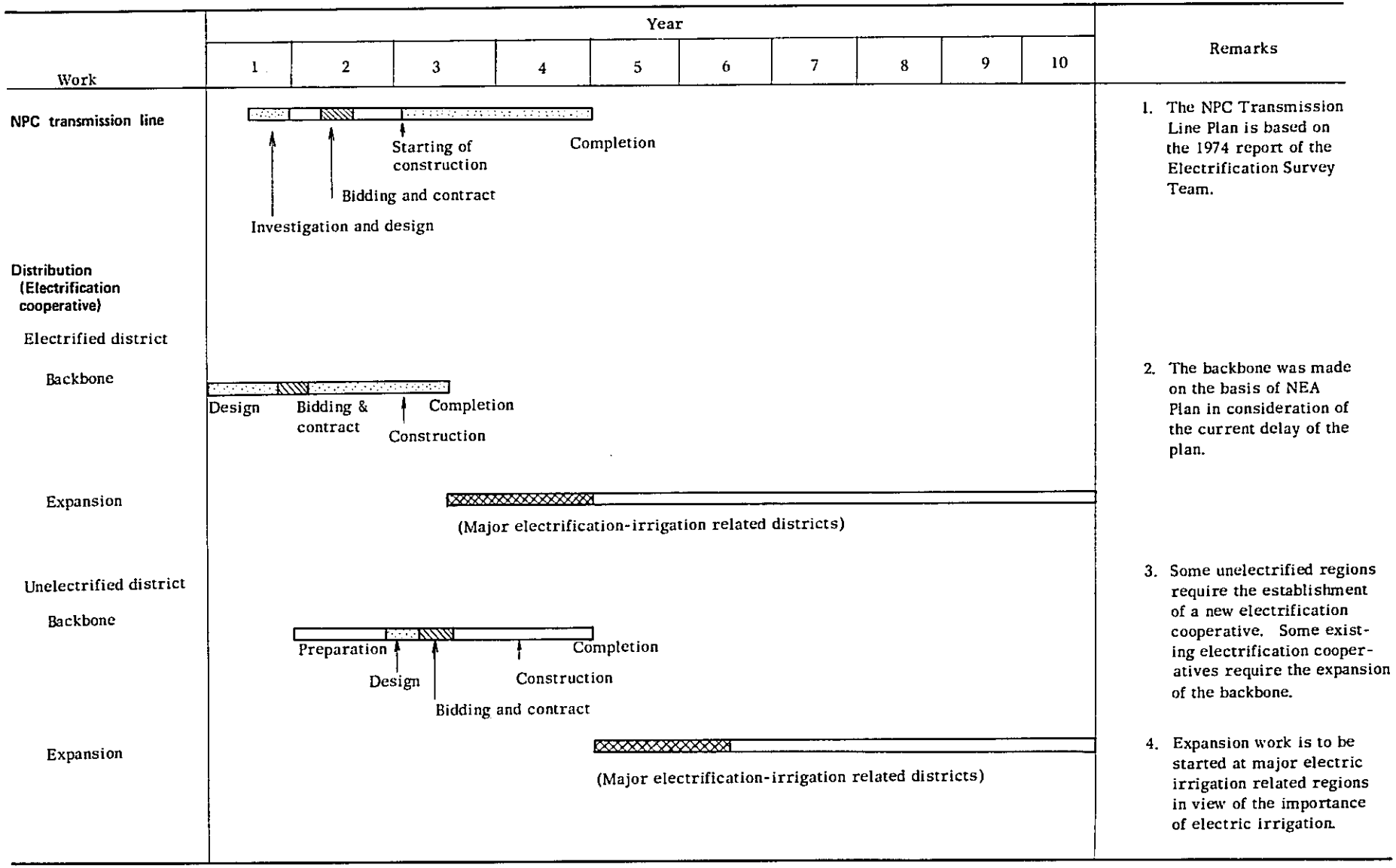


Table 6.01 Current Status of Electrification Project by Regions

Work	Province						Remarks
	Cagayan		Isabela		Nueva Vizcaya		
Classification of region (Electrification Cooperative)	Region with electrification	Region without electrification	Region with electrification	Region requiring expansion	Region with association	Region requiring expansion	
NPC transmission line	To be completed in 1977	To be completed in 1977	To be completed in 1977	To be completed in 1977	To be completed in 1977	To be completed in 1977	
Distribution							
Backbone	To be completed in 1976 (in progress)	No concrete plan	To be completed in 1976 (in progress)	No concrete plan	To be completed in 1976 (in progress)	No concrete plan	
Expansion	No concrete plan	Same as above	No concrete plan	Same as above	No concrete plan	Same as above	

b) Construction of feeder roads

(2) Improvement of existing roads

a) Straightening and grading
b) Widening
c) Upgrade roads from dirt to gravel
d) Changing temporary bridges into permanent bridges
e) Completion of drainage
f) Landslide and erosion prevention in mountainous areas
g) Elevating road surfaces on flat terrain

The many activities involved in road improvement may be classified as measures to upgrade conditions and measures to assure traffic movement during the wet season.

The total length of proposed roads is substantial and there is much work to be done. The order in which work should be done is a problem.

6. 09 The present status of the road network in the Cagayan Valley Region is similar to that in Japan several years ago. The steps taken in Japan to date are as follows.

(1) First stage : Assure traffic movement
  a) Change temporary (wooden) bridges into permanent ma-bridges
  b) Upgrade roads from dirt to gravel.

(2) Second stage : Upgrading of operating standards
  a) Straightening and grading.
  b) Widening.
  c) Paving of gravel roads.

(3) Third stage : Disaster prevention measures
  a) Landslide and erosion prevention in mountainous areas.

(4) *Fourth stage* : *Measures to cope with increasing traffic volume*
  a) Establishment of new national and local highways.
  b) Construction of expressways.

(5) Fifth stage : Expansion of vital secondary roads
  a) Improvement and expansion of municipal and town roads.

The above only indicates the main points in the transition to improved roads and does not in any way imply that completion of one stage means automatic transfer to the next stage. For example, there are vital secondary roads which were constructed during an early stage, and national highways which still remain unpaved.

Points to be kept in mind are the flow of road improvements (that is, whether or not existing roads have been made passable throughout the year); second, whether or not roads have been improved where traffic volume has increased; and third, whether a new road is to be constructed in situations where traffic and environmental conditions have worsened to the point that traffic cannot use the present road.

6. 10 Japan's experiences show that a rough order for road improvements in the Cagayan Valley Region may be as follows.

(1) First stage : Assure traffic movement on present roads during the wet season.
   a) Upgrade roads from dirt to gravel.
   b) Change temporary bridges into permanent bridges.

(2) Second stage : Disaster prevention measures vis-a-vis storm and rain.
   a) Perfection of drainage facilities.
   b) Landslide and erosion prevention in mountainous areas.
   c) Elevating road surface on flat terrain.

(3) Third stage : Upgrading of operating standards
   a) Straightening and widening.
   b) Paving gravel roads.

(4) Fourth stage : Construction of new roads
   a) Construction of new national and provincial highways.

When road improvements are planned and/or related operations are about to be carried out, the following should be taken into consideration.

6. 11 This order applies to roads other than trunk roads. The Cagayan Valley Region is an agricultural area, so a road improvement plan such as Japan's, which centers around commerce and industry, does not apply directly. The improvement of feeder roads should be undertaken early on, matching its tempo with that of the agricultural development plan or the social development plan.

Characteristics of this region include heavy annual rainfall and frequent and large-scale floods since flood prevention measures are inadequate. Greater consideration must be given to protecting roads from rain and flood damage than in the case of Japan.

In the scheme given above, the construction of new roads appears last. This does not mean that the present road network of the region is sufficient, however. Among the new road construction plans, then, those with high priority should be undertaken during a relatively early stage. The determination of an appropriate stage may necessarily derive from other projects, such as a harbor project or the rural exodus policy.

6. 12 The improvement of individual roads should be promoted according to the importance of the road. For example, the scheme shown above does not necessarily imply that steps will be taken in linear progression starting with changing all temporary bridges into permanent bridges. The importance of deciding the order of individual road improvements lies in the relationship of this activity with the integrated regional development plan.

In the beginning, it will be more advantageous to perform all construction work at once, such as doing paving when the road is being improved. To the extent permitted by the investment effect, integrated and coherent construction activity should be respected.