

については作物の多様化の施策に沿った作付計画を前提とした必要水量を設定することとなるが、この場合でも水稲の全面作付といった将来の作付変化への対応についての十分な配慮が必要である。なお、まだ利用度は少ないが将来の増加が予想される養魚池などの水利用についても一応の検討が必要と思われる。

4. その他（上水、浸食防止等）

4-1. 浸食防止について

カガヤン川流域の侵食状況は19%の地域が中程度の侵食8%の地域が重度の侵食として分類されている。重度の侵食を受けている地域はマガット川、チョコ川流域に多い。カガヤン川上流域においては支川を含め年平均1千万 m^3 を越える量の流出土砂が生産されている。そのうちカガヤン川の運送能力は平均的にみて年15百万 m^3 と見積られており、大部分は流域内に留まっているという状況にある。表N-3に侵食度合による分類、特徴、その面積を図N-2には地域の侵食度合を表わす。今後の調査の基本方針としては、土地の侵食状況に関する地図等を基に、可能な範囲で現地踏査等を実施し、山地崩壊、土壌侵食の著るしい区域を設定する。その設定された区域について、砂防ダム、段付工等による浸食防止の可能性について検討する。また浸食防止は流域の森林計画とも密接な関係にあり、これとの整合性を図るものとする。

4-2. 上水等

カガヤン川流域の総人口は1975年で185.5万人である。その生活用水の主要な供給源は地下水となっている。具体的には全世帯数の52%はポンプを水源とし、23%が井戸、10%が浸水を水源としている。湖水や河川水を水源としているのは2%に過ぎない。

将来の需要の見通しとして2000年における都市用水の需要は228万 m^3/day と予想されている。

今後の調査としては、都市の水需給バランスの現状を調査するとともに、将来の水需要を推定する。そして将来の水需要量を供給するために必要な水源を検討する。水源としては主に地下水になると考えられるが、地区的には必要に応じてダム等河川水を検討する。

表IV-3 EROSION CLASSES, CHARACTERISTICS AND AREA COVERAGE

Class	Area						Total (km ²)	Total (%)
	Lower Cagayan (km ²)	Chico River (km ²)	Magat River (km ²)	Upper Cagayan (km ²)	Ilagan River (km ²)			
1	4,700	735	1,694	4,131	4,804	16,064	52	
2	367	2,498	2,794	306	432	6,397	21	
3	755	1,516	1,666	1,431	607	5,975	19	
4	434	499(0.10)	676(0.10)	381	549	2,539	8	
Total	6,256	5,248	6,830	6,249	6,392	30,975	100	

Remarks,

Class 1 : No apparent erosion

2 : Slight erosion, less than 1/4 of original surface soil removed.

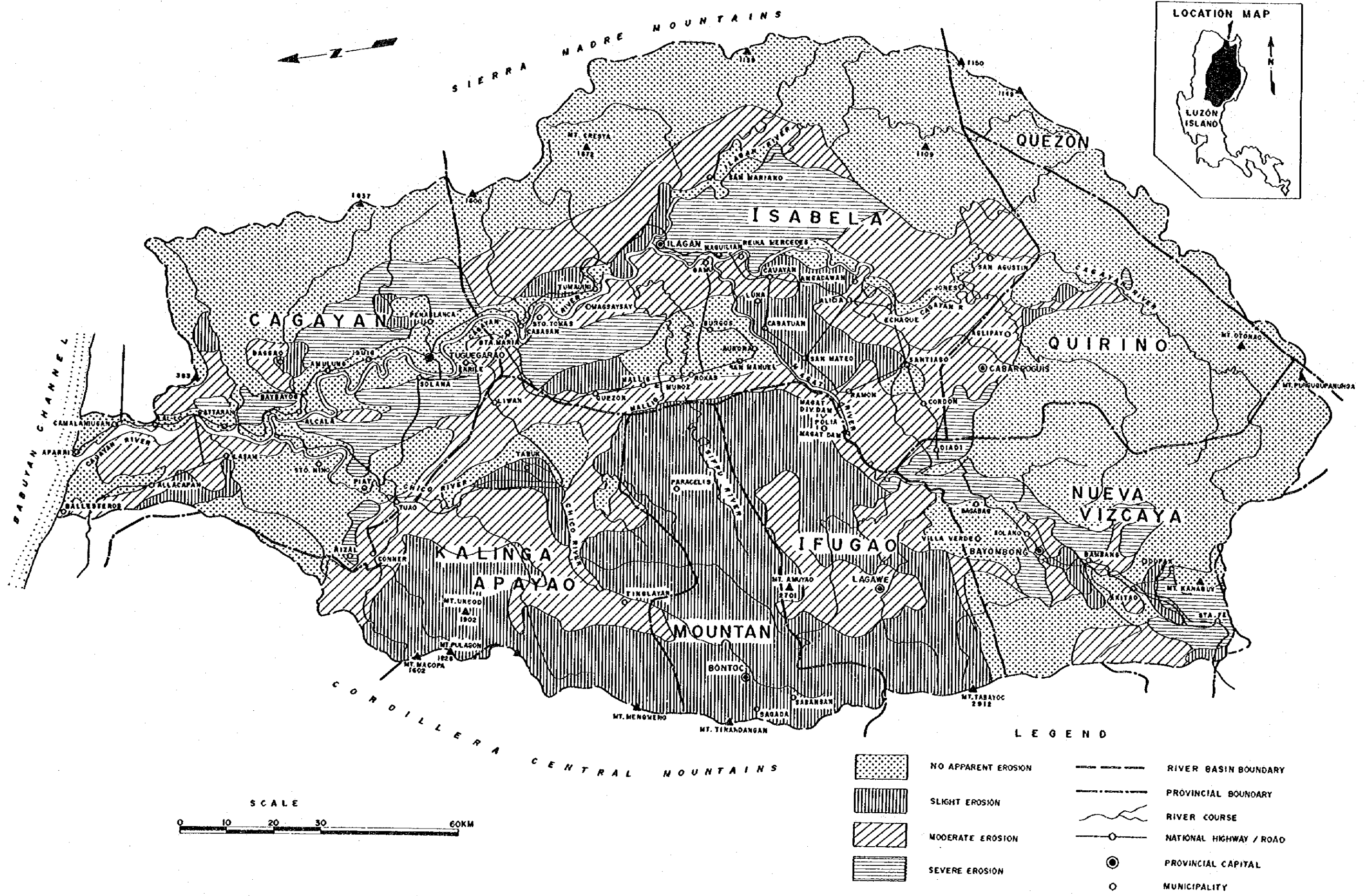
3 : Moderate erosion, 1/4 to less than 1/2 of surface soil eroded.

4 : Serious erosion, 3/4 or over 3/4 of original surface soil eroded, or all the surface soil and less than 1/4 of sub-soil eroded.

Source: Framework Plan, Cagayan Valley

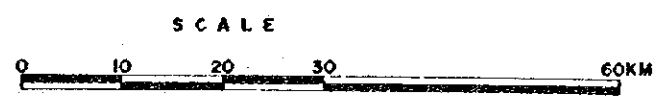


IV-2) SOIL EROSION SUSCEPTIBILITY OF CAGAYAN RIVER BASIN



LEGEND

	NO APPARENT EROSION		RIVER BASIN BOUNDARY
	SLIGHT EROSION		PROVINCIAL BOUNDARY
	MODERATE EROSION		RIVER COURSE
	SEVERE EROSION		NATIONAL HIGHWAY / ROAD
			PROVINCIAL CAPITAL
			MUNICIPALITY



V. 要 約 (総合所見)

1-1. 流域の現況

ルソン島は7千余のフィリピンの島々の中で最大の島である。その北部を島の北端に向かって北流するカガヤン川は流域面積 27,300 km² (利根川の約1.6倍)のフィリピン最大の河川である。流域の中心部へは主都マニラから飛行機で約1時間、乗用車で10時間足らずで到達できるから、さほど辺境の地というわけでもないのだが、全体として開発は進んでいない。しかし局部的に見れば土地利用が極限にまで進んでいる所もあり、無秩序に蚕食的に開発が進められている傾向が見られる。総合開発計画が必要とされる所以である。

流域は地形的には氾濫原およびその周辺、丘陵、山岳の三種に区分できる。

氾濫原およびその周辺は砂礫質のところを除き、川の流路ぎりぎりのところまで農地として利用され、営農の便のためであろうが、住居もその近くのいくらかも標高差のないところに構えられている。都市は河岸段丘上に位置しているが、これとて洪水時には冠水を免がられない。これらが洪水被害の多発、被害額の増大をもたらす原因となっているが、洪水防御設備は無いに等しい。

丘陵地帯は主として草地であるが、放牧に一部利用されているのみで、効果的な利用は一般になされていない。これはおそらく水資源の不安定さによるものと考えられるが、更にさかのぼれば焼畑農業による土地収奪の後遺症でもあるのであろう。

山岳部は全体として良好な森林は見られず、すすきのような植生に覆われた草地と雑木の疎林が主である。これも焼畑農業の遺物であるように観察される。バナウェ周辺やチコ川上流部には有名なライステラス(棚田)が発達しており、それなりに安定した生活が営まれている。耕作に機械や畜力を使わず、作物の搬出も人肩に頼るしかないという非常に効率の悪い生産形態ではあるが、これはこれで一種の文化を形成しており、当面求めて変化を与える必要はないものと考えられる。このあたりの河道はライステラスの石垣が護岸として働き、非常に安定しており、構造物の周辺を除き、特に改修の必要はない。山地は比較的安定しており、道路周辺に小規模な崩落がみられるくらいで、大規模な侵食地形はみられない。

1-2. 河川の現況

流域の東西はそれぞれシェラマドレ山脈およびコルディレラセントラル山脈によって区切られている。前者は1,000~2,000 m、後者は2,000~3,000 mの標高の山々から構成されており、河川は急激に流下して20~30kmで平野部に出る。本川最上流端は両山脈の接点に当たり、標高の低い鞍部状の地形から一気に平野部の流れとなる。構造地質的にはコルディレラセントラル山脈の隆起速度がシェラマドレ山脈のそれより大きいため、カガヤン川主川は流域の東寄りを流れることになっている。

平野部の流れは1/8,000程の緩勾配で、チコ川合流点下流のマガビット狭窄部から上流

は蛇行が著しい。

既存の洪水防御施設としては河岸の欠壊を防止するための護岸および水利が部分的に施されているだけで、ほとんど見るべきものはない。支川マガット川にマガットダムが1983年に完成しているが、洪水調節容量は持っていない。

1-3. マスタープラン策定の基本方針

既往の洪水による氾濫実績から判断すると、洪水防御を築堤主体に行うことには相当の無理がある。本川だけに限っても250kmに及ぶ連続堤が兩岸に必要であるし、連続堤による遊水効果の減少を考慮すると、高さも相当高いものが必要となる。またマガビット狭窄部に規制されて洪水の滞留時間が長く(10数日に及ぶ実績がある)、これに耐える築堤の構造も問題となる。

また連続堤はそれが連続してはじめて効用を発揮するわけであるが、これだけの延長の築堤を完成させるには相当の期間を要する。

以上のことからこの川の洪水防御計画は次のような方針に基づいて策定するものとする。

- ① 洪水調節上有効なダムを数箇所選定し、洪水調節を行う。
- ② マガビット狭窄部を狭窄部下流の改修が可能な範囲で拡張する。
- ③ 蛇行の著しい河道のショートカットを行う。このショートカットは必ずしも全河道を替えるのではなく、洪水時のみの捷水路を作るという選択もあり得る。
- ④ 以上のような条件のもとに築堤計画を作成する。堤防は原則として山付き堤または輪中堤として計画し、連続堤は極力避ける。
- ⑤ 以上の洪水防御を行った後の想定氾濫区域を数段階の超過確率洪水に対して作成する。
- ⑥ 一方この流域がフィリピン国内で果たすべき役割を想定し(現段階では農業計画が主体となる)、上記想定氾濫区域を考慮しつつ土地利用計画を作成する。
- ⑦ 1~5の作業と6との調整を行う。
- ⑧ 1のダムを多目的ダムとして計画し、水資源開発ポテンシャル、水力発電ポテンシャルを算定し、水資源あるいは発電上更に必要なダムがあれば、サイトを選定し、可能であれば多目的ダムとして計画する。
- ⑨ 既存の施設の改善を含め、灌漑排水計画を樹てる。

以上は超過確率1/150年の洪水を対象として計画し、これをBasic Master Planとする。事業は当然段階的に実施されるべきものであるから、近年の実績洪水を対象としてFirst Phase Planを作成する。これはBasic Master Planに基づき、手戻りの生じない形のものとするとは云うまでもない(例えば築堤の法線は変えず、高さや幅を暫定的なものとするといったことである)。事業量の目標値をBasic Master Planの半分程度とす

る。当面の事業の目標としてFirst Step Planを作成する。事業量はFirst Phase Planの半分程度とし、主として都市域の洪水防御を中心に計画する。このFirst Step PlanがI/Aで記述されている20年計画に相当するものになると考えている。

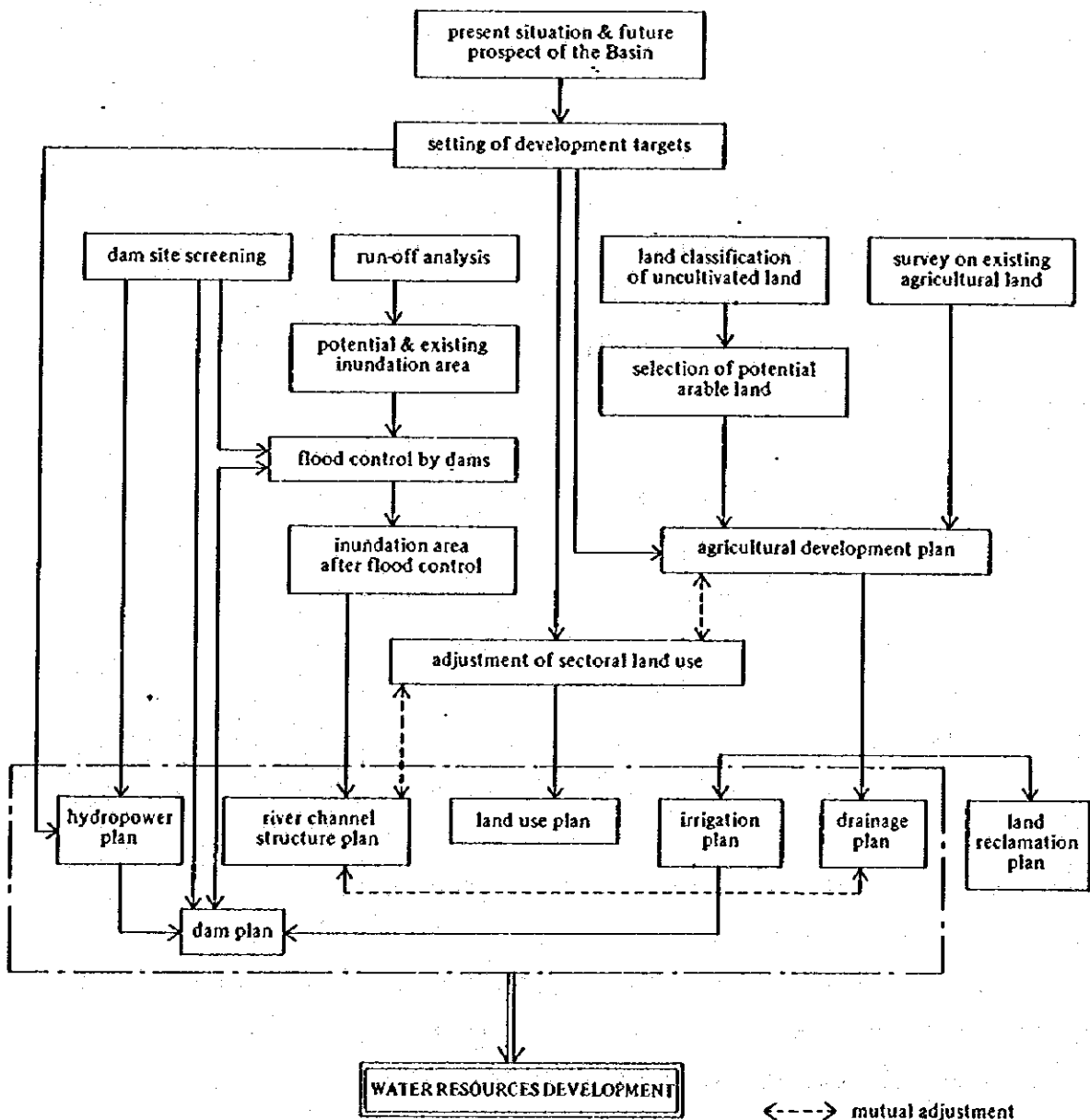
水資源のひとつの要素としての地下水については将来に向けての余裕と考えて、現段階で積極的に開発することは考えないものとする。包蔵量はかなりあると思われるので、この調査では総括的にしか触れられない生活用水、工業用水にあてることも可能である。

2-1. 本格調査の作業手順

本格調査の作業のフローは図V-1の通りである。全国の現況および将来にわたる人口動態、産業構造を把握し、カガヤン川流域の担うべき役割を想定する。洪水防御計画に基づいて土地の利用区分を作成する。氾濫原の土地利用区分は例えば次のようなものが考えられる。①洪水防御河能区域、②洪水防御困難区域、③遊水池として温存すべき区域、④乾期のみ利用（農地）する区域等。

土地利用区分と開発目標とを照らし合わせつつ、土地利用計画を作成する。開発目標が達成できない場合は洪水調節計画の見直しを行う。

図V-1 FLOW CHART



2-2. 洪水防御計画

まず流量解析を行う。既往調査によってピックアップされている想定ダムサイト(45箇所)を要素として含む流域分割を行い、水系モデルを作成し、それをもとに流量解析を行う。水文資料があまり整っていないので相当大胆な仮定が必要である。精度が悪いことを前提とした話であるが、できれば高水低水兼用のタンクモデルとし、再現流況による利水計算を行うことを考したい。うまくいかないようであれば別々のモデルで一向にさしつかえない。

流域が広大であり、かつ雨の降り方が東の山地、平野部、西の山地とそれぞれ異なっているので、降雨の時間分布、地域分布を含めて確率評価を行なうことが非常に困難である。その手法については本格調査の中で十分な検討を行う必要があるが、Basic Master Planの対象降雨は超過確率1/100年とし、他に1/50, 1/20, 1/5, 1/1年も計算する。1/50年以下についてはそれに近い実績降雨をあててもよい。

各規模の洪水について、現況河道での想定氾濫区域を求める。これは事業効果を算定するための資料となる。

洪水調節に有効なダムを必要数選定し、洪水調節計算を行う。マガビット狭窄部を拡張する。拡張の規模は一次案としては狭窄部下流の流下能力の範囲内とする。蛇行の著しい箇所のショートカットを行う。

以上の洪水調節および河道改修を行った後の想定氾濫区域を求めた後、築堤計画を作成する。築堤完成後の堤外地についても氾濫頻度図を作成し、堤外地土地利用区分の資料とする。

2-3. 多目的ダム計画

洪水調節用に選定されたダムサイトについて、灌漑計画との調整を計り多目的ダム計画を樹てる。この段階では発電は利水従属型で計画しておく。

既設のマガットダムの貯水池運用計画を作成し、洪水調節機能をもたせることとするが、既存の灌漑計画に影響を与えるようであれば、他ダム(例えばアリミットダム)により容量の振替えを行う。

灌漑用のダムが別に必要とされる場合は、これにも洪水調節機能を持たせられるかどうかの検討を行う。

2-4. 灌漑排水計画

堤内地となる平地についてはほとんど既開発の箇所となるであろうが、一般的な計画手法に則って行えばよい。

本調査で計画される洪水防御計画によれば、おそらく広大な堤外地が残されることになろうが、それらの土地については冠水頻度および冠水深を考慮して利用計画を樹てるものとする。

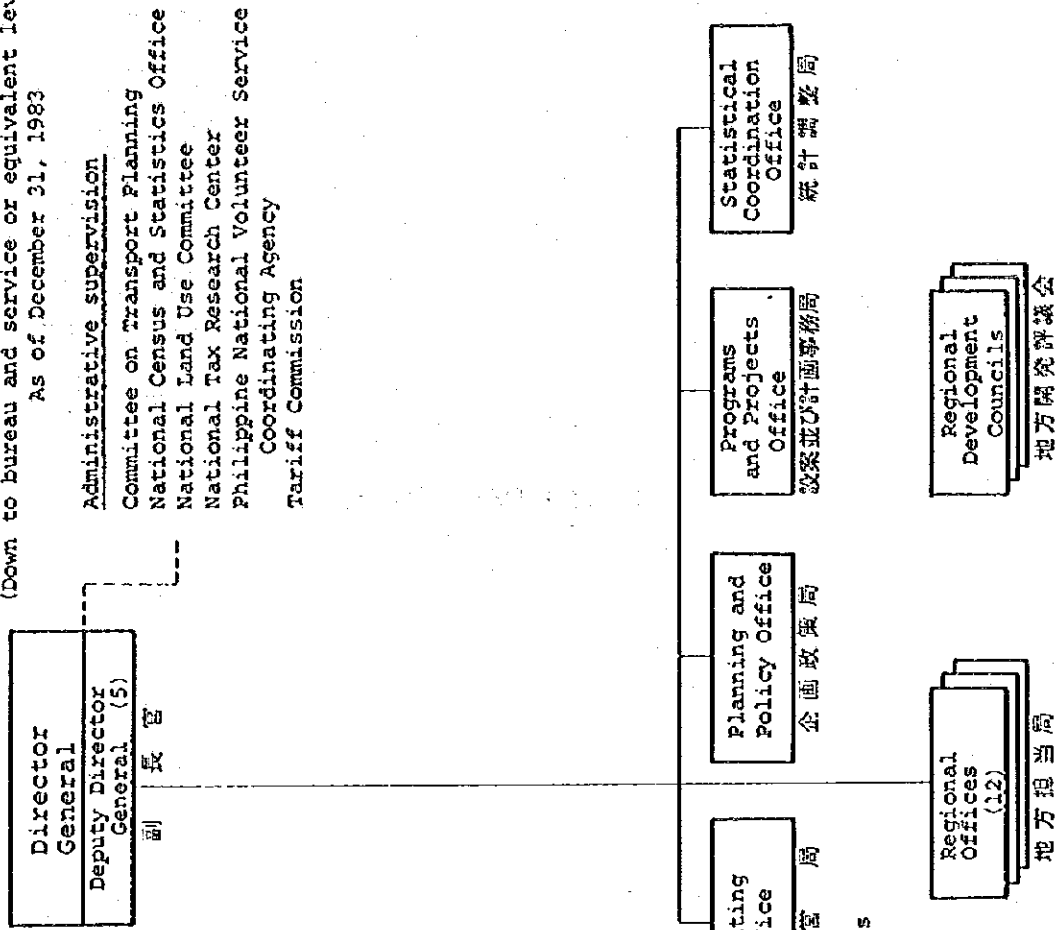
未利用地の多い丘陵地帯については水資源開発との関連において利用計画を樹てる。

VI. 参 考 资 料

1. 比政府關係機關組織圖

1-1 國家經濟企畫庁 (NEDA) 組織圖 Organization Chart

NATIONAL ECONOMIC AND DEVELOPMENT AUTHORITY
 (Office of the Director General, except NEDA Board)
 (Down to bureau and service or equivalent levels)
 As of December 31, 1983



Attached Corporations
 Development Bank of the Philippines
 Government Service Insurance System
 Kalinga Special Development Region*
 Laguna Lake Development Authority
 Leyte Sab-A Basin Development Authority
 Philippine Deposit Insurance Corporation
 Philippine Institute for Development Studies
 Philippine National Bank
 Philippine Veterans Bank
 Public Estates Authority
 Social Security System

Attached units by law
 Development Budget Coordination Committee
 Investment Coordination Committee
 National Productivity Commission
 Statistical Advisory Board

*OBM considers this as a regular government agency

Note: Only mother corporations and subsidiaries created by law are reflected; subsidiaries created through SEC are not included except where noted.

1-2 公共事業・道路省組織図

Organization Chart

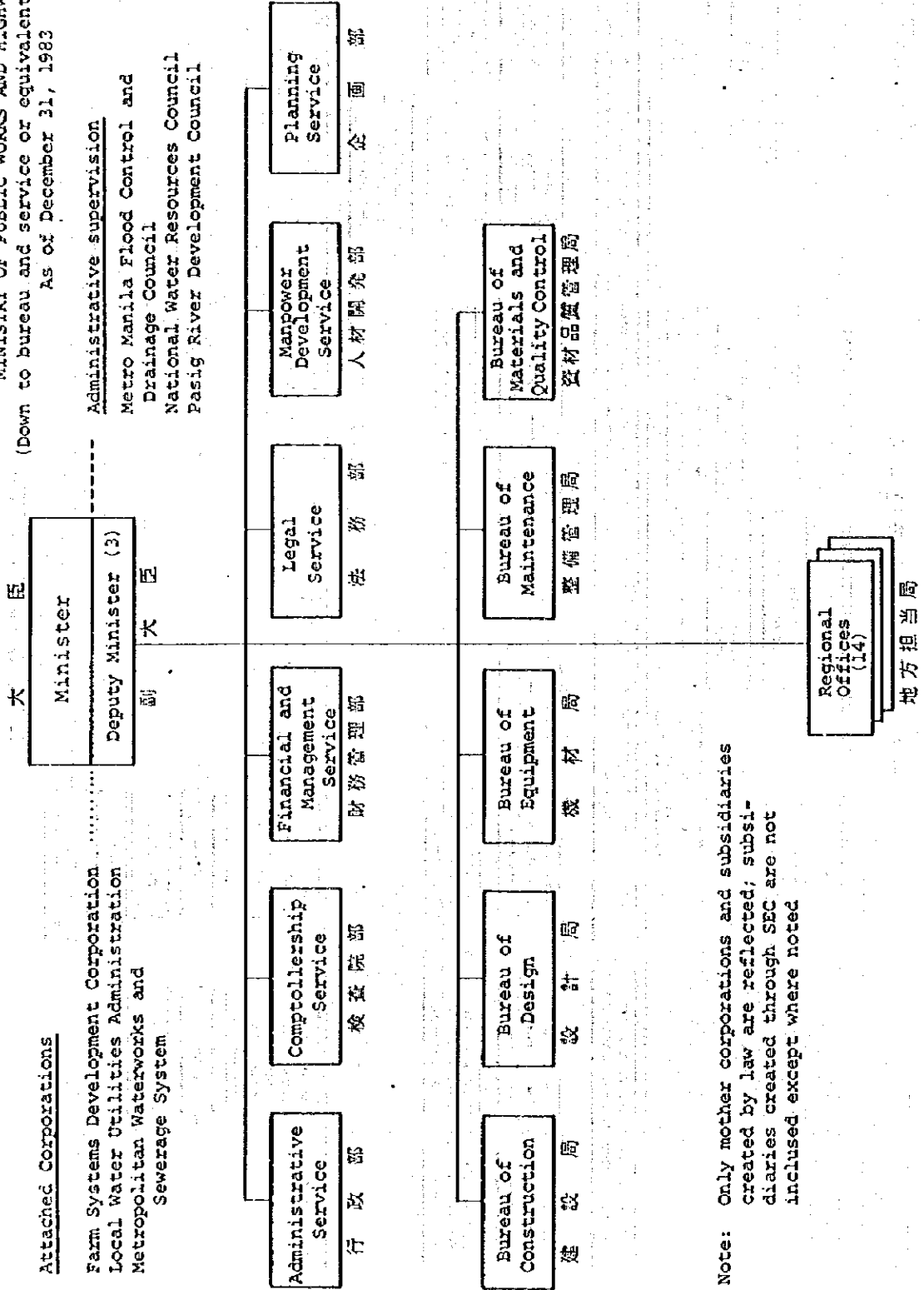
MINISTRY OF PUBLIC WORKS AND HIGHWAYS
(Down to bureau and service or equivalent levels)
As of December 31, 1983

Attached Corporations

Farm Systems Development Corporation
Local Water Utilities Administration
Metropolitan Waterworks and
Sewerage System

Administrative supervision

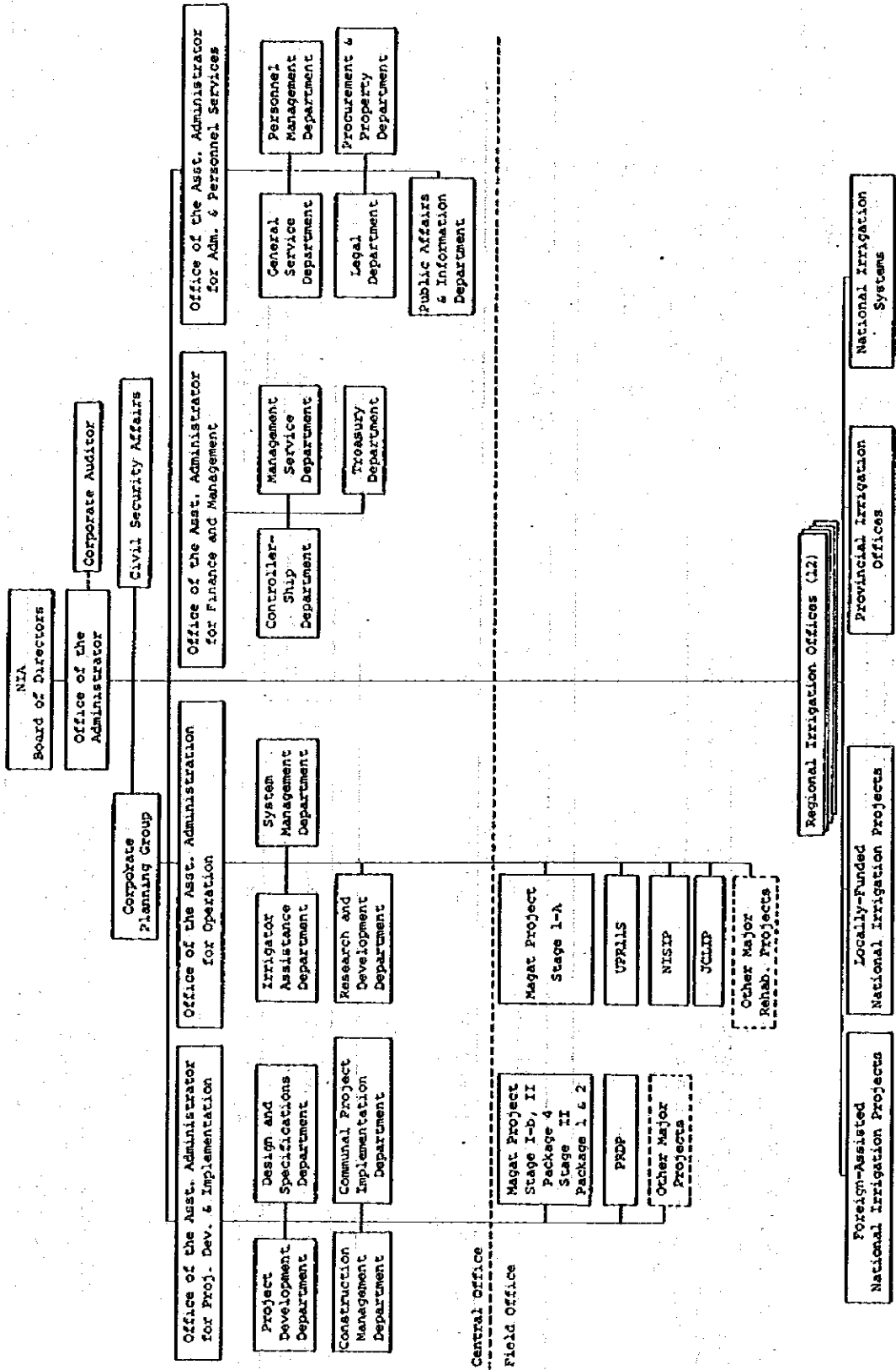
Metro Manila Flood Control and
Drainage Council
National Water Resources Council
Pasig River Development Council



Note: Only mother corporations and subsidiaries created by law are reflected; subsidiaries created through SEC are not included except where noted

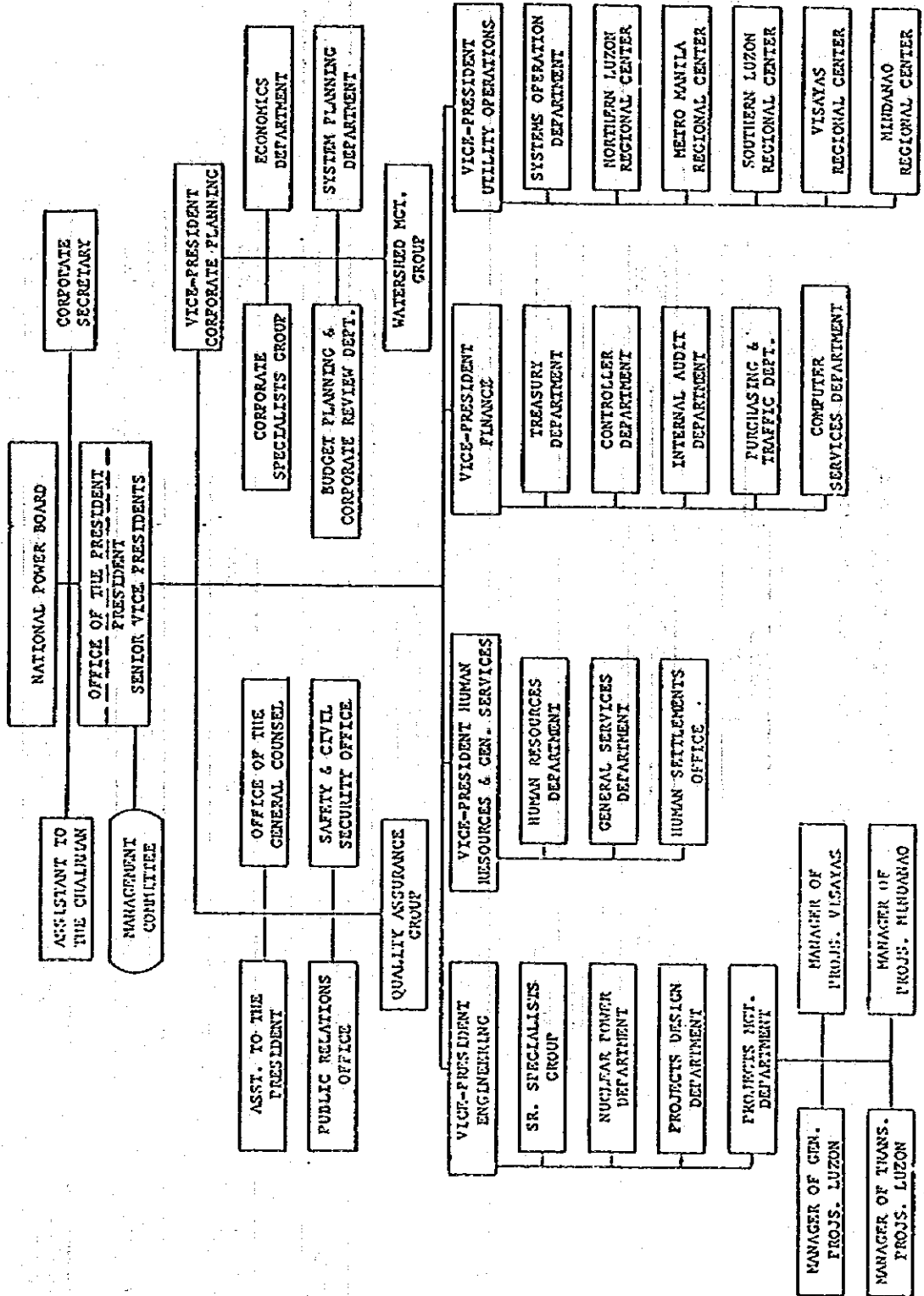
1-3 国家かんがい庁組織図

NATIONAL IRRIGATION ADMINISTRATION ORGANIZATION CHART



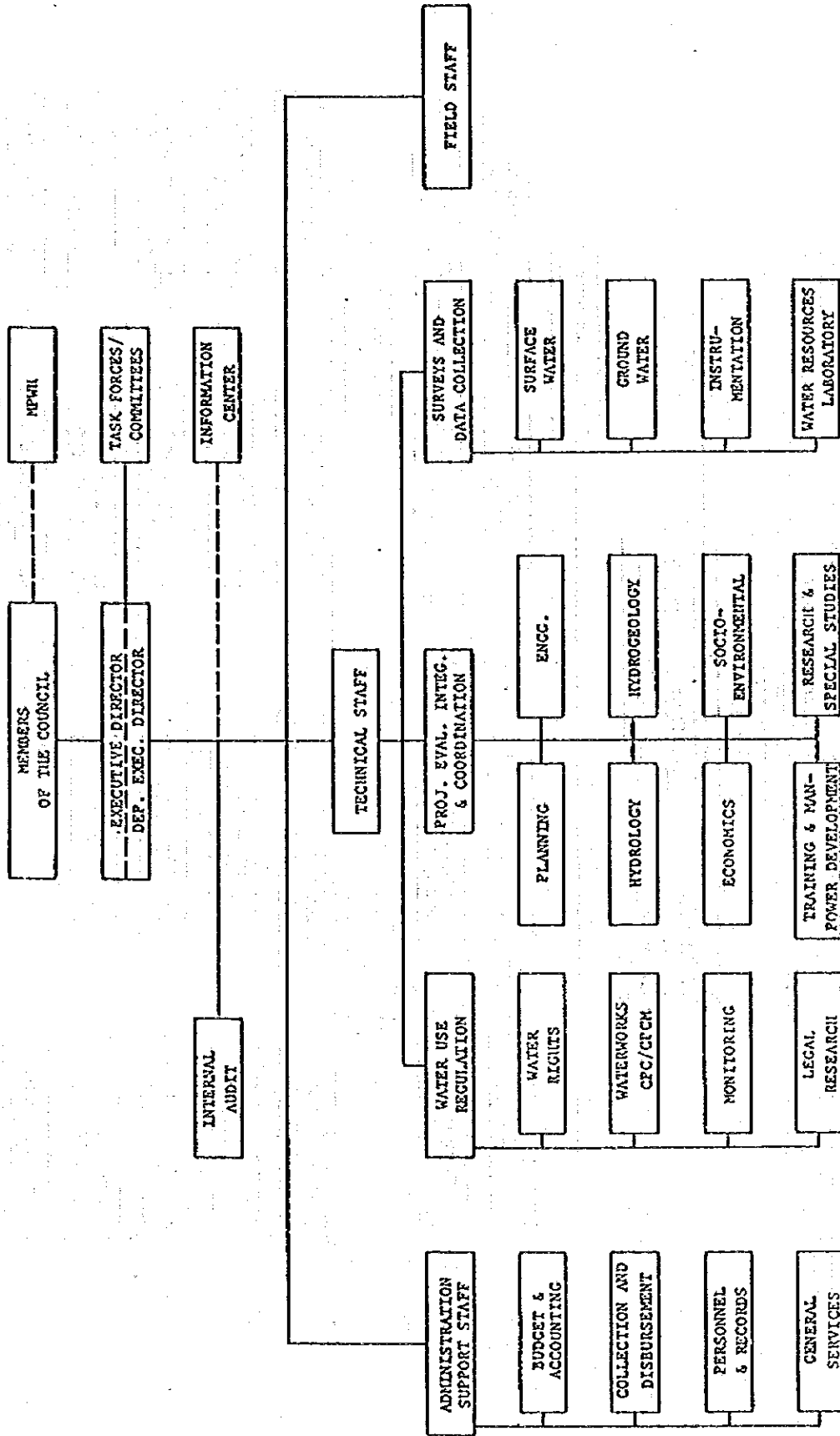
1-4 國家電力公社組織圖

NATIONAL POWER CORPORATION
ORGANIZATIONAL CHART



1-5 國家水資源委員會組織圖

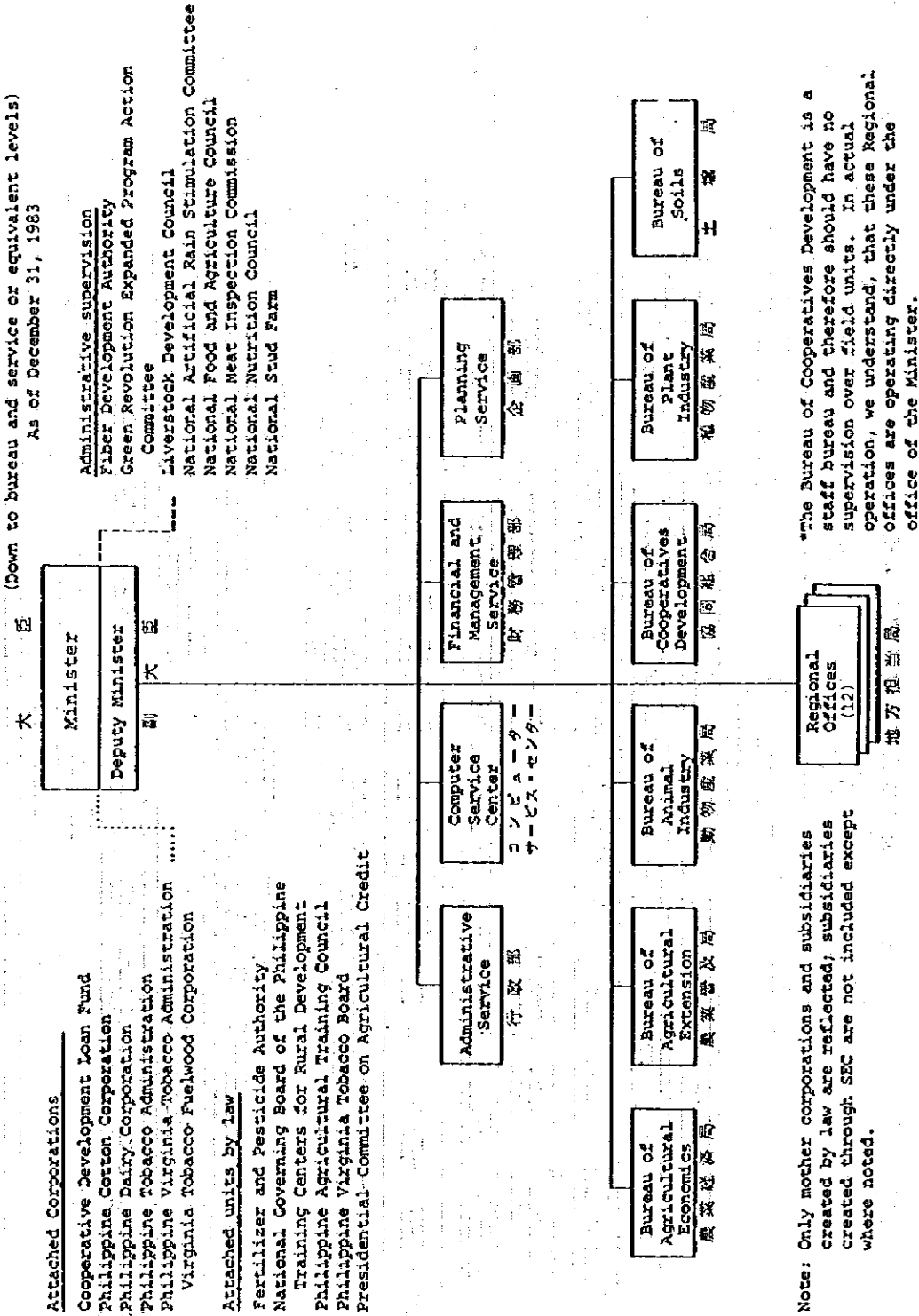
NATIONAL WATER RESOURCES COUNCIL ORGANIZATIONAL CHART



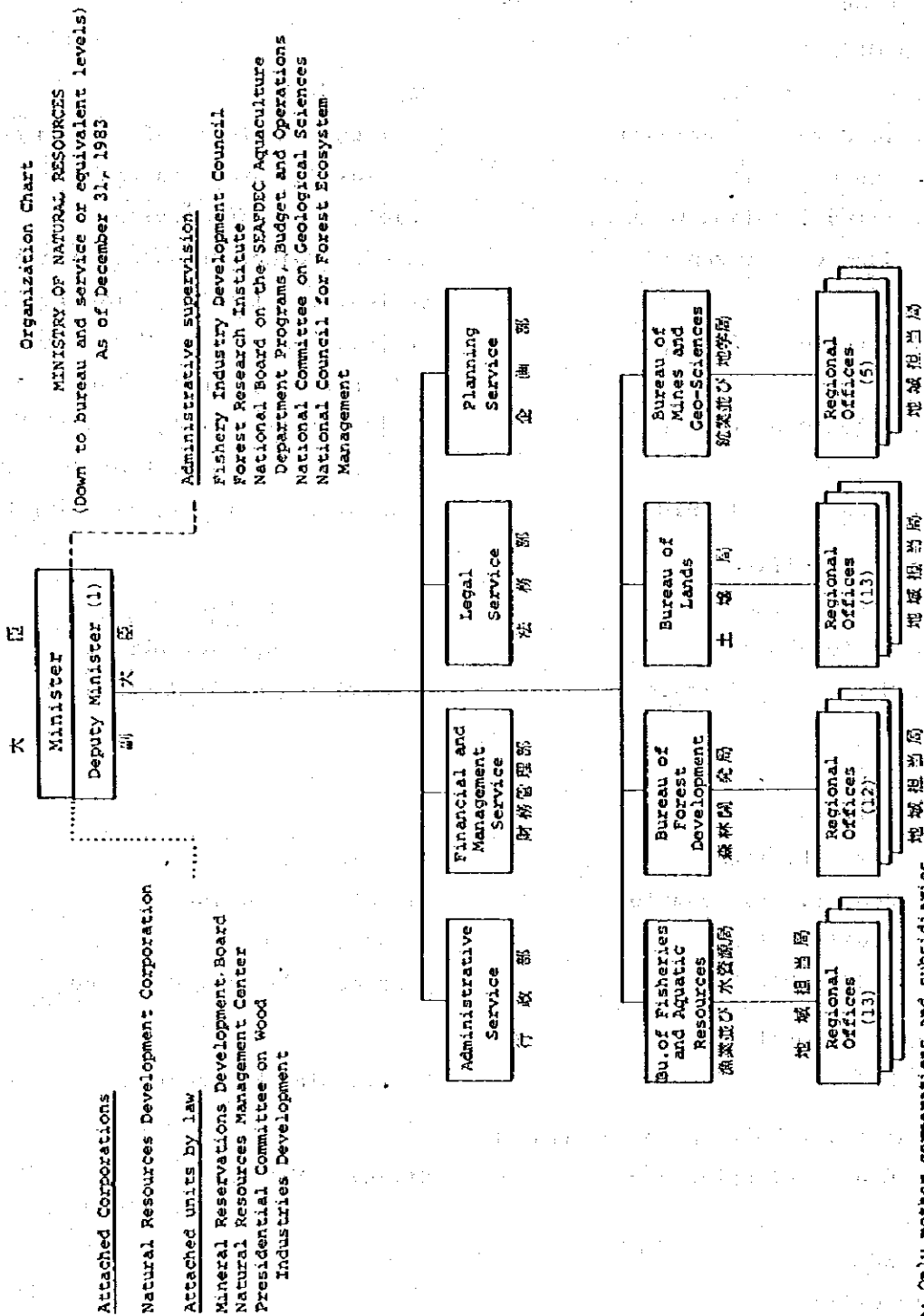
1-6 農業省組織圖

Organization Chart

MINISTRY OF AGRICULTURE
As of December 31, 1983



1-8 天然資源省組織圖



Note: Only mother corporations and subsidiaries created by law are reflected; subsidiaries created through SEC are not included except where noted.

2. 面会者リスト

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10 PC Region II

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Assistant Regional Director for
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11 日本側関係者

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元田良孝	日本大使館一等書記官
中條康明	同上
岡崎有二	JICAマニラ事務所

3. 比政府要請書 (T / R)

Terms of Reference for Master Plan Study
on the Cagayan River Basin

1. Project Area

The project area is located in the northern part of Luzon Island and comprises all the Cagayan river basin with a watershed area of 26,600 km².

2. Background of the Project

2.1 Present Condition of the Basin

(1) The Cagayan river is the main drainage way of the Basin with a total length of 505 km. The principal tributaries to the Cagayan river are the Magat, Ilagan, Sifu-Mallig and Chico rivers.

(2) The average annual precipitation varies from under 2,000 mm in the northern part of the Basin to over 3,000 mm in the mountainous southern part. Total annual run-off is estimated to be 12,800 million cubic meters. Over 60% of the annual run-off occurs during five months from August to December. The Basin is frequently visited by typhoons during July to December.

(3) The population of the Basin was 1.86 million in 1975 and is estimated to reach 3.55 million in 2,000. The economy of the Basin depends primarily on agriculture. The main agricultural products are rice and corn.

(4) The present land use of the Basin is as follows: 7% for rice land, 5% for diversified farmland, 39% for grassland/shrubland and, 49% for forest and other lands.

2.2 Necessity of Water Resources Development

(1) A vast land along the Cagayan river and main tributaries is flooded almost every year. The flood plain covers an area of 150,000 ha. The total population susceptible to flooding numbers 470,000 as of 1980. The latest disastrous flood occurred in November 1980, inflicting 96 losses of human lives and severe damages to public and private properties. The average annual flood damage is estimated at P 880 million/yr in 1981 prices.

Flood control activities, however, consisted primarily of revecement works to protect infrastructures from bank erosion. Almost no attempt has been made to prevent overflows of flood from the river channel.

Early commencement of substantial and systematic flood control activities is expected for mitigation of the flood damages and enhancement of the land use in the flood prone areas.

(2) A total area of 476,000 ha is suitable for irrigation farming in the whole basin. Out of the total irrigable area, irrigation facilities were provided for 175,000 ha and the on-going and proposed irrigation developments covered 241,000 ha in 1975. A major portion out of the on-going and proposed irrigation development area will be completed in the near future.

However, there still remain considerable irrigable areas to be developed in future. Major irrigation schemes will be formulated in the flood plain of the Cagayan river as well as the upstream area of the Magat river for development. The flood plain of the Cagayan river has been left behind in development due to frequent flooding and poor irrigation facilities. The income level of the people in the flood plain is naturally low.

Agricultural development is contemplated in this flood plain not only for increasing agricultural production of the Basin but also for the equalization of the regional economy within the Basin.

(3) Total 45 potential damsites are identified in the Basin. Out of them, Magat multipurpose dam is under construction and the others remain to be developed for hydropower, irrigation and flood control in future.

The Basin possesses abundant hydropower potentials. It is estimated that more than 3,000 MW of hydropower can be developed economically. However, only the Magat dam hydropower development has been implemented with an initial installed capacity of 360 MW.

The Basin has already been interconnected with the Luzon Grid, and the hydropower development in the Basin is expected to play an important role in meeting the increasing power demand of all Luzon Island.

3. Objective and Policy of the Study

(1) The objective of the study is to provide a basin-wide, long-term plan

(master plan) for a comprehensive water resources development in the Cagayan river basin.

(2) In order to promote economic development of the Basin, the master plan shall present several development projects to be implemented in the near future rather than conceptual or framework plans. In this context, stress, shall be placed on project identification and project formulation. The master plan shall also present an implementation program of the formulated projects so that the project benefit may be enjoyed from time to time corresponding to the relevant investment.

(3) Since the Cagayan river basin covers a large area and the objective of the study is to prepare a basin wide plan, only projects with a considerable impact on the regional socio-economy and water resources will be taken up for the master plan study.

(4) The study will cover the following sectors of development:-

- Flood Control
- Irrigation and Drainage
- Hydropower
- Municipal Water Supply
- Erosion Control

Project formulation shall be made mainly for the purpose of flood control, irrigation and drainage, and hydropower development. Municipal water supply and erosion control projects may be studied at the conceptual and framework plan level.

(5) For efficient water resources development, relevant sectors shall be well coordinated in formulating the following types of development projects.

- Multipurpose dam project for hydropower, irrigation and flood control
- Irrigation project in the flood plain

(6) The master plan shall be prepared not only for economic development but

also social welfare advancement and equalization of regional development.

(7) The planning period shall be 20 years.

4. Scope of Work

In order to achieve the objective and policies set out in Section 3, the following technical studies and field investigations shall be performed as well as collection, collation and review of existing data, informations and reports.

4.1 Regional Socio-economy

To carry out macro-studies on socio-economy of the Basin such as population, economic structure, income, agricultural production, industrial production, power demand, transportation, etc. to provide background informations for the master plan study.

4.2 Water Resources

(1) To carry out macro-studies on availability and problems with respect to rainfall, run-off, sedimentation, water quality, groundwater, etc. to evaluate potentiality of water use and needs of water control in the Basin.

(2) To carry out detailed hydrological analyses at the project sites on surface run-off, flood run-off, flood routing, sediment run-off, salinity intrusion, etc. for project formulation. For analyses, field measurements and sampling test will be conducted as necessary.

4.3 Related Land Resources

To carry out macro-studies on land use, land capability, geology, etc. for delineation of potential areas for irrigation development in the Basin.

4.4 Flood Control

(1) To carry out the river survey including longitudinal profile and cross sectional survey covering the Cagayan river and its main tributaries and to calculate carrying capacity of respective river stretches.

(2) To estimate the flooding conditions such as flood water level, flooding area, flooding depth and duration etc, and flood damages.

(3) To study such flood control plans as flood control by dams including review of the Magat dam (on-going), dyking system and channel excavation, prevention of bank erosion, flood plain zoning, etc. In the studies, geological survey at the project sites will be carried out through the surface reconnaissance as necessary.

(4) To lay out flood control facilities.

4.5 Irrigation and Drainage

(1) To identify irrigation development areas including rehabilitation areas based on land capability map, land use map, existing irrigation conditions, field reconnaissance survey, etc.

(2) To carry out such studies and surveys as semi-detailed soil survey with sampling test as necessary, proposal of cropping pattern, estimation of water requirement, estimation of exported crop productions and required agricultural inputs, etc. in the identified areas for irrigation development.

(3) To study irrigation development plans by various irrigation systems including rehabilitation and drainage plans. In the studies, ground survey and geological reconnaissance survey will be carried out at the project sites as necessary.

(4) To lay out irrigation and drainage facilities.

4.6 Municipal Water Supply

(1) To carry out studies on present water demand and supply conditions, and estimation of future water demand in the major cities/towns in the Basin.

(2) To identify additional water sources to meet the future demand.

4.7 Erosion Control

(1) To identify areas subject to serious surface erosion based on soil erosion map, field reconnaissance, etc.

(2) To carry out studies on possible erosion control measures such as check dam, terracing, reforestation, etc. in the identified areas.

4.8 Dam and Hydropower

- (1) To find potential damsites in the Basin and to select prospective damsites for further study, based on preliminary studies of the potential damsites including field reconnaissance survey.
- (2) To carry out damsite survey such as aerophoto shooting and photogrammetric mapping covering the damsite and reservoir area, ground cross-sectional-survey, surface geological survey, boring investigation if necessary, for the selected prospective damsites.
- (3) To carry out studies on dam structures, access roads, reservoir use for hydropower, irrigation and flood control, problems caused by reservoir impounding, etc. for planning dam development projects.
- (4) To carry out studies on power market, hydropower station, transmission line system, energy output, etc. for planning hydropower development projects.
- (5) To lay out dam and hydropower development facilities.

4.9 Social and Environmental Impact Assessment

To assess impacts of the proposed projects on social and natural environment including resettlement problem of inhabitants by reservoir creation, loss of social, cultural and archaeological properties by reservoir creation, intrusion in the estuary due to various projects, etc.

4.10 Formulation of Master Plan

The master plan shall contain the following studies.

- Formulation of development concept and framework
- Estimate of costs and benefits for the identified projects
- Evaluation of the projects
- Priority setting of the projects
- Preparation of implementation schedule

5. Time Schedule of the Study

A work time schedule of the master plan study will be determined in consideration of the following conditions.

- (1) River survey shall be executed in the dry season from December to May.
- (2) Aerophoto shooting shall be executed in the most dry season from February to April.
- (3) Photogrammetric mapping including ground control survey shall be executed for each of prospective dam and reservoir areas, selected from potential damsites based on the preliminary study.
- (4) Ground cross-sectional survey of prospective damsites shall be executed in the dry season after completion of the photogrammetric mapping.

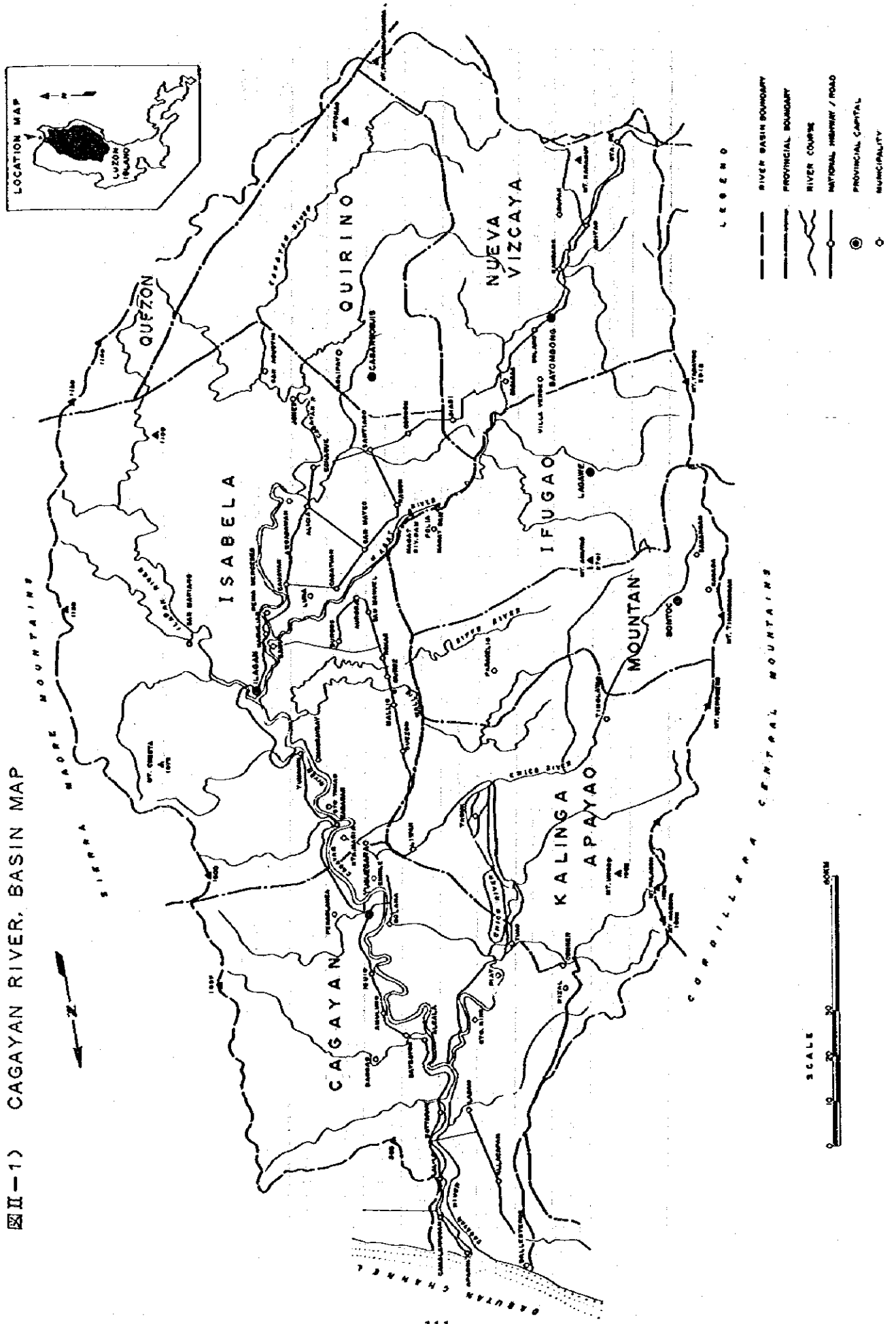
The master plan study shall be conducted within 24 months starting in July, 1984 as illustrated in the tentative time schedule.

Report

The following reports will be prepared in the course of the study.

- (1) Inception report within two months after commencement of the study.
- (2) Interim report within 13 months after commencement of the study.
- (3) Draft Final report within 21 months after commencement of the study.
- (4) Final report within 24 months after commencement of the study.

II-1) CAGAYAN RIVER, BASIN MAP



Tentative Time Schedule

	1984												1985												1986				
	JUN	JUL	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL			
Survey and Mapping																													
River Survey																													
Aerophoto Shooting																													
Ground Control Survey																													
Photo Mapping																													
Dam-site Survey																													
Selection of Prospective Dam-site																													
Main Study																													

Inception Report Internim Report Draft Final Report Final Report

NOTE: Procedure for permission Aerophoto Shooting.

4. 事前調查協議結果

MINUTES OF DISCUSSION
ON
MASTER PLAN STUDY ON THE CAGAYAN RIVER BASIN
WATER RESOURCES DEVELOPMENT

1. At the request of the Government of the Philippines, a Contact Mission of the Japan International Cooperation Agency (JICA), visited the Philippines from May 19 to May 30, 1985 in preparation for the Master Plan Study on the Cagayan River Basin Water Resources Development (the Study).

The Mission carried out field inspection of the project area and held series of discussions with officials of the Ministry of Public Works and Highways (MPWH), and other agencies concerned.

2. A final meeting was held on May 28, 1985, at the MPWH Office, Manila. A list of those who attended is shown in Annex I. Main issues discussed are as follows:

- 1) Security of the safety of the Study Team:

The Mission ~~stated~~ requested that MPWH should ensure the safety of the Study team during the implementation of the Study, namely to inform the Study team of any existing risks and take necessary measures to secure the safety of the Study team.

In addition, the Mission mentioned that the Study should be postponed or suspended in case that there arises threatening safety of the Study team.

MPWH agreed to study possible measures to secure the safety of the team.

- 2) Coordination with authorities concerned:

MPWH informed that Cagayan River Basin Master Plan Study Steering Committee and Technical Working Group has been organized in order to oversee the effective execution of the Study. The member list of Steering Committee is shown in Annex II.

- 3) Scope of Work:

The Mission presented a draft of the Implementing Arrangement as shown in Annex III for discussion, and exchanged views on it.

a) Transfer of Technology:

MPWH requested the JICA to transfer technology by way of seminars and lectures as well as in-service training and also to provide planning and design, construction and operation and maintenance manuals, criteria, guidelines and other general standard applied in the Study.

The Mission answered that the former request will be presented and discussed for consideration in Japan.

The Mission also explained that the latter will be covered by making detailed explanation on planning procedure.

b) Office and the Equipment:

MPWH will provide a suitable office space with furniture in Manila and/or in Tuguegarao for Japanese Study Team. However, MPWH requested JICA to provide office equipment due to financial constraint. The Mission stated that it will recommend to the Government of Japan to provide office equipment for the Study.

c) Provisions of vehicles:

MPWH will provide at least two (2) vehicles at the project study site for use of the Japanese Study Team. Considering the situation that two (2) vehicles are not sufficient for the Study activity, and that there are no available four-wheel drive vehicles in Tuguegarao, the Mission asked MPWH, on the possibility of providing more number of vehicles. MPWH explained their current situation, and requested that additional vehicles be provided by JICA for the Study. The Mission stated that it will recommend to the Government of Japan, to provide additional vehicles for the Study.

d) Field Surveys:

MPWH agreed to undertake Ground Control of the dam sites and profiles and cross-section surveys of the main river and major tributaries, and hydrological observation, but due to financial constraint on its budget, requested that the aerial photograph, mapping and geological survey be undertaken by JICA. *M. Earnestly &*

In connection with field survey to be executed by MPWH, MPWH requested JICA to provide necessary field equipment.

The Mission answered that the request will be presented and discussed for consideration in Japan.

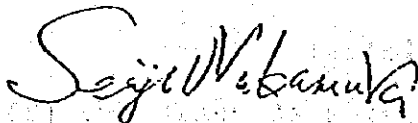
4) Information on the existing maps and data:

The Mission requested that MPWH will provide necessary list and information on the existing maps and data. MPWH promised to submit them by the end of June, 1985 through JICA Manila Office.

Dated: May 28, 1985

For JICA:

For MPWH:



Mr. SEIJI NAKAMURA
Team Leader



TEODORO T. ENCARNACION
Asst. Minister for Planning

LIST OF ATTENDANCE

1. Ministry of Public Works and Highways (MPWH):

- | | |
|-----------------------------|---|
| Mr. Teodoro T. Encarnacion | - Asst. Minister for Planning |
| Mr. Trino-Trinidad G. Meris | - Chief, Planning Service |
| Mr. Antonio A. Alpasan | - Project Manager IV PMO-MFCP |
| Mr. Rogelio A. Flores | - Project Manager III PMO-MFCP |
| Mr. Jose C. Guanzon | - Chief Civil Engineer Planning Service |
| Mr. Manuel S. Alconis | - Head Civil Engineer Planning Service |
| Mr. Ikuji Seko | - JICA Consultant for Flood Control |

2. JICA Contact Mission:

- | | |
|----------------------|------------------|
| Mr. Seiji Nakamura | - Mission Leader |
| Mr. Tsuneo Uesaka | - Member |
| Mr. Takashi Sunakawa | - Member |
| Mr. Shinsuke Ota | - Member |
| Mr. Hiroyuki Kutsuna | - Coordinator |

LIST OF MEMBERS OF THE STEERING COMMITTEE

OSCAR L. RODRIGUEZ Deputy Minister, MPWH	- Chairman
JOSE B. DEL ROSARIO Asst. Administrator, NIA	- Member
JOSE PENDOZA Regional Director, Region II, MPWH	- Member
ANGEL ALEJANDRINO Executive Director, NWRC	- Member
JESUS M. SUNGA Director, Infrastructure Staff, NEDA	- Member (by invitation)
LIRIO ABUYUAN Regional Director, Region II-NEDA	- Member (by invitation)
REGINO IBARRA Department Manager, NPC	- Member (by invitation)
GUMERSINDO LASAM OIC, Region II Ministry of Agriculture and Food	- Member (by invitation)
EDMUNDO V. CORTES Director, Bureau of Forest Development, MNR	- Member (by invitation)
Dr. ROMAN L. KINTANAR Administrator, Philippine Atmospheric, Geophysical and Astronomical Services Administration (PAGASA)	- Member (by invitation)

注) Annex III (I/Aのドラフト) は省略

4 - 2. 第 2 次調査議事録及び Implementing Arrangement

MINUTES OF DISCUSSION

ON

MASTER PLAN STUDY ON THE CAGAYAN RIVER BASIN

WATER RESOURCES DEVELOPMENT

Date : 30 July 1985

Place : Office of the Asst. Minister
for Planning, MPWH Building
Port Area, Manila

Attendance : Please see attached Annex I

The Mission had a series of reconnaissance surveys, discussions and exchange of views with the authorities concerned on the Study, and finally agreed upon the Implementing Arrangement, Annex II.

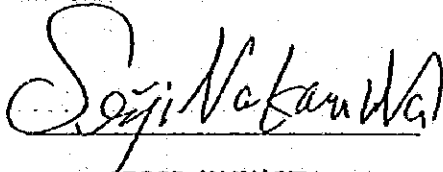
Main issues discussed are as follows:

1. In response to the request, JICA shall provide the following items for the implementation of the Study, which will remain the property of JICA unless otherwise agreed:
 - a) office equipment
 - b) field equipment
 - c) supplementary vehicles
2. In reference to undertaking of GOP, MPWH requested that ground control of the prospective dam and reservoir sites be undertaken by JICA, due to limited time schedules as well as its budget constraints. The Mission agreed to undertake its ground control survey by JICA!

3. In reference to technology transfer, MPWH requested JICA to receive four (4) trainees in Japan.

The Mission answered that request will be presented and discussed for consideration. The Mission requested MPWH to submit immediately A2 A3 Form for one (1) trainee who will be taken up this fiscal year.

For JICA

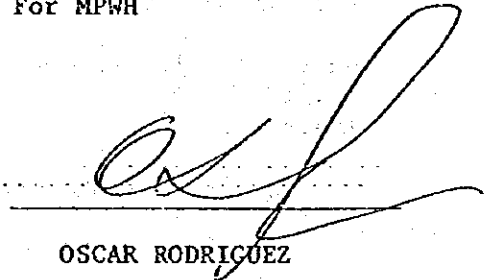


SEIJI NAKAMURA

Team Leader

Preliminary Survey Team

For MPWH



OSCAR RODRIGUEZ

Deputy Minister

01 August 1985

Manila, Philippines

MASTER PLAN STUDY ON THE CAGAYAN RIVER BASIN

WATER RESOURCES DEVELOPMENT

ATTENDANCE

I. Authorities Concerned:

	<u>NAME</u>	<u>DESIGNATION</u>	<u>OFFICE</u>
1.	Mr. TRINO-TRINIDAD G. MERIS	Chief, Planning Service.	MWPH
2.	Mr. ROGELIO A. FLORES	Project Manager III	PMO-MFCP-MPWH
3.	Mr. JOSE GUANZON	Chief, Project Evaluation Division, Planning Service	MPWH
4.	Mr. JOSE B. DEL ROSARIO	Assistant Administrator	NIA
5.	Mr. ISIDRO DIGAL	Manager, Planning Div.	NIA
6.	Mr. LEONARDO R. CRUZ	Sr. Corporate Planning Specialist	NPC
7.	Mr. NESTOR ALIMAN	Sr. Planning Specialist	NPC
8.	Mr. IKUJI SEKO	Flood Control Consultant	MPWH-JICA

II. Mission:

1.	Mr. SEIJI NAKAMURA	Team Leader	MOC
2.	Mr. HIROYUKI KITSUNA	Coordinator	JICA

III. JICA Philippines:

1.	Mr. YUJI OKAZAKI		JICA
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IMPLEMENTING ARRANGEMENT ON THE TECHNICAL COOPERATION
BETWEEN THE JAPAN INTERNATIONAL COOPERATION AGENCY
AND THE
MINISTRY OF PUBLIC WORKS AND HIGHWAYS
FOR THE
MASTER PLAN STUDY ON THE CAGAYAN RIVER BASIN WATER RESOURCES DEVELOPMENT
IN THE REPUBLIC OF THE PHILIPPINES

AGREED
BETWEEN
JAPAN INTERNATIONAL COOPERATION AGENCY
AND
MINISTRY OF PUBLIC WORKS AND HIGHWAYS

For JICA

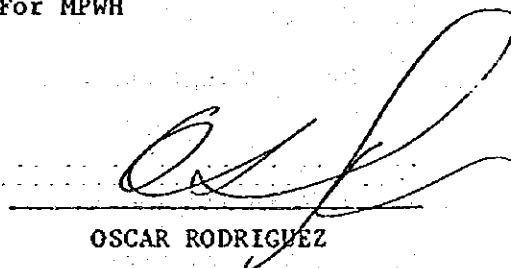
For MPWH



SEIJI NAKAMURA

Team Leader

Preliminary Survey Team



OSCAR RODRIGUEZ

Deputy Minister

01 August 1985

Manila - Philippines

I. INTRODUCTION

In response to the request of the Government of the Republic of the Philippines (hereinafter referred to as "GOP"), the Government of Japan (hereinafter referred to as "GOJ") has decided to conduct a Master Plan Study on the Cagayan River Basin Water Resources Development (hereinafter referred to as "the Study") and exchanged the Notes Verbales with GOP concerning the implementation of the Study. The Japan International Cooperation Agency (hereinafter referred to as "JICA"), the official agency responsible for the implementation of the technical cooperation programs of GOJ, will undertake the Study, in accordance with the relevant laws and regulations enforced in Japan. On the part of GOP, the Ministry of Public Works and Highways (hereinafter referred to as "MPWH") shall act as the counterpart agency to the Japanese Study Team and also as coordinating body in relation with other governmental and non-governmental organizations concerned for the smooth implementation of the Study.

The present document constitutes the implementing arrangement between JICA and MPWH under the above-mentioned Notes Verbales exchanged between the two governments.

II. OBJECTIVE OF THE STUDY

The objective of the Study is to prepare a Master Plan for the Cagayan River Basin Water Resources Development, taking into consideration its flood control, irrigation and drainage, and hydropower.

The planning period shall be about 20 years.

III. THE STUDY AREA

The Study Area will cover the Cagayan River Basin which is approximately 27,000 sq. km.

IV. SCOPE OF THE STUDY

Scope of the Study will include the following:

A. General

1. Review and evaluate all data and previous studies directly relevant to the Study and conduct field investigations.
2. Conduct sectoral analysis mainly flood control, irrigation and drainage, hydropower, and inter-sectoral analysis.
3. Examine and evaluate alternative schemes to seek the best sequences of the water resources development of the Cagayan River Basin that will meet the basin-wide and/or nationwide, immediate, medium and long term needs.

B. Specific

1. Data Collection & Review and Field Investigations

Collect and review the existing data and information on the following:

- a) available topographical data and maps
- b) hydrological and hydraulic data
- c) geological and seismological data
- d) meteorological data
- e) soil data
- f) agricultural and agro-economical data

g) regional and economy and sociology

h) others

Conduct the following field investigations:

a) field reconnaissance

b) profile and cross-section survey of the main river and major tributaries.

c) aerial photography and mapping of the prospective dam sites

d) irrigation and drainage system survey.

e) geological survey

f) others

2. Sectoral and inter-sectoral analysis

Sectoral analysis

a) Examine damage caused by actual/probable flood and effects of flood control dams, by means of flood run-off analysis.

b) Examine river channel improvement plan including dikes, widening the narrow, short-cut (cutting-off channel), etc.

c) Examine the existing and future agricultural situations and the agricultural development potential, and identify major rehabilitation works for existing irrigation and drainage systems and new works for the potential irrigable areas.

d) Examine hydropower potential on the Basin.

Inter-sectoral analysis

a) Examine land use condition and define a future land use plan, taking into consideration the existing land use, the development potential, the river improvement plan, etc.

- b) Conduct dam site identification study on the Basin and assess its potential use for flood control, irrigation and drainage, and hydropower.
- c) Conduct an overall study on water supply and demand balance for the area.

3. Formulation of Master Plan

- a) Examine development strategies in the field of the water resources development covering mainly flood control, irrigation and drainage, and hydropower, with analysis of their future demand/needs.
- b) Identify alternative development schemes for the river basin in the comprehensive approach.
- c) Estimate construction costs and benefits of the alternative schemes.
- d) Conduct technical and economic evaluation of the alternative schemes.
- e) Determine and recommend the technical and economic priority order of individual project.
- f) Formulate an implementation schedule for further studies.

C. Transfer of Technology

- a) Transfer technological knowledge to Philippine counterpart personnel through the study by way of in-service training locally and abroad.
- b) Conduct seminars on the Water Resources Development using the

Study as the subject matter.

V. THE STUDY SCHEDULE

The Study will be executed in accordance with the attached Tentative Study Schedule.

VI. REPORTS

JICA shall prepare and submit the following Reports in English to GOP:

a) Inception Report (30 copies)

The Inception Report will be prepared at the commencement of the field survey, which will include, among others, method of approach, proposed plan of operation, etc.

b) Progress Report (30 copies)

The Progress Report will be prepared within six (6) months after the commencement of the Study covering the results of the Preliminary Study and the part of the field surveys.

c) Interim Report (30 copies)

The Interim Report will be prepared within fourteen (14) months after the commencement of the Study. The report will cover all studies and analyses carried out including alternative development schemes to be analyzed in detail.

d) Draft Final Report

Main Report - 30 copies

Supporting Reports -- 10 copies

Compiled Data and Information - 1 copy

The Draft Final Report will be prepared within eighteen (18) months

after the commencement of the Study. The report will cover all studies and analyses with enough supporting data, including the alternative development schemes analyzed in detail. The Authorities concerned shall submit their comments within forty-five (45) days after receipt of the Draft Final Report.

e) Final Report

Main Report - 50 copies

Supporting Reports - 50 copies

Compiled Data and Information - 2 copies

The Final Report will be finalized forty-five (45) days after receipt of comments from the Authorities concerned on the Draft Final Report.

VII. UNDERTAKING OF GOP

In accordance with the Notes Verbales exchanged between GOJ and GOP, the GOP shall accord privileges, immunities and other benefits to the Japanese Study Team and, through the Authorities concerned, take necessary measures to facilitate the smooth conduct of the Study.

1. a) GOP shall be responsible for dealing with claims which may be brought by third parties against the members of the Japanese Study Team and shall hold them harmless in respect of claims or liabilities arising in the course of, or otherwise connected with the discharge of their duties in the implementation of the Study, except when such claims or liabilities arise from gross negligence or willful misconduct of the above-mentioned members.
- b) GOP shall secure the safety of the Study Team during the imple-

mentation of the Study.

2. MPWH shall, at its own expense, provide the Japanese Study Team, if necessary, in cooperation with other agencies concerned, with the following:

- a) Available data and information related to the Study;
- b) Counterpart personnel and support staff necessary for the Study;
- c) Suitable office space in METRO MANILA as a main office and TUGUEGARAO as a sub-office;
- d) Credentials or identification cards to the members of the Japanese Study Team;
- e) Two (2) vehicles with drivers;
- f) Profiles and cross-sections survey of the main river and major tributaries and hydrological observations.

3. MPWH shall make the necessary arrangements with other governmental and non-governmental organizations concerned for the following:

- a) to secure the safety of the members of the Japanese Study Team;
- b) to permit the members of the Japanese Study Team to enter, leave and sojourn in the Philippines for the duration of their assignment therein;
- c) to exempt the members of the Japanese Study Team from taxes, duties, fees and other charges on equipment, machinery and other materials brought into the Philippines for the conduct of the Study;
- d) to exempt the members of the Japanese Study Team from income

tax and charges of any kind imposed on or in connection with any emolument or allowance paid to the members of the Japanese Study Team for their services in connection with the implementation of the Study;

- e) to provide the necessary facilities to the Japanese Study Team for remittance as well as utilization of the funds introduced into the Philippines from Japan in connection with the implementation of the Study;
- f) to secure permission for entry into private properties or other areas for the conduct of the Study;
- g) to secure permission to take all data and documents (including aerial photographs) related to the Study out of the Philippines to Japan by the Study Team;
- h) to provide medical services as needed and the expenses will be borne by the members of the Japanese Study Team.

VIII. UNDERTAKING OF GOJ

In accordance with the Notes Verbales exchanged between GOJ and GOP, the GOJ, through JICA, shall take the following measures for the implementation of the Study;

1. to dispatch, at its own expense, the Study Team to the Philippines;
2. to pursue technology transfer to the Philippine counterpart personnel in the course of the Study, by way of training in the Philippines and in Japan.

3. to conduct, at its own expense, an aerial photography with scale of 1/30,000 and a topographic mapping with scale of 1/25,000 covering prospective dam and reservoir sites.

IX. CONSULTATION

JICA and MWR shall consult with each other in respect of any matter that may arise from or in connection with the Study.

TENTATIVE STUDY SCHEDULE

	month	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
1	dam site screening																								
2	river survey(profile and cross section)																								
3	aerial photography and ground control																								
4	photo mapping																								
5	analysis (master planning)																								
6	report presentation																								

5. 比国の基礎データ

- 面積 積 300千km²(日本の0.8倍)
- 人口(a) 50,740千人
(1982年央)
- 政体 立憲共和制
元首：フェルディナンド・E・マルコス大統領
(Ferdinand E. MARCOS)
- 民族 マレイ族を主体として、原始民族、中国人、スペイン人の混血。
- 言語 ビリビノ語(国語)。他に公用語として英語が用いられている。
多数の部族語がある。
- 宗教 ローマン・カトリック 85%、アグバイ派 3.9%、回教 4.3%、
その他 7%。
- 教育 小学校6年(義務教育)、次に高校4年。大学は学部によって就業年
限が異なる。
小学校年令層に占める就学者数(1981)^(b) : 110%
中学校 " : 63%
成人識字率(1979)^(c) : 75.0%
- 貿易^(d) 貿易額(輸出入総額) : 13,282.3百万米ドル
輸出額(FOB) : 5,019.8百万米ドル
米国, 日本, EC, ASEAN, 共産国
輸入額(CIF) : 8,262.5万米ドル
日本, 米国, サウディ・アラビア, EC, ASEAN
- 外貨準備総額^(b) 2,573百万米ドル
(1982)
- 対外公的債務残高 8,836百万米ドル(対GNP比 22.5%)
(1982年末)^(b)
- 債務返済比率^(b) 対GNP比 2.6% 対輸出比 12.8%
(1982)
- GNP(1982)^(a) 41,530百万米ドル(1人当たり 820米ドル)
- 消費者物価指数^(e) 1981 1982 1983
(1980=100) 114.6 126.0 139.0
- 会計年度 1977会計年度より暦年(1976年までは7月1日-6月30日)
- 援助の要請 技術協力

① 開発調査

各実施機関より、取りまとめ官庁であるNEDAに提出された案

件は、特に緊急なものを除いては、各年度初めに一括して、優先度を付した上でNEDAより在フィリピン各国大使館に提出される。

NEDAでは外国援助部が主管であるがインフラストラクチャのF/S等、公共事業に関連するものは、公共事業部で内容の審査を行なっているが、場合によってはNEDAが各実施機関に要請書の修正を指示することもある。

案件の採択は、毎年の年次協議で決定され、その結論を調査団とNEDAとの間でR/Dの形で記録している。

6. 収集資料リスト

6. 収集資料リスト

収集資料リスト

番号	資料名称	形態	版型	発行年月日	発行機関名又は収集先
1	フィリピン国カガヤンバンレー地域総合開発計画調査報告書	書物	A 4	1975年 2月	国際協力事業団
2	フィリピン国小水系河川総合開発計画(パンゴトコロ河洪水防衛・砂防計画) 事前調査報告書	"	"	1977年 4月	" (社研部, 開調二課)
3	フィリピン国AGNO川, BICOL川, CAGAYAN川における洪水予警報システム の総合計画設立のための調査報告書	"	"	1977年 8月	" (")
4	フィリピン国AGNO川, BICOL川, CAGAYAN川における洪水予警報システム の総合計画設立のための調査報告書付録Ⅱ(多重無線送信施設編)	"	"	1978年 3月	" (")
5	フィリピン国ルソン島カガヤン川上流・ディョドヨ水力発電開発計画調査報告書	"	"	1980年12月	" (鉱工業, 資源調査課)
6	" アイリーン港整備計画事前調査報告書	"	"	1981年 3月	" (社研部, 開調二課)
7	" アイリーン港整備計画調査報告書	"	"	1982年 3月	" (")
8	" カガヤンバンレー地域配電計画調査報告書	"	"	1977年 9月	" (鉱工業, 資源調査課)
9	" カガヤン川流域水資源総合開発計画調査報告書	"	"	1983年 2月	建設省, 国際建設技術協会
10	" マツノ川開発計画フィージビリティ調査報告書	"	"	1984年 2月	国際協力事業団(鉱工業資源課, 農計部農技課)
11	" カガヤン地域の開発と土地利用・作付方式帰国報告書	"	"	1980年11月	"
12	" 地下水かんがい計画調査報告書 中部ルソン地区	"	"	1974年 4月	海外技術協力事業団(JICAの前身)
13	" カガヤン農業総合開発フィージビリティ調査報告書	"	"	1976年 4月	国際協力事業団(農研技課)
14	" " エバリュエーション調査報告書	"	"	1982年 5月	" (")
15	" " 総合報告書	"	"	1984年11月	" (")
16	Five-Year Philippine Development Plan, 1983-1987	コピー	"	1982年 5月	National Economic Development Authority (NEDA)
17	Condensed Version of Draft Updated Philippine Development Plan 1984-1987	"	"	1984年 6月	"

収 集 資 料 リ ス ト

番号	資 料 の 名 称	形 態	版 型	発 行 年 月 日	発 行 機 関 名 又 は 政 策 先
18	Long-Term Philippine Development Plan Up to the Year 2000	書 物	A 4	1977年 9月	Cabinet Committee on the Development Plan
19	Perspective Plan for the Cagayan Valley Regional 1978-2000 Regional Debevelopment Council II	コピー	"	1976年11月	NEDA
20	The 10 Year development plan 1976-85 by Dr.Rodolfo C.Nayaga	コピー	"	1976年	Cagayan Valley Institute of technology Cabagan,Isabela
21	Regional development Issues & strategies,Philippine development planning studies	書 物	"	1978年	NEDA
22	1984 Philippine Statistical yearbook	"	"	1985	NEDA
23	フィリピンの農業 現状と開発の課題	"	"	1980年 3月	個別研究シリーズNo.3, 国際森林業協力協会
24	1982 Annual Report-National Power Corporation	パンフ レット	"	1983	NPC
25	Chico River Irrigation Project	"	"	1983年10月	NIA
26	Magat dam Inauguration	"	"	1982年10月	NIA
27	Final Report on the Flood Forecasting and Warning System in the Agno,Bicol and Cagayan River Basins Project Volume 1 Civic and telecommunication Works	コピー (製本)	"	1982年 6月	建設技術研究所 CTI Engineering Co., LTD.
28	フィリピン事情	コピー	B 5	1983年 2月	在フィリピン日本大使館
29	Cagayan: Ilagan River Basin (Region II Framework plan)	書 物	A 4	1981年12月	National Water Resources Council
30	Magat Dam, Magat Resettlement Program	パンフ レット	"	"	NIA
31	Cagayan River Basin location map of Rainfall and Water storage Gaging station	コピー	"	"	"
32	List of PAGASA Stations	コピー	"	"	"

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番号	資 料 の 名 称	形 態	版 型	発 行 年 月 日	発 行 機 関 名 又 は 収 集 先
33	Earthquake Hazard Mitigation Program for Southeast Asia, Philippine Component	コピー		1985年	Progress Report
34	Land area of Cagayan River Basin by district/municipality /Province	コピー			BFD
35	Cagayan : Ilagan River Basin (Region II Framework plan)	書 物	A 4	1981年12月	National Water Resources Council
36	" : Magat River Basin ()	"	"	"	"
37	Cagayan Valley : Chico River Basin ()	"	"	1980年12月	"
38	" : Upper Cagayan River Basin ()	"	"	"	"
39	" : Abulog River Basins ()	"	"	1980年 9月	"
40	" : Lower Cagayan Basins ()	"	"	1980年 7月	"
41	Cagayan River Flood Control Basin-Wide Study - Supplemental Report - Addenda	"	"		Philtech : Philippine Technical Consultants, INC.
42	Cagayan River Flood Control Basin-Wide Study - Volume 1 Part 1 Text - Main Report	"	"	1983年 1月	"
43	Cagayan River Flood Control Basin-Wide Study - Volume 2 b Part 1 Text - Tuguegarao River - Multi purpose Project - Feasibility Study	"	"	1983年 1月	"

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番号	資 料 の 名 称	形 態	版 型	発 行 年 月 日	発 行 機 関 名 又 は 収 集 先
44	Cagayan River Flood Control Basin-Wide Study <ul style="list-style-type: none"> • Volume 3 b Part 1 Text • Sta. Cruz River No. 2 • Multi purpose Project • Pre. Feasibility Study 	書 物	A 4	1983年 1月	Philtech : Philippine Technical Consultants, INC.
45	Cagayan River Flood Control Basin-Wide Study <ul style="list-style-type: none"> • Volume 4 Part 1 Text • Potential • Dam and Reservoir Projects • Identification Study 	"	"	1981年 7月	"
46	Cagayan River Flood Control Basin-Wide Study <ul style="list-style-type: none"> • Volume 5 • Main Cagayan River • Flood Control Scheme • Conceptual Study 	"	"	1981年 7月	"
47	Cagayan River Flood Control Basin-Wide Study <ul style="list-style-type: none"> • Appendix 1 • Hydrometeorology 	"	"	1983年 1月	"
48	Cagayan River Flood Control Basin-Wide Study <ul style="list-style-type: none"> • Appendix 2 • Topography 	"	"	1983年 1月	"

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番号	資 料 の 名 称	形 態	版 型	発 行 年 月 日	発 行 機 関 名 又 は 収 集 先
49	Cagayan River Flood Control Basin-Wide Study <ul style="list-style-type: none"> • Appendix 3 • Geology and Foundation 	書 物	A 4	1981年 7月	Philtech : Philippine Technical Consultants, INC.
50	Cagayan River Flood Control Basin-Wide Study <ul style="list-style-type: none"> • Appendix 4 • Flood Damage Studies 	"	"	1981年 7月	"
51	Cagayan River Flood Control Basin-Wide Study <ul style="list-style-type: none"> • Appendix 5 • Sociology 	"	"	1981年 7月	"
52	Cagayan River Flood Control Basin-Wide Study <ul style="list-style-type: none"> • Appendix 6 • Agricultural Project • Identification 	"	"	"	"
53	Cagayan River Flood Control Basin-Wide Study <ul style="list-style-type: none"> • Appendix 7 • Irrigation Studies • Domestic and Municipal Water Supply Studies 	"	"	"	"
54	Cagayan River Flood Control Basin-Wide Study <ul style="list-style-type: none"> • Appendix 8 • Other • Physical Developments • Community Planning • Transportation-Infrastructure 	"	"	"	"

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55	Cagayan River Flood Control Basin-Wide Study <ul style="list-style-type: none"> • Appendix 9 • Cost Estimates 	書 物	A 4	1981年 7月	Philtech : Philippine Technical Consultants, INC.
56	" <ul style="list-style-type: none"> • Volume 1 Part 2 • Regional Drawings • Main Report 	"	"	1983年 1月	"
57	" <ul style="list-style-type: none"> • Volume 26 Part 2 : Drawings • Tuguegarao River • Multipurpose Project • Feasibility Study 	"	"	"	"
58	" <ul style="list-style-type: none"> • Volume 3 b Part 2 : Drawings • Sta. Cruz River No 2 • Multipurpose Project • Pre-Feasibility Study 	"	"	"	"
59	" <ul style="list-style-type: none"> • Volume 4 Part 2 : Drawings • Potential • Dam and Reservoir Projects 	"	"	1981年 7月	"

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番号	資 料 の 名 称	形 態	版 型	発 行 年 月 日	発 行 機 関 名 又 は 収 集 先
60	Interlock For NPC Employees and Friends	雑 誌	A 4	1984 6-7月	The Public Relations Department, National Power Corporation
61	Cagayan Integrated Agricultural Development Project (CIADP年報)	"	"	"	CIADP年報
62	A Report on the Cagayan River Basin Luzon Island Philippines United States Department of the Interior Bureau of Reclamation	管 物	"	1966年12月	Educational Materials Production Fund NEC/USAID
63	Socio-Economic Profile of Cagayan Valley Region II	"	"	1984年	Development Academy of the Philippines National Council on Integrated Area Development Cagayan Integrated/Agricu- ltural Development Project
64	Socio-Economic Profile Cagayan Province	"	"	1984年	CIADP, PDS (Provincial development Staff) NEDA
65	Cagayan Valley Integrated Area Development Plan	"	"	1984年	National Council on Integrated Area Development Cagayan Integrated Agri- Cultural Development Project
66	Southeast Asia Association of Seismology and Earthquake Engineering ①.....Philippine Earthquake Epicenters ②.....Assessment of Seismic Intensity of Philippine Earthquakes ③.....Catalogue of Destructive Philippine Earthquakes	コピ-		1975年 9月 1983年 5月 1589年 1983年	

JICA