

JAPAN INTERNATIONAL COOPERATION AGENCY (JICA)
DEPARTMENT OF AGRARIAN REFORM
REPUBLIC OF THE PHILIPPINES

THE FEASIBILITY STUDY
ON
THE DEVELOPMENT OF VIABLE AGRARIAN
REFORM COMMUNITIES
IN
SOUTHERN PALAWAN

FINAL REPORT
APPENDIX I

MARCH 1995

SANYU CONSULTANTS INC.

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JAPAN INTERNATIONAL COOPERATION AGENCY (JICA)

**DEPARTMENT OF AGRARIAN REFORM
REPUBLIC OF THE PHILIPPINES**

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**FINAL REPORT
APPENDIX I**

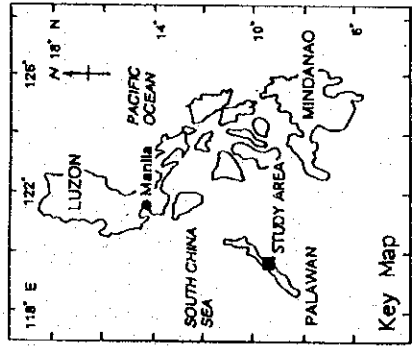
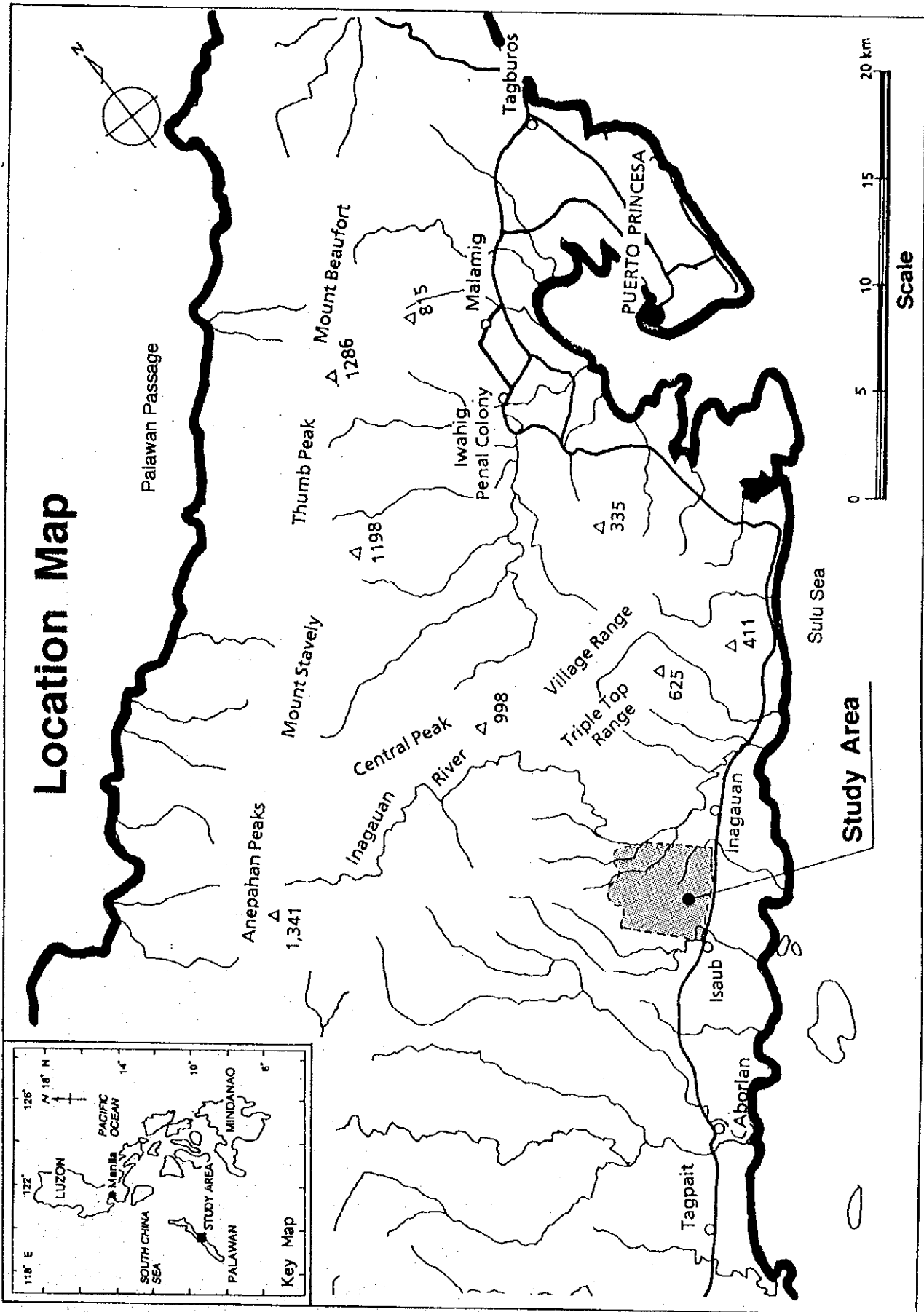
MARCH 1995

SANYU CONSULTANTS INC.

国際協力事業団

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Location Map



パラワン南部農地開発計画一般平面図

GENERAL DEVELOPMENT PLAN OF VIABLE AGRARIAN REFORM COMMUNITIES IN SOUTHERN PALAWAN

(FIRST STAGE DEVELOPMENT)

ITEM	DESCRIPTION
1) AREA	
STUDY AREA	1,929 ha
BENEFICIAL AREA	1,341 ha
IRRIGABLE AREA	590 ha
2) RESERVOIR	13.9 sq.km
RESERVOIR	0.31 MCM
N.W.S	45.0 m M.S.L
L.W.S	41.0 m M.S.L
3) IRRIGATION & DRAINAGE & ROAD FACILITIES	
IRRIGATION CANAL	
DESIGN DISCHARGE	: MAX 0.843 cum/s
CANAL LENGTH	: MAIN 4.21 km
DRAINAGE CANAL	
CANAL LENGTH	: 1.8 km
FARM TO MARKET ROAD	
ROAD LENGTH	: MAIN 11.8 km
4) VILLAGE WATER SUPPLY	
LEVEL II	: 3 VILLAGES (8 Blocks)
5) POST HARVEST FACILITIES	
WARE-HOUSE, RICE-MILL, TRANSPORTATION etc.	

WATER RESOURCES SITE (EuM)

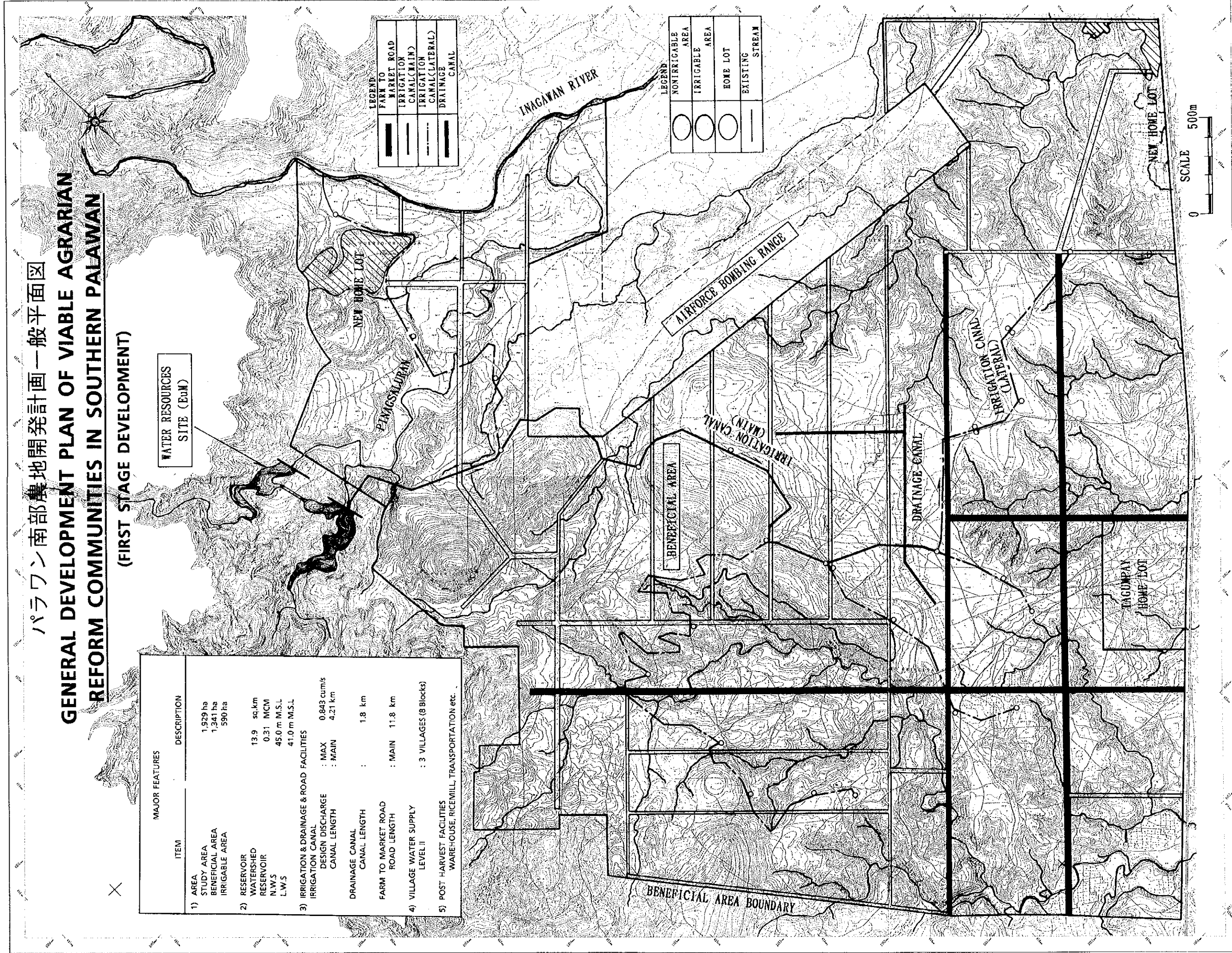
LEGEND

	FARM TO MARKET ROAD
	IRRIGATION CANAL (MAIN)
	IRRIGATION CANAL (LATERAL)
	DRAINAGE CANAL

LEGEND

	NON IRRIGABLE AREA
	IRRIGABLE AREA
	HOME LOT
	EXISTING STREAM

SCALE 0 500m



パラワン南部農地開発計画一般平面図

GENERAL DEVELOPMENT PLAN OF VIABLE AGRARIAN REFORM COMMUNITIES IN SOUTHERN PALAWAN

(SECOND STAGE DEVELOPMENT)

ITEM	DESCRIPTION
1) AREA	
STUDY AREA	1,929 ha
BENEFICIAL AREA	1,341 ha
IRRIGABLE AREA	590 ha
2) RESERVOIR	14.5 sq.km
WATERSHED	2.09 MCM
RESERVOIR N.W.S	54.0 m M.S.L
L.W.S	45.6 m M.S.L
3) IRRIGATION & ROAD FACILITIES	
IRRIGATION CANAL	
CANAL LENGTH :	LATERAL 10.5 km
FARM TO MARKET ROAD	
ROAD LENGTH :	LATERAL 29.2 km
4) POST HARVEST FACILITIES	
WAREHOUSE, RICEMILL, TRANSPORTATION etc.	

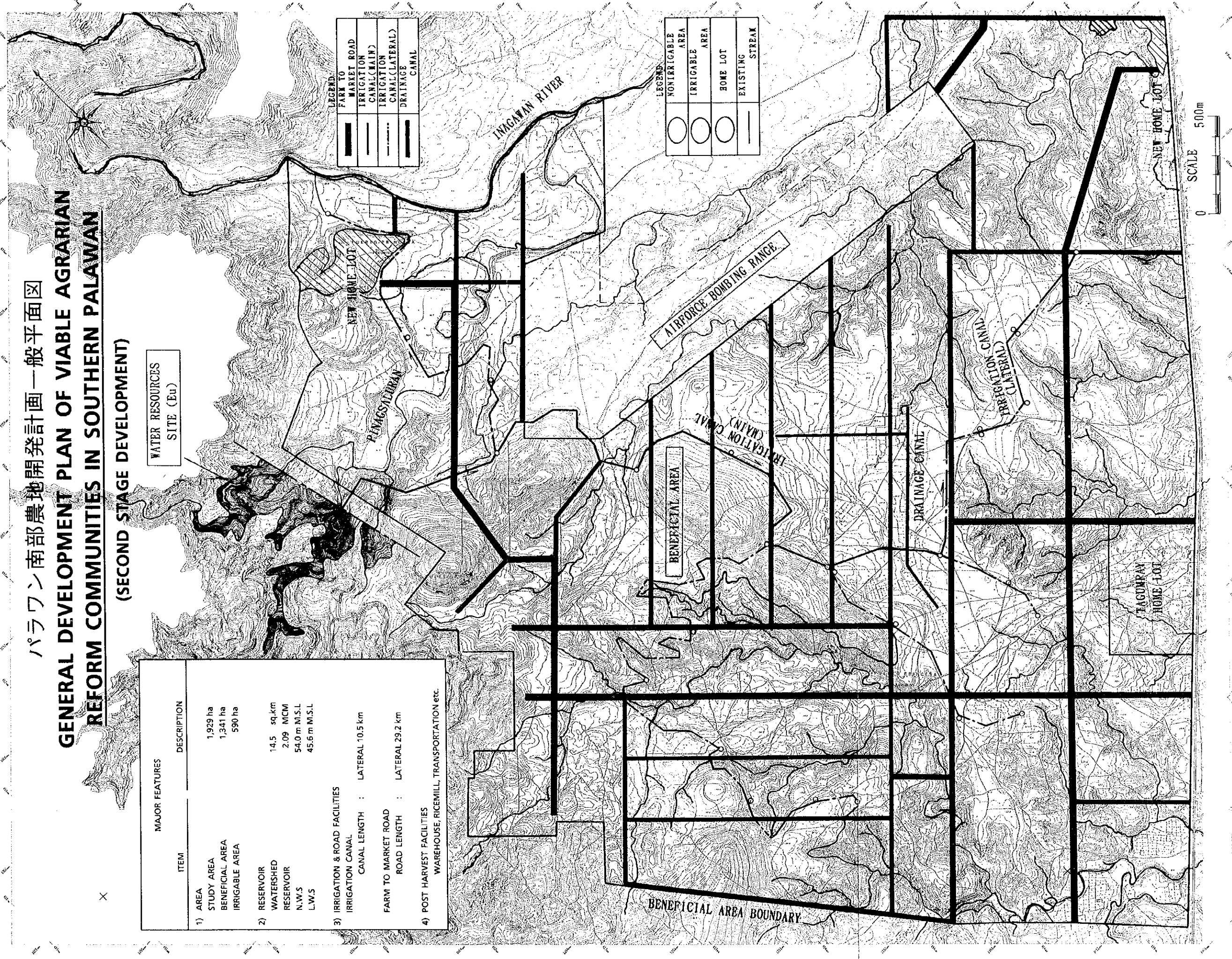
WATER RESOURCES SITE (Eu)

LEGEND:

	FARM TO MARKET ROAD
	IRRIGATION CANAL (MAIN)
	IRRIGATION CANAL (LATERAL)
	DRAINAGE CANAL

LEGEND:

	NON IRRIGABLE AREA
	IRRIGABLE AREA
	HOME LOT
	EXISTING STREAK



SCALE 500m

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ABBREVIATION, CONVERSION TABLE AND GLOSSARY

ABBREVIATION

ADB	Asian Development Bank
ATI	Agricultural Training Institute
BPA	Bureau of Power Association
BAS	Bureau of Agricultural Statistics
BAT	Bureau of Air Transportation
BCGS	Bureau of Coast and Geodetic Survey
BDT	Bureau of Domestic Trade
BFT	Bureau of Foreign Trade
BIR	Bureau of Internal Revenue
BL	Bureau of Lands
BMGS	Bureau of Mines and Geosciences
BOI	Board of Investment
BOP	Bureau of Posts
BSWM	Bureau of Soils and Water Management
BSMSI	Bureau of Small and Medium Scale Industries
BSP	Bangko Sentral ng Pilipinas
BUTEL	Bureau of Telecommunication
CARP-IC	Comprehensive Agrarian Reform Program - Irrigation Component
CARP-SIP	Comprehensive Agrarian Reform Program - Small Irrigation Project
CB/CBP	Central Bank of the Philippines
CDA	Cooperative Development Authority
CENRO	Community Environmental and Natural Resources Office - DENR
CFI	Crocodile Farming Institute, JICA
CHD	City Health Department
DA	Department of Agriculture
DAR	Department of Agrarian Reform
DARCO	Department of Agrarian Reform, Central Office
DARPO	Department of Agrarian Reform, Provincial Office
DARRO	Department of Agrarian Reform, Regional Office
DARMO	Department of Agrarian Reform, Municipal Office
DBM	Department of Budget and Management
DECS	Department of Education, Culture and Sports
DENR	Department of Environment and Natural Resources
DFA	Department of Foreign Affairs
DILG	Department of Interior and Local Government

DOF	Department of Finance
DOH	Department of Health
DOLE	Department of Labor and Employment
DOTC	Department of Transportation and Communication
DPWH	Department of Public Works and Highways
DSWD	Department of Social Welfare Development
DTI	Department of Trade and Industry
EMB	Environmental Management Bureau, DENR
FRSO	Fishery Regulatory Service Office
FORI	Forest Research Institute
IBRD	International Bank for Reconstruction and Development
IRRI	International Rice Research Institute
IMF	International Monetary Fund
JICA	Japan International Cooperation Agency
JSPS	Japan Society for Promotion of Science
LBP	Land Bank of the Philippines
LWUA	Local Water Works and Utilities Administration
MCSO	Malaria Control Services Office
MWSS	Metropolitan Waterworks and Sewerage System
NACIDA	National Cottage Industries Development Authority
NAMRIA	National Mapping and Resources Information Authority
NDC	National Development Corporation
NCSSO	National Census and Statistic Office
NEA	National Electrification Administration
NEDA	National Economic and Development Authority
NEPC	National Environmental Protection Council
NFA	National Food Authority
NHA	National Housing Authority
NIA	National Irrigation Administration
NIST	National Institute of Science and Technology
NLUC	National Land Use Committee
NMYC	National Manpower and Youth Council
NNC	National Nutrition Council
NPC	National Power Corporation
NPCC	National Pollution Control Commission
NRCP	National Research Council of the Philippines

NWRB	National Water Resources Board
OEA	Office of Energy Affairs
OECE	Overseas Economic Cooperation Fund
PAES	Palawan Agricultural Experimental Station
PAF	Philippine Air Force
PAGASA	Philippine Atmospheric, Geophysical and Astronomical Services Administration
PNAC	Philippine National Agricultural College
PCA	Philippine Coconut Authority
PCARRD	Philippine Council for Agricultural Resources Research and Development
PCCI	Philippine Chamber of Commerce and Industry
PCIERD	Philippine Council for Industry and Energy Research Development
PCGG	Presidential Commission on Good Government
PCGR	Presidential Commission on Government Reorganization
PCSDS	Palawan Council for Sustainable Development Staff (formally PIADPO)
PDC	Provincial Development Council
PEO	Provincial Engineering Office
PIADPO	Palawan Integrated Area Development Project Office
PHILRICE	Philippines Rice Institute
PHILVOCS	Philippine Institute of Volcanology and Seismology
PALECO	Palawan Electrification Corporation
PENRO	Palawan Environmental and Natural Resources Office, DENR
PNB	Philippine National Bank
PNOC	Philippine National Oil Corporation
PPA	Philippine Ports Authority
PPH	Palawan Provincial Hospital
RDC	Regional Development Council
RWDC	Rural Waterworks Development Corporation
SPIADP	Second Palawan Integrated Area Development Project
SSS	Social Security System
TBAC	Technical Board for Agricultural Credit
UP	University of the Philippines

CONVERSION TABLE

LENGTH

mm	: millimeter(s)
cm	: centimeter(s)
m	: meter(s)
km	: kilometer(s)
inch	: inch(s) = 2.54 cm
mile	: mile(s) = 1.6093 m

AREA

sq.mm	: square millimeter(s)
sq.cm	: square centimeter(s)
sq.m	: square meter(s)
sq.km	: square kilometer(s)
ha	: hectare(s)

WEIGHT

mm.gr	: milligram(s)
gr	: gram(s)
kg	: kilogram(s)
ton	: ton(s)
ounce	: ounce(s) = 28.350 gr

CAPACITY

lit	: liter(s)
cu.m	: cubic meter(s)
gallon	: gallon(s) = 3.785 lit
MCM	: million cubic meter(s)
cavan	: cavan(s) = 50 kg of palay

DISCHARGE

lps	: liter per second
cms	: cubic meter per second (or cu.m/sec)
cu · fsec	: cubic foot per second
lpd	: liter per day

VELOCITY

mm/sec	: millimeter per second
cm/sec	: centimeter per second
m/sec	: meter per second
km/hr	: kilometer per hour
knot	: knot(s) = 1.86 km/hr

sec	: second(s)
min	: minute(s)
hr	: hour(s)
Max. or max.	: maximum
Min. or min.	: minimum

%	: percent
No.	: number
°C	: degree(s) centigrade
Hp	: horse power(s)
w	: watt(s)

KW	:	kilowatt(s)
MW	:	megawatt(s)
WH	:	watt(s) hour
KWH	:	kilowatt(s) hour
EL	:	elevation
MSL	:	mean sea level
FWL	:	full water level
HWL	:	high water level
LWL	:	low water level
ET	:	evapotranspiration
mm/day	:	millimeter(s) per day
ETcrop	:	evapotranspiration of crop
N	:	nitrogen
P	:	phosphate
K	:	potassium
LV	:	local variety
LIV	:	local improved variety
HYV	:	high yielding variety
O&M	:	operation and maintenance
EIRR	:	economic internal rate of return
MT	:	metric ton(s)
B/S	:	benefit - cost ratio
FY	:	fiscal year (1st of January to end of December)
Peso	:	peso(s), unit of local currency
		peso = US\$ 0.03891 (as of September 27, 1994)
US\$:	dollar(s) = 25.70 pesos (as of September 27, 1994)

GLOSSARIES

Study Area	: Area of about 2,000 ha consisting of the Tagumpay and its outlying areas
Province	: Political subdivision of the country comprising municipality(s) and city(s)
Municipality	: Political subdivision of a province comprising barangay
Barangay	: Political subdivision of a municipality comprising sitio
Sitio	: Minimum unit of political subdivision
Poblacion	: Political center of a town
Monsoon	: Predict wind that blows from the sea to the continent and opposite in Winter
Trade Wind	: One of three Philippines air currents, comprising from a generally easterly direction reaching the island during the period from February to April
IR	: High yielding variety of palay which bears variety from IRRI
Palay	: Paddy, unhusked rice, sometimes called rough rice (<i>Oryza Sativa</i>)
Cogon	: Coarse grass which usually covers idle land or abandoned clearing (<i>Imperata cylindrica</i>)
Ganta	: Common unit of volume for rice equivalent to 2.24 kg of milled rice
Nipa	: Heavy leafed type of palm used in hatching huts
Share tenant	: A practice where operators rent the land they work and pay as rent a share of a cash or crops grown
Carabao	: The animal that most farmers use for plowing and other farming works. It is about the size of an ox and is similar to the water buffalo in other countries.
Fiesta	: Spanish term for feast, celebrated pompously once a year to honor the patron saint.
Kaingin	: Deforestation by shifting cultivation with slashing and burning forest/brush
Survival Rate	: The number who graduate/the number who enroll

APPENDIX A. GENERAL

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Appendix A.1 Implementing Arrangement and Others

A.1.1 Implementing Arrangement

IMPLEMENTING ARRANGEMENT

ON

THE TECHNICAL COOPERATION

FOR

THE FEASIBILITY STUDY

ON

THE DEVELOPMENT OF VIABLE AGRARIAN REFORM COMMUNITIES IN SOUTHERN PALAWAN

IN

THE REPUBLIC OF THE PHILIPPINES

AGREED UPON BETWEEN

DEPARTMENT OF AGRARIAN REFORM

AND

JAPAN INTERNATIONAL COOPERATION AGENCY

METRO MANILA, 24 MARCH 1993

Ernesto D. Garilao
MR. ERNESTO D. GARILAO
Secretary,
Department of Agrarian
Reform

Masaru Sasaki
MR. MASARU SASAKI
Leader,
Preparatory Study Team,
Japan International
Cooperation Agency

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 the Feasibility Study on the Development of viable Agrarian reform Communities in Southern Palawan in the Republic of the Philippines (hereinafter referred to as "the Study"), and exchanged the Notes Verbals with GOP concerning the implementation of the Study.

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, Department of Agrarian Reform (hereinafter referred to as "DAR"), shall act as the counterpart agency to the Japanese study team and also as the 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 arrangements between JICA and DAR under the above mentioned Notes Verbals exchanged between two governments.

II. OBJECTIVES OF THE STUDY

The objectives of the Study are:

1. to formulate a feasibility study on the agricultural development plan for Tagumpay Settlement and its outlying areas in southern Palawan; and
2. to carry out technology transfer to the Philippine counterpart personnel in the course of the Study.

III. THE STUDY AREA

The Study covers an area of approximately 2,000ha including the 1,066ha Tagumpay Settlement area which was transferred from the Department of Justice to DAR.

IV. SCOPE OF THE STUDY

The Study will consist of three(3) works and will cover the following items.

1. Work I

1.1. Collection and analysis of the following data and information, through the field survey on the following:

- (1) natural condition (topography, meteorology, hydrology, geology, soil, water quality, and, water resources);
- (2) social condition (population, regional socio-economy, social infrastructure, education, and regional development plan);
- (3) agriculture (land use, land tenure, cultivation technique, cropping pattern, yield, production, agricultural machinery, and livestock);

MS

MS

(4) agro-economy (farmers economy, agricultural credit, processing, and marketing system);

(5) agricultural infrastructure (water source, irrigation and drainage system, farm road, and rural water supply);

(6) agricultural supporting system (farmers' organizations, supporting organizations, and extension service organizations); and

(7) environmental condition (natural condition, and social condition).

1.2. Identification and evaluation of the development potentials of water and land resources and constraints based on the results of the above survey.

2. Work II

Preparation of a topographic map covering the Study area at the scale of 1/4,000 based on aerial photography and ground control survey.

3. Work III

3.1. Field survey for collection of supplementary data and information of the Study areas.

3.2. Formulation of the agricultural development plan of the Study areas by considering the following components:

(1) Land use;

(2) Cropping pattern;

(3) Farming system;

(4) Water source;

(5) Irrigation and drainage;

(6) Rural infrastructure;

(7) Post harvest and marketing system; and

(8) Farmers' organization and supporting service.

3.3. Preparation of environmental conservation plan.

3.4. Preparation of a preliminary design of the main facilities.

3.5. Formulation of operation and maintenance plan.

3.6. Preparation of the project implementation schedule.

3.7. Estimation of the project costs and benefits.

3.8. Overall evaluation of the project

3.9. Recommendation.

V. STUDY SCHEDULE

The Study will be executed in accordance with the tentative schedule shown in the Annex.

VI. REPORT

JICA will prepare and submit the following reports in English to GOP.

1. Inception Report

Twenty (20) copies at the commencement of the Work I field work.

2. Progress Report (1)

Twenty (20) copies at the end of the Work I field work.

3. Interim Report

Twenty (20) copies at the commencement of the Work III field work.

4. Progress Report (2)

Twenty (20) copies at the end of the Work III field work.

5. Draft Final Report

Twenty (20) copies at the end of the Work III home office work. GOP provides JICA with its comments on the Draft Final Report within one (1) month after receipt of the Draft Final Report.

6. Final Report

Fifty (50) copies within one (1) month after receiving GOP's comments on the Draft Final Report.

VII. UNDERTAKING OF GOP

In accordance with the Notes Verbals exchanged between GOJ and GOP, GOP shall accord privileges, immunities and other assistance to the Japanese team through the Study.

1. 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 and 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.

2. D.A.R. shall, at its own expense, provide the Japanese study team with the following, if necessary, in cooperation with other agencies concerned:

(1) available data and information related to the Study,

(2) counterpart personnel,

(3) suitable office space with necessary equipment in Metro Manila, and

TENTATIVE SCHEDULE

Item	Month	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
Work I in Philippines																				
Work I in Japan																				
Work II Topographic Mapping																				
Work III in Philippines																				
Work III in Japan																				
Submission of Report																				

(Note) Ic/R : Inception Report
 P/R (1) : Progress Report (1)
 Iu/R : Interim Report
 P/R (2) : Progress Report (2)
 Df/R : Draft Final Report
 F/R : Final Report

- (4) credentials or identification cards to the members of the Japanese study team.
- 3. DAR shall make necessary arrangements with other governmental and non-governmental organizations concerned for the following:
 - (1) to secure the safety of the Japanese study team;
 - (2) to permit the members of the Japanese study team to enter, leave and sojourn in the Philippines for the duration of their assignment therein;
 - (3) to exempt the members of the Japanese study team from taxes, duties, fees and any other charges on equipment, machinery and other materials brought into the Philippines for the conduct of the Study;
 - (4) to exempt the members of the Japanese study team from income tax and charges of any kind imposed on or in connection with any emoluments or allowances paid to the members of the Japanese study team for their services in connection with the implementation of the Study;
 - (5) to provide necessary facilities to the Japanese study team for the remittance as well as utilization of the funds introduced into the Philippines from Japan in connection with the implementation of the Study;
 - (6) to secure permission for entry into private properties or restricted areas for the conduct of the Study;
 - (7) to secure permission to take all data and documents (including diapositive film and photographs) related to the Study out of the Philippines to Japan by the Japanese study team; and
 - (8) to provide medical services as needed and its expenses will be chargeable on the members of the Japanese study team.

VIII. UNDERTAKING OF GOJ

- In accordance with the Notes Verbals exchanged between GOJ and GOP, GOJ through JICA shall take the following measures for implementation of the Study:
1. to dispatch, at its own expense, study teams to the Philippines;
 2. to pursue technology transfer to the Philippines counterpart personnel in the course of the Study; and
 3. to provide the necessary equipment and machinery for the implementation of the Study, which will remain the property of GOJ unless otherwise agreed.

IX. CONSULTATION

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






MINUTES OF MEETING
ON
IMPLEMENTING ARRANGEMENT
FOR
THE FEASIBILITY STUDY
ON
THE DEVELOPMENT OF VIABLE AGRARIAN REFORM COMMUNITIES
IN
SOUTHERN PALAWAN
IN
THE REPUBLIC OF THE PHILIPPINES

The preparatory study team (hereinafter referred to as "the Team") organized by the Japan International Cooperation Agency (hereinafter referred to as "JICA"), and headed by Mr. MASARU SASAKI, visited the Philippines from March 14 to March 25, 1993 for the purpose of discussing and confirming the Implementing Arrangement for the Feasibility Study on the Development of Viable Agrarian Reform Communities in Southern Palawan in the Republic of the Philippines (hereinafter referred to as "the Study").

The Team had a series of discussions with the officials concerned of Department of Agrarian Reform (hereinafter referred to as "DAR") and other organizations on the Implementing Arrangement for the Study. The list of participants of the meeting is attached in the ANNEX.

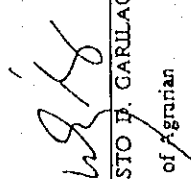
As a result of the discussions, the Team and DAR agreed on the Implementing Arrangement for the Study.


The following are the main issues discussed and agreed upon by both sides in relation to the Implementing Arrangement for the Study.

1. DAR shall investigate water discharge at proper three sites of the Inagauan River twice a month and summarize the data for the following period:
 - from the time the necessary equipment are installed to the commencement of the Study
 - from the end of the field survey of Work I to the commencement of the field survey of Work III
2. Both sides agreed that topographic maps at the scale of 1/4,000 will be prepared for an area of approximately 30 km² covering the Study area based on an aerial photography and ground control survey.

3. DAR shall make necessary arrangements/procedures to concerned government agencies and organizations for the preparation of topographic maps of the Study area on a request of the Japanese study team.
4. DAR shall prepare, at its own expense, the Project Description and Environmental Impact Statements if necessary, according to the Philippine laws and regulations. Japanese study team shall provide DAR with basic data and information on environmental issues in the course of the Study.
5. DAR expressed concern over the sustainability of the project and emphasized the need to prepare and organize the project beneficiaries to operate, manage and maintain the project facilities. JICA agreed to direct the study to look into that aspect.
6. The study area covers around 2,000 ha consisting of the Tagumpay Settlement area (1,066 ha) and the adjoining areas under negotiation with Department of Justice. If the area under the Department of Justice is not transferred to DAR within the Work I Study period, the project formulation will be limited to the Tagumpay Settlement area.
7. DAR requested that the following equipment necessary for the Study be procured by JICA and be donated to the DAR after the termination of the Study:
 - vehicles;
 - personal computer sets;
 - photocopy machines; and
 - survey equipments.
8. The Team promised to convey its request to the Government of Japan. The team promised to convey its request to the Government of Japan.

MEIRO MANILA, 24 MARCH 1993


MR. ERNESTO B. GARLAO
Secretary
Department of Agrarian
Reform


MR. MASARU SASAKI
Leader,
Preparatory Study Team,
Japan International
Cooperation Agency





LIST OF PARTICIPANTS

1. Philippine Side

Department of Agrarian Reform Mr. PERCIVAL DALUGDUG Ms. MA. ISABEL L. PEREZ Ms. JEAN M. FORNOLES Ms. MYLENE L. ZERNA Ms. BASILIA NORADA Mr. LEANDRO A. CAYMO Mr. STEPHEN SEVIDAL Mr. EDGARDO R. REBUCAS Mr. MASAHIRO YAGI	Director, DAR Region IV Director III, Project Management Services (PMS), DAR Project Development Officer, PMS, DAR Project Development Officer, PMS, DAR Chief, Bureau of Land Development, DAR Chief Agrarian Reform Programme Officer (CARPO), DAR Palawan CARPO, DAR Region IV Senior Agrarian Reform Officer, DAR Region IV Colombo Plan Expert
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2. Japanese Side

Preparatory Study Team Mr. MASARU SASAKI Mr. AKIRA NAGATA Mr. SHIGEMITSU TSUKAMOTO Mr. YUICHI FUKASAKA Mr. HIDEHIKO HIOKI	Leader Member Member Member Member
--	--




A.1.2. LIST OF PERSONNEL CONTACTED DURING THE STUDY

a) Department of Agrarian Reform (DAR)

1) Central Office

Secretary Ernesto D. Garilao : Secretary
 Ms. Susan Leones : Director, DAR, BARBD
 Ms. Amelia Cosca : Chief, Resource Mobilization Division, PDMS
 Ms. Jean M. Fornoles : PDO IV, DAR, PDMS

2) Regional Office

Mr. Percival Dalugdug : Regional Director
 Mr. Plaridel Vera Cruz : EA-V

3) Provincial Office

Mr. Ricardo S.A. Fransisco : PARO OIC
 Mr. Rolly San Juan : Programmer
 Mr. Hector S. Herrera : Agrarian Reform Statistician

b) National Economic Development Authority (NEDA)

1) Central Office

Dr. Josefina U. Esguerra : Director, Public Investment Staff
 Mr. Jose R. Castillo : Economist, PDD

2) Regional Office IV

Mr. Catalino S. Boquiren : Regional Director, Region IV (formerly, Ms. Lirio Y. Calixto)
 Mr. Oskar D. Balbastro : Director III, Region IV
 Ms. Liberty Abelon : OIC, Economic Development Division
 Ms. Elenore Cousart : Chief, Social Development Division
 Mr. Edilberto Ramirez : Chief, Infrastructure Development Division
 Mr. Fidel Udarbe : Desk Officer, Palawan Province
 Ms. Erlinda Creencia : Senior Economic Development Officer

c) National Irrigation Administration (NIA)

1) Central Office

Eng. Edilberto B. Punzal : Manager, (OIC), PDD

Eng. Felixberto Payawal : Manager, SMD

2) Provincial Office

Eng. Rodolfo H. Marasigan : Provincial Irrigation Irrigation Engineer, PIO
 Eng. Lebrito D. Aneron : Asst. PIO
 Mr. Rogelio Java : Planning Engineer

4) NIA-CARP

Eng. Rogelio Rotoni : Director, NIA-CARP
 Eng. Rey C. Adao : Asst. Project Manager

5) NIA-SPIADP-IC

Eng. Dante P. Balino : Project Manager, PMO

6) NIA, NARRA

Eng. Ramon Perdido : Chief
 Eng. Carmelo Estorillo : Irrigation Superintendent

d) Department of Agriculture (DA)

1) Palawan Office

Mr. Cesar S. Pereyra : Director, SPIADP
 Mr. Carlos G. Macolor : Chief, Fishery Regulatory Service, Puerto Princesa
 Mr. Narciso A. Nery : Agronomist, Palawan

2) Agricultural Training Institute (ATI)

Mr. Ismael Jerry C. Fermo : Training Center Superintendent II

3) Palawan Agricultural Experimental Station

Mr. Nestor Torres : Superintendent
 Ms. Librada L. Fuentes : DA-ROS
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- Mr. Cesar S. Siador, Jr. : Chemical Engineer, Environmental Management Bureau
 Mr. Salvador J. Martin : Director, Mines Geosciences Bureau
 Mr. Aniano D. Torres : Supervision Geologist, Mines Geosciences Bureau
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 Mr. Red Antonio G. Prinsepe :
- 3) Provincial Office (PENRO)
 Mr. Armando P. Putaqui : Provincial Environmental and Natural Resources Officer
 Mr. Arthur B. Palatino : Sr. Environmental Management Specialist
 Ms. Priscilla L. Adriano : Ecosystem Management Specialist
 Mr. Bernardo S. Francisco : Sr. Forest Management Specialist
- 4) Community Office
 Mr. Felipe C. Ortiz : Community Environmental and Natural Resources Officer
 Mr. Greg Bautista : OIC, Forest Management Service, Forester II
- g) Inagawan Penal Colony
 2) Inagawan Penal Colony
 Mr. Andres O. Obed : Penal Supervisor
- h) Department of Health (DOH)
 1) City Health Office
 M.D. Juanito V. Duenas :
 Ms. Jianchon :
 i) Malaria Control Service
 M.D. Andres S. Cubacub : Chief, Technical Division, Regional Health
 Mr. Wendell B. Magalit : Provincial Staff
- j) Inagawan Irrigation Service Association
 Mr. Jaime Carbonel : President
- k) Provincial Government
 Mr. Salvador P. Socrates : Governor
 Ms. Josephine C. Escano : Office of the Planning and Department
- l) Puerto Princesa City
 Mr. Edward S. Hagerdon : Mayor
 Mr. Angel P. Padon : Div. Coordinator, City Planning Div.
 Ms. Melissa U. Macasaet : City Agriculturist
 Mr. Lorenzo Cervancia : City Agriculturist
- m) PAGASA
 Mr. Leonie Lopez : Senior Meteorologist, Aborlan, PNAC
 Ms. Theima E. Abedes : Staff
- n) PHIVOLCS
 Mr. Enrico A. Mangao : Staff
- o) SPIADP
 Mr. Angel P. Padon : Staff
 Mr. Faviel F. Yayen : Administrative Officer III
 Ms. Linda Bacosa : Staff
- p) Land Bank
 Mr. Fernando A. De Los Reyes : Chief Loans and Credit Officer
- q) Palawan National Agricultural College (PNAC)
 Dr. Godofredo F. Ferriol : Vice President for Extension
- r) Bureau of Statistics (BAS) Palawan
 Mr. Rodolfo M. Bergones : Director
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- s) Water District, Palawan (LWUA)
 Mr. David Dacanay : General Manager
 Mr. Deogracias P. Caperal : Board Chairman
- t) PALECO
 Ms. Lolita Carbonell : Manager OIC
 Mr. Rodrigo C. Reginio : Staff
 Mr. Nicasio A. Elauria : Technical Service Dept.
 Mr. Tonni Gesta : Construction Eng.

u) National Power Cooperation (NPC)

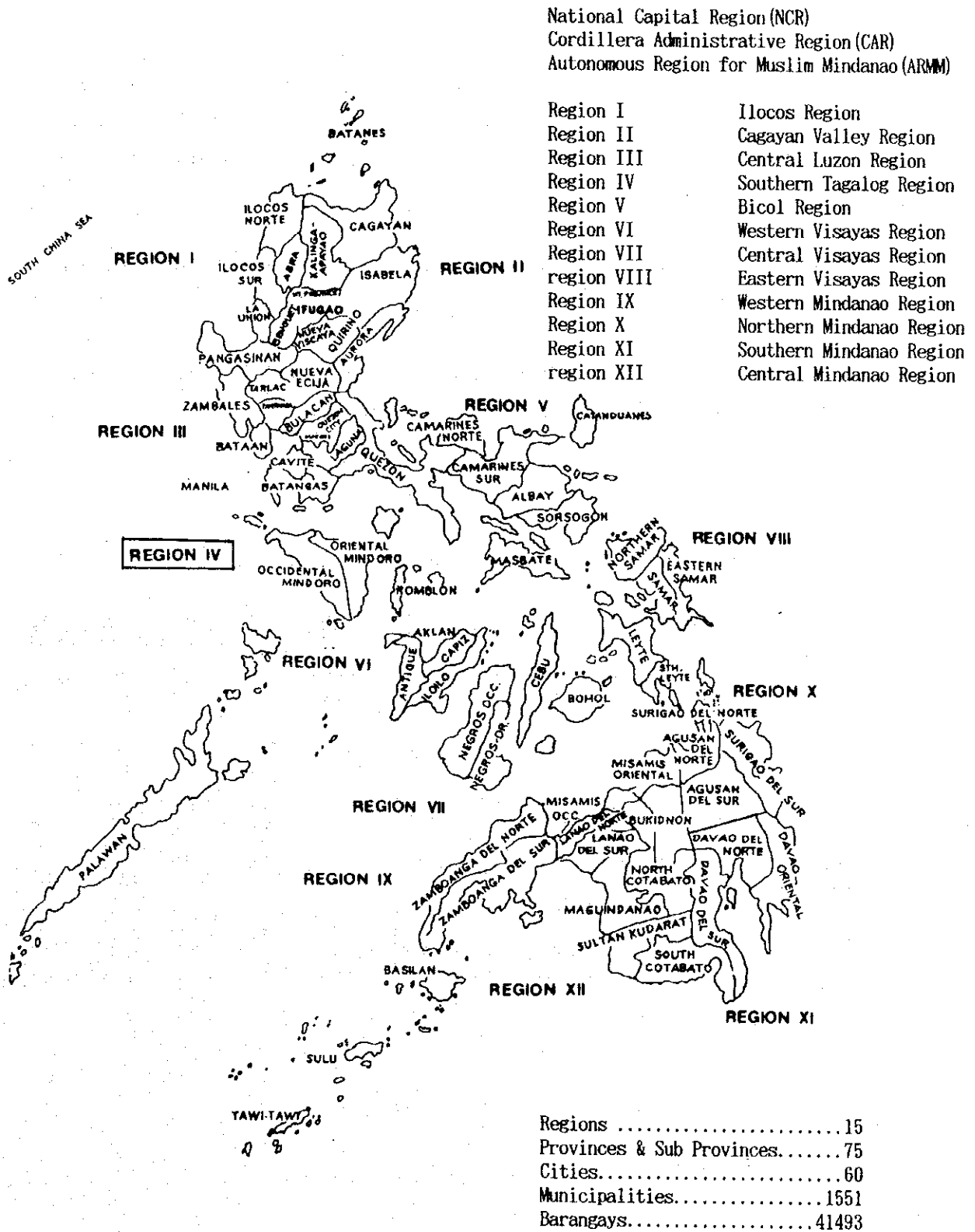
Mr. Teodoro V. Largo : Administrative Chief
Ms. Elisa P. Calisa : Chief, Project Planning
Division
Ms. Gloria O. Faronila : Dt. Agriculturist, Water-
shed Management Dept.

v) National Food Authority (NFA), Palawan

Ms. Marita F. Abadilla : GOA-I

A. 2. Background of the Study

Regional Delineation



A. 2. 1. Outline of the National Economy

In 1984 and 1985, the Philippine economy experienced the worst economic and financial crisis since its post war history. However, the economy started to recover with an economic growth of 3.4% in 1986 and steadily increased to 6.8% in 1988.

In 1991, however, the economy recorded negative growth rates because of the gulf war, oil crisis and various calamities.

Per capita GDP in 1990 was 715 US\$ (17,300 pesos), while unemployment rate in 1992 was 8.6% (refer to Table A. 2. 1).

Table A.2.1. Economic Indicators of the Philippines

		1983	1984	1985	1986	1987	1988	1989	1990	1991	1992
GDP (Million Pesos)	at Current Price	369,077	524,481	571,883	608,887	682,764	799,182	925,444	1,073,098	1,244,741	1,338,421
	at Constant 1985 Price	665,717	616,962	571,883	591,423	616,923	658,581	699,448	718,069	712,316	710,396
	Growth Rate (%)	1.9	-7.3	-7.3	3.4	4.3	6.8	6.2	2.7	-0.8	-0.3
Wholesale Price Index (1978=100)	Metro Manila	208.0	346.5	409.3	410.6	444.0	498.5	550.7	607.5	689.3	720.1
	Annual Change (%)	16.2	66.5	18.2	0.3	8.1	12.3	10.5	10.3	13.5	4.5
Balance of Payment	Export	5,005	5,391	4,629	4,842	5,720	7,074	7,821	8,186	8,840	9,824
	Import	-7,487	-6,070	-5,111	-5,044	-6,737	-8,159	-10,419	-12,206	-12,051	-14,519
	Services	-740	-823	26	783	0	-80	303	618	1,351	2,879
	Transfer	472	386	379	441	573	775	830	714	827	817
	Balance	-2,750	-1,116	-77	-1,022	-444	-390	-1,465	-2,688	-1,033	-999
Labour Force (1000)	Total	20,130	20,756	21,239	22,072	22,880	23,452	23,859	24,525	25,246	26,940
	Employed	18,543	18,550	18,967	19,631	20,795	21,498	21,849	22,532	22,980	24,618
	Unemployed	1,587	2,206	2,362	2,441	2,085	1,954	2,010	1,993	2,266	2,322
	Unemployed Rate (%)	7.9	10.6	11.1	11.1	9.1	8.3	8.4	8.1	9.0	8.6

Source: Statistical Yearbook, NSCB

A. 2. 2. Poverty Incidence of Families

In 1991 poverty incidence in the Philippines was 40.7%, experiencing a per capita poverty threshold income of 7,350 peso per year. About 70% of these poor families live in rural areas and are mainly engaged in agricultural production.

Poverty incidence in the Palawan province is estimated at 38% as of 1991 (refer to Table A. 2. 2).

Table A.2.2. Poverty Incidence

	1988			1991		
	Annual Per Capita Poverty Threshold (pesos)	Magnitude of Families	Incidence (%)	Annual Per Capita Poverty Threshold (pesos)	Magnitude of Families	Incidence (%)
Philippines	4,777	4,230,484	40.2	7,350	4,879,620	40.7
NCR	6,576	310,284	21.6	9,471	245,018	14.9
Area Outside NCR	4,489	3,920,200	43.1	7,004	4,634,602	44.9
CAR	5,116	89,572	41.9	6,574	85,666	37.6
Region I	4,934	280,344	44.9	8,123	332,014	49.4
Region II	4,573	177,072	40.4	7,072	210,977	43.1
Region III	5,242	304,313	29.3	8,293	394,612	33.0
Region IV	4,832	527,360	41.1	8,083	613,452	38.0
Region V	4,144	402,522	54.5	6,476	461,776	56.1
Region VI	4,344	472,909	49.4	6,545	499,975	46.7
Region VII	3,711	388,571	46.8	5,650	383,210	42.4
Region VIII	3,818	292,953	48.9	5,240	269,471	40.7
Region IX	3,793	208,710	38.7	6,957	329,525	54.5
Region X	4,523	279,900	46.1	6,564	378,170	55.2
Region XI	4,876	318,117	43.1	6,529	394,416	47.5
Region XII	4,147	177,807	36.1	6,913	281,339	51.0

Source: Statistical Yearbook, 1993, NSCB

A. 2. 3. Employment

Agriculture, fisheries and forestry still accounts for about 45% of total employment at the national level and 37% at Region IV in 1992 (refer to Table A. 2. 3).

Table A. 2. 3. Employed Persons by Major Industry (1992)

Industry	(1000)								
	Total	NCR	CAR	Region 1	Region 2	Region 3	Region 4	Region 5	Region 6
Industry	23917	2905	498	1321	1054	2215	3168	1772	2184
Agriculture, fishery and forestry	10869	36	332	693	669	740	1174	968	1192
Mining and quarrying	143	4	33	5	1	8	12	28	7
Manufacturing	2546	627	11	103	61	285	528	175	154
Electricity, gas and water	92	18	2	4	2	11	14	10	9
Construction	1035	190	14	64	20	176	195	63	57
Wholesale and retail trade	3283	619	30	140	95	341	436	218	294
Transportation, storage and communication	1221	258	12	72	33	157	208	61	81
Financing, insurance, real estate and bussiness services	452	199	2	13	7	50	62	15	25
Community, social and personel services	4254	954	62	225	165	443	538	233	367
Not defined	21	-	1	3	1	6	1	2	-

Industry	(1000)					
	Region 7	Region 8	Region 9	Region 10	Region 11	Region 12
Industry	1827	1332	924	1518	1743	845
Agriculture, fishery and forestry	861	807	557	882	950	530
Mining and quarrying	9	3	8	10	17	-
Manufacturing	205	79	37	102	107	44
Electricity, gas and water	5	5	4	4	4	2
Construction	95	35	22	34	55	14
Wholesale and retail trade	269	148	111	180	249	111
Transportation, storage and communication	76	49	44	76	61	27
Financing, insurance, real estate and bussiness services	20	11	6	16	23	3
Community, social and personel services	283	195	131	215	275	114
Not defined	4	1	2	-	-	-

Source: NSO

A. 2. 4. CARP

The CARP is the agrarian reform system distributing three (3) hectares of land to landless farmers and farmers who own less than three (3) hectares. Though agrarian reform has always been a program of the government since 1955, CARP itself commenced on June 1988.

The Project Area in Palawan province is one of the CARP areas owned by the government.

The Government has projected to distribute 5.5 million hectares of land nationwide within a period of ten (10) years from 1987 to 1997 (refer to table A. 2. 4).

As of July 1994, accomplishment of land distribution under the CARP in Region IV was 145,417 ha, equivalent to about 35% of the total land to be distributed under CARP in the region (refer to Table A. 2. 5.).

In the Palawan province, where the Project Area is located, 26,923 ha were distributed to 8,665 farmers as of December 1993, Equivalent to 57 % of the total provincial coverage (refer to Table A. 2. 6).

Table A.2.4. Projected CARP by Region(1987-1997)

	Phase I Area (ha)	Phase II Area (ha)	Phase III Area (ha)	Total Area (ha)
Philippines	1,149,353	1,596,313	2,760,171	5,505,837
CAR	29,651	25,114	35,329	90,094
Region 1	27,280	18,416	59,040	104,736
Region 2	116,254	65,140	101,381	282,775
Region 3	232,833	111,641	102,435	446,909
Region 4	67,577	142,533	239,216	449,326
Region 5	103,636	262,003	444,164	809,803
Region 6	86,984	286,745	287,769	661,498
Region 7	51,829	82,203	184,001	318,033
Region 8	53,254	70,445	273,280	396,979
Region 9	38,595	76,255	285,711	400,561
Region 10	152,320	105,365	206,217	463,902
Region 11	53,172	109,971	352,684	515,827
Region 12	135,968	240,482	188,944	565,394

Source: DAR

Table A.2.5. Accomplishment of CARP in the Region IV
(as of July 1994)

	(Unit:ha)								
	Scope				Accomplishment				Balance
	Phase I	Phase II	Phase III	Total	Phase I	Phase II	Phase III	Total	
Aurora	4,591	3,753	317	8,661	1,895	4,018	0	5,913	2,748
Batangas	14,273	12,142	24,857	51,272	12,142	8,787	0	20,929	30,343
Cavite	4,782	2,490	13,211	20,483	3,310	624	0	3,934	16,549
Laguna	3,802	4,013	12,404	20,219	3,770	2,754	0	6,524	13,695
Marinduque	42,732	1,399	4,934	49,065	4,156	251	0	4,407	44,658
Occ. Mindoro	15,872	7,320	12,149	35,341	14,504	5,873	0	20,377	14,964
Or. Mindoro	11,658	2,114	24,195	37,967	10,667	445	0	11,112	26,855
Palawan	11,797	23,214	13,562	48,573	9,705	19,737	0	29,442	19,131
Quezon I	5,636	13,540	24,775	43,951	4,329	9,759	0	14,088	29,863
Quezon II	13,469	13,185	25,611	52,265	10,010	6,200	0	16,210	36,055
Rizal	5,227	10,736	8,361	24,324	4,236	6,788	0	11,024	13,300
Romblon	4,283	5,553	10,098	19,934	1,115	342	0	1,457	18,477
Total	138,122	99,459	174,474	412,055	79,839	65,578	0	145,417	266,638

Source: DAR

Table A.2.6. Accomplishment of CARP in the Palawan
(as of December 1993)

Municipality	Scope			Cumulative as of Dec. 1993		Balance (ha)
	Area (ha)	Area (ha)	Farmer/Beneficiaries	Farmer/Beneficiaries		
Aborlan	1,682	1,239	625		443	
Balabac	1,775	654	222		1,121	
Bataraza	4,698	738	297		3,960	
Brook's Point	2,158	944	400		1,214	
Busuanga	297	17	5		280	
Coron	4,286	135	86		4,151	
Cuyo	19				19	
El Nido	573	33	26		540	
Narra	19,333	18,629	4,851		704	
Araceli	36				36	
Dumaran	633	6	2		627	
P.P. City	5,945	2,215	1,086		3,730	
Roxas	2,299	979	533		1,320	
Quezon	1,603	69	33		1,534	
Rizal	152				152	
San Vicente	100				100	
Taytay	1,319	1,265	499		54	
Total	46,908	26,923	8,665		19,985	

Source: DAR, Palawan

Figure A.2.1. Organization Chart-DAR Head Office

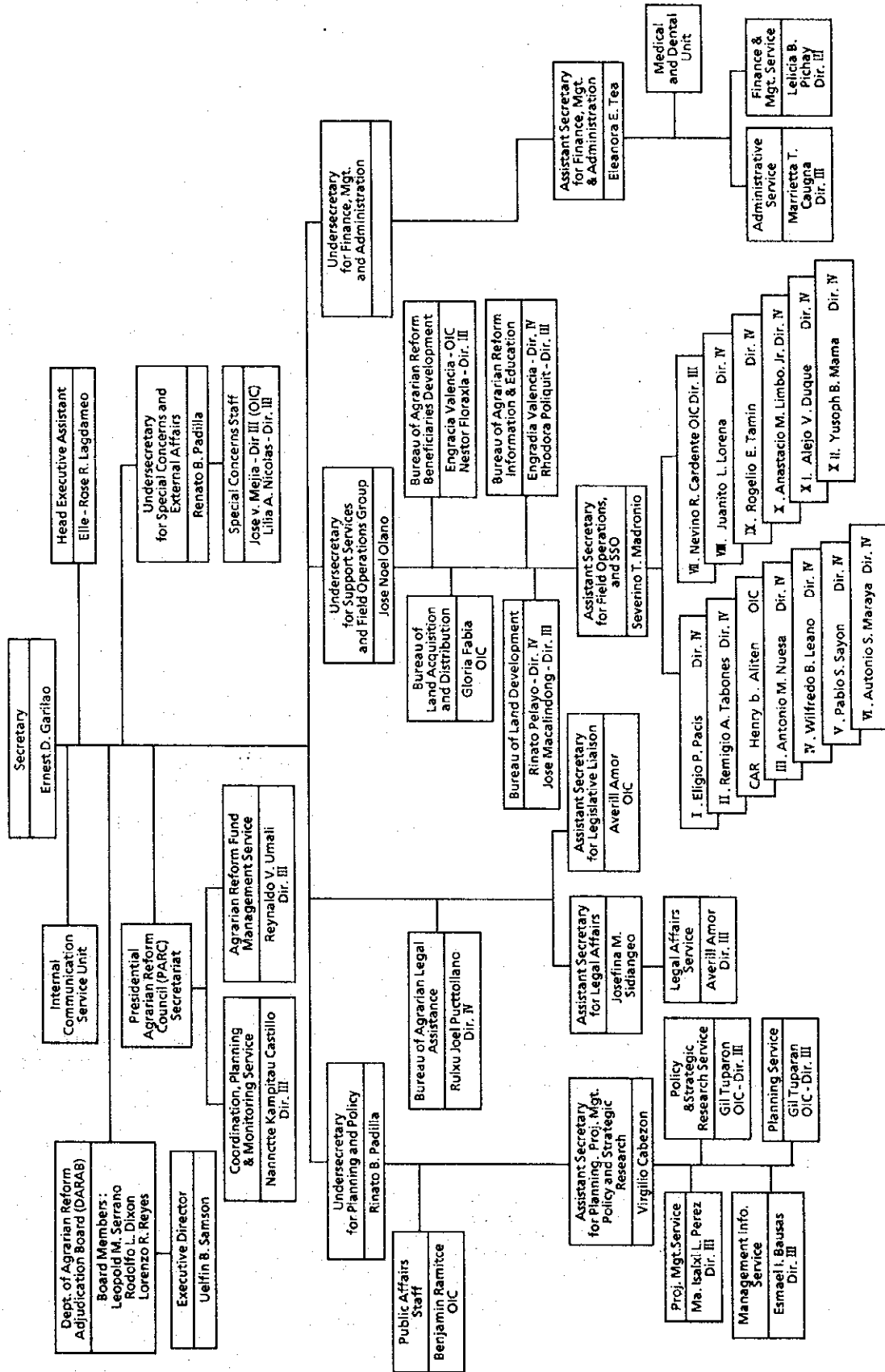
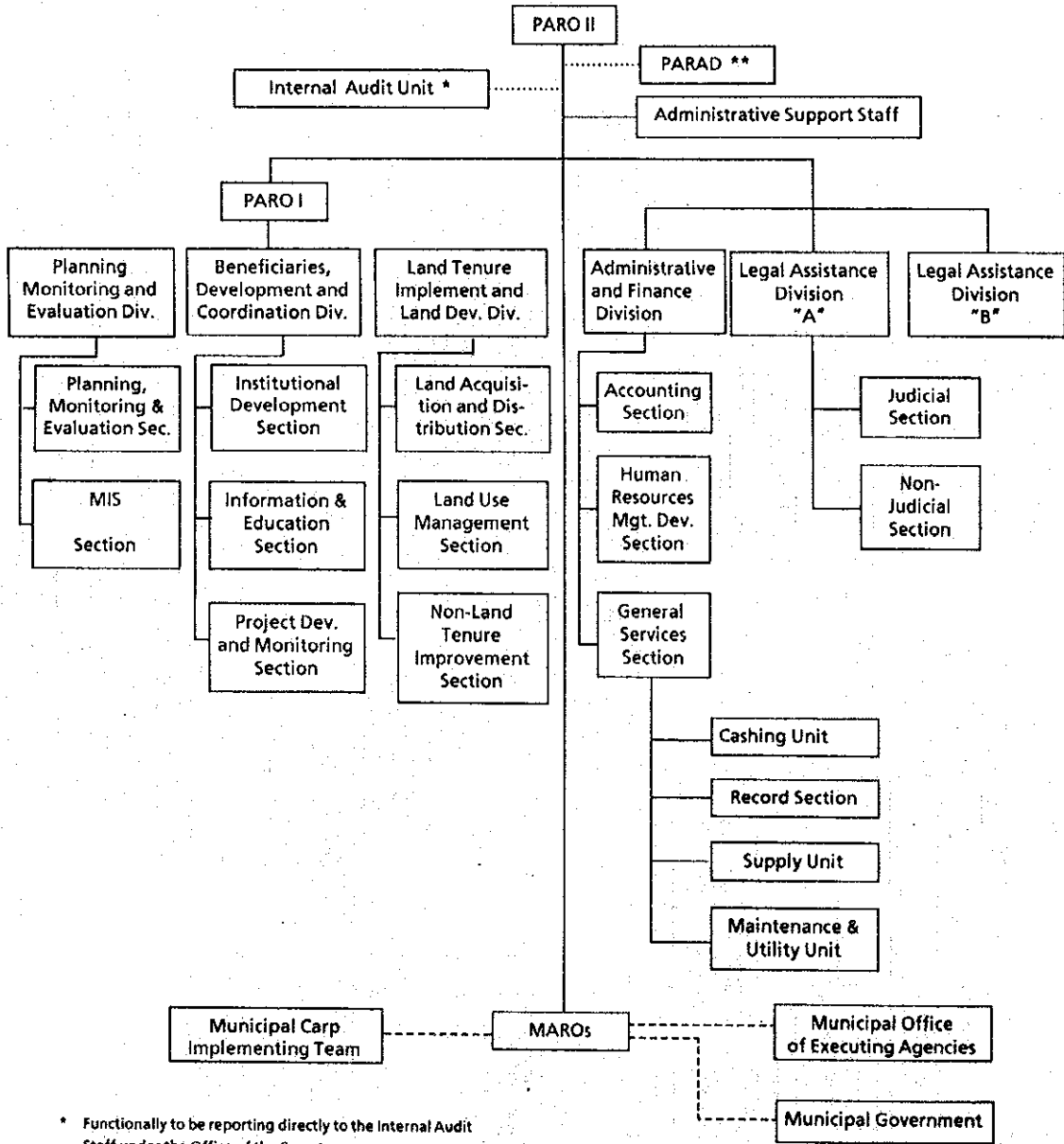


Figure A.2.2. Organization Chart-DAR Palawan Office



- * Functionally to be reporting directly to the Internal Audit Staff under the Office of the Secretary.
- ** Functionally to be reporting directly to the DARAB.

Legend :

- PARO : Provincial Agrarian Reform Officer
- PARSSO : Provincial Agrarian Reform Support Services Officer
- PARAD : Provincial Agrarian Reform Adjudicator
- MARO : Municipal Agrarian Reform Officer

Figure A.2.3 Organization Chart of Provincial Governmental Office, Palawan

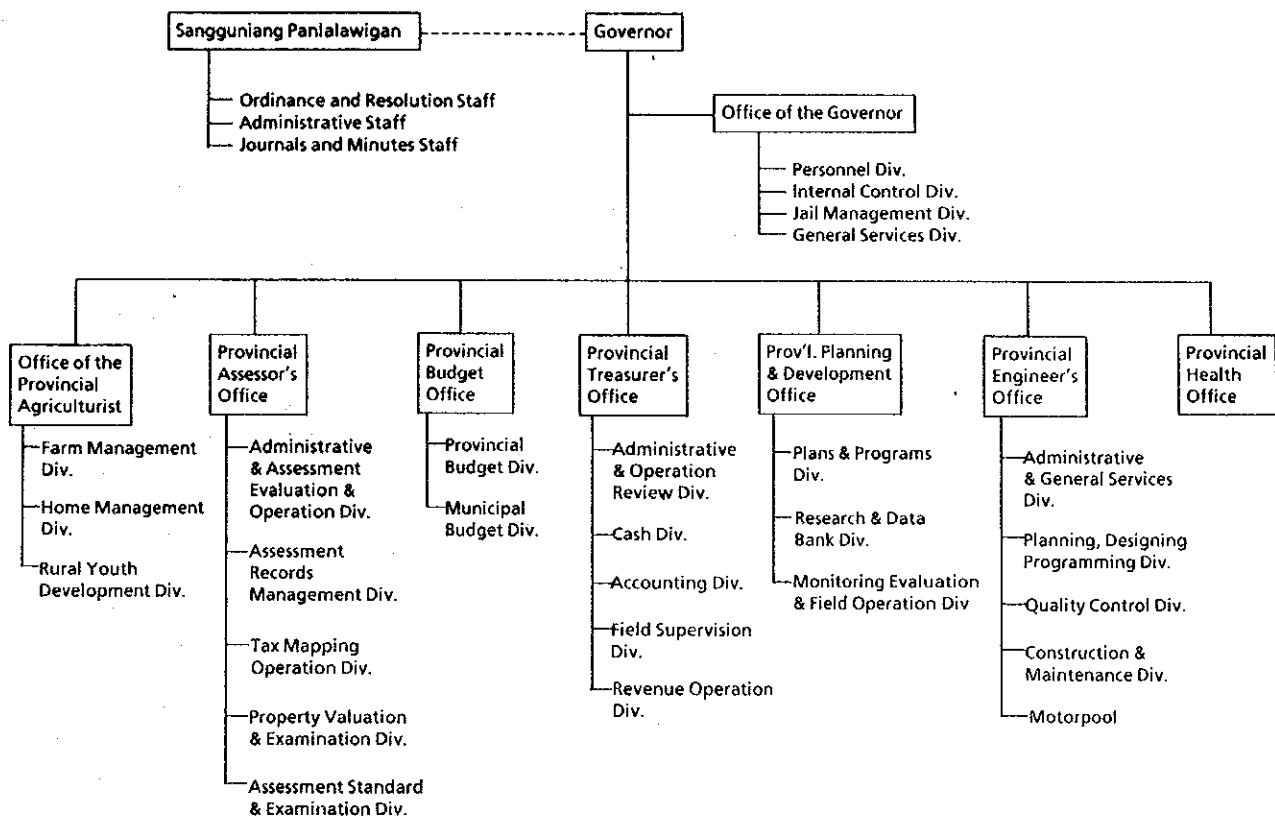
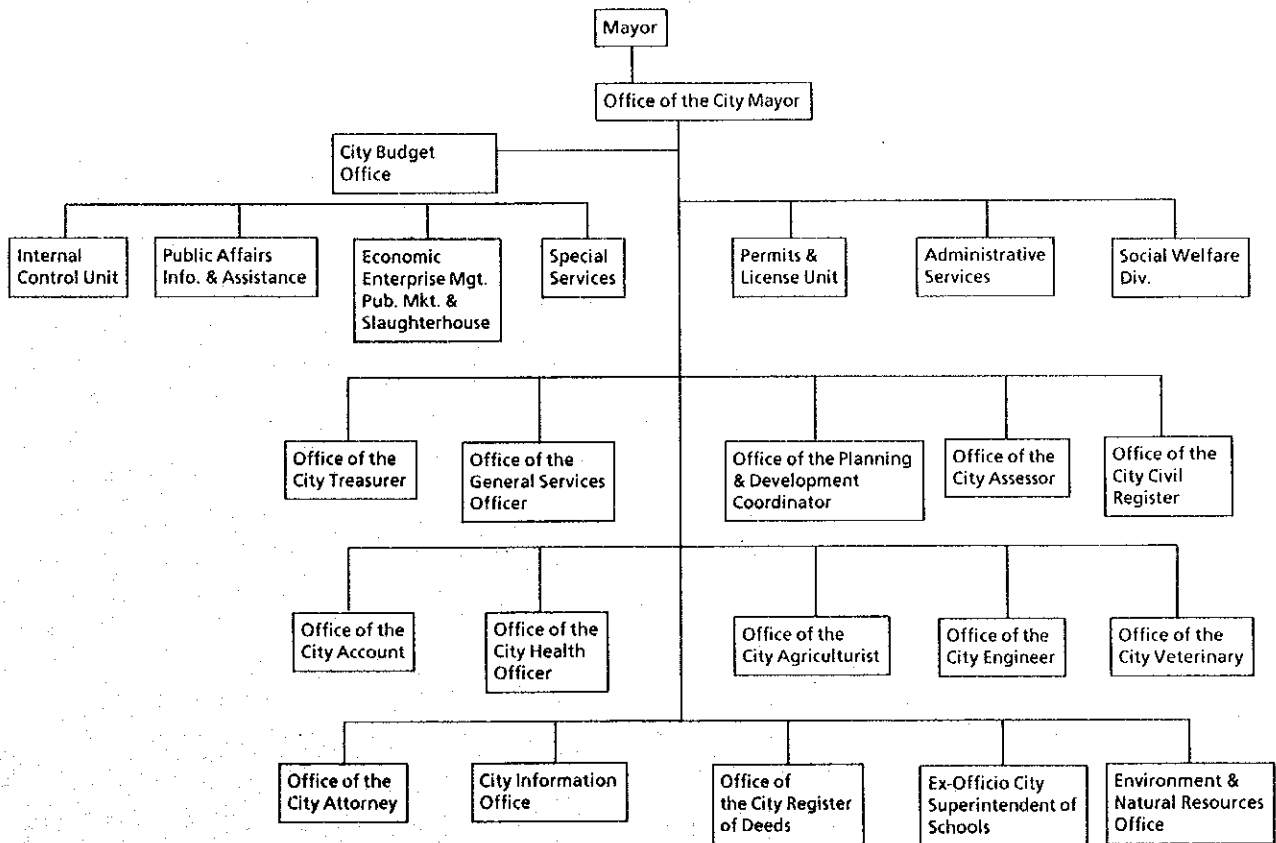


Figure A.2.4 Organization Chart of Municipal Office, Puerto Princesa City



APPENDIX B. SOCIO-ECONOMIC CONDITIONS

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B. Socio-economic Conditions

B.1 Population

Population of the Philippines is about 60.7 million in 1990, increasing at an annual rate of 2.35% between 1980 and 1990. About 51% of the population live in the rural areas, which shows a decrease of about 20% compared to that of 1970 rural population (refer to Table B. 1).

Table B.1 Population of the Philippines

	Population	Annual Growth Ratio
1960	27,087,685	3.57
1970	36,684,486	3.08
1975	42,070,660	2.78
1980	48,098,460	2.71
1990	60,703,206	2.35

Source: Statistical Yearbook 1993, NSCB

B. 2 Gross National Product (GNP) and Gross Domestic Product

though the growth ratio of the agricultural and fishery sector remained stagnant with an average annual rate of 1.1% since 1980, the sector still occupies important status in the Philippine economy, contributing 23% to GNP in 1991 (refer to Table B. 2)

Table B.2 GNP and GDP by Industrial Origin
(Constant Price of 1985)

	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991
	(Million Pesos)									
A. Agriculture, Fishery, Forestry	149641	144586	143247	140554	145725	150414	155964	159964	160734	161859
B. Industry Sector	264957	268987	238038	200548	205164	216173	232500	251581	256136	247813
a. Mining and Quarrying	9165	9244	8959	11893	12313	11232	11704	11389	11091	10770
b. Manufacturing	174315	173756	156195	143851	146453	154604	167681	178396	181983	180506
c. Construction	64110	70204	56027	29037	28547	31742	22235	41384	42639	35928
d. Electricity, Gas and Water	17367	15783	16857	15767	17851	18595	19880	20412	20423	20609
B. Service Sector	238869	252144	235677	230781	240534	253120	270671	286837	298439	298555
a. Transportation, Communication & Storage	31415	32622	32060	31666	33075	35086	37898	40243	41217	41407
b. Trade	86338	89739	83637	82835	86917	90038	94645	99283	101354	102677
c. Finance	21914	24957	20110	17123	18517	21465	23814	27235	29964	29091
d. Ownership of Dwellings & R. Estate	34093	34693	32585	32132	33205	34759	36691	39083	40146	40242
e. Private Services	36918	42289	39506	39121	40120	42060	45301	47534	49353	49273
f. Government Services	28191	27844	27779	27904	28700	29712	32322	33459	36405	35665
Gross Domestic Product	653467	665717	616962	571883	591423	619707	658463	698382	715309	708227
Net factor income from abroad	(7281)	(10234)	(18662)	(15809)	(12248)	(10978)	(6170)	(8689)	1655	7989
Gross National Product	646186	655483	598340	556074	579175	608729	652293	689693	716964	716216

Source: NSCB

B.3 Gross Value Added (GVA) in Agriculture

GVA in the agriculture sector is biggest in the agriculture sector, followed by the fishery sector. However, not only the total GVA but also the GVA of individual crops have been fluctuating every year. Among the selected crops, fluctuations in the GVA of paddy is the highest (refer to Table B. 3).

Table B.3 GVA in Agriculture, Fishery and Forest
(Constant Price)

	(million pesos)									
	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991
I. Agriculture Industry	135907	131170	131587	131557	135486	138075	144028	150694	153414	155219
A. Agriculture	108920	101202	102204	104499	106240	107155	115447	121066	122631	123573
a. Paddy	21120	19622	20259	22476	23590	22837	23138	25281	24873	25821
b. Corn	8410	8205	8072	9491	9528	10119	10466	10203	10950	10567
c. Coconut including copra	10959	10609	12472	11307	10515	9652	9008	7007	7084	6782
d. Sugarcane	5870	4841	5964	3791	3364	3053	2997	3897	3652	4141
e. Banana	3799	3679	3691	3531	3600	3635	2940	2913	2698	2684
f. Other crops	33766	30782	26924	30112	29873	30368	35518	37240	36613	36245
g. Livestock	10953	11379	11970	10972	12552	13700	14532	16334	16854	17043
h. Poultry	8238	8193	8100	6771	7072	7595	9990	11082	12215	12467
j. Agricultural activities and services	5805	3892	4752	6048	6146	6196	6858	7109	7692	7823
2. Fishery	26987	29968	29383	27058	29246	30920	28581	29628	30783	31646
III. Forestry	13734	13416	11660	8997	10239	12339	11264	9270	7320	6640
Gross Added Value	149641	144586	143247	140554	145725	150414	155292	159964	160734	161859

Source: NSCB

B. 4 Balance of Trade

The country shows a yearly deficit in its balance of trade. Though the deficit of the three years from 1984 to 1986 is rather small, the deficit during the last six (6) years have increased considerably (refer to Table B. 4).

Table B.4 Balance of Trade
of the Philippines

	Export	Import	Balance
1980	5,788	7,727	-1,939
1981	5,720	7,946	-2,226
1982	5,020	7,667	-2,647
1983	5,005	7,487	-2,482
1984	5,391	6,070	-679
1985	4,629	5,111	-482
1986	4,842	5,044	-202
1987	5,720	6,737	-1,017
1988	7,074	8,159	-1,085
1989	7,821	10,419	-2,598
1990	8,186	12,206	-4,020
1991	8,840	12,051	-3,211
1992	9,824	14,519	-4,695

Source: Statistical Yearbook 1993, NSO

B. 5 Value of Agricultural Export

The agricultural sector also contributes about one third to the total export value. Coconut oil earns the biggest foreign currency in value, followed by banana and sugar (refer to Table B. 5).

Table B.5 Quantity and Value of Agricultural Export

	(Unit:1000 ton, million FOB US\$)									
	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991
Sugar										
Quantity	1247.5	962.8	877.2	571.6	222.0	162.9	142.6	210.3	247.0	274.1
Value	416.0	299.3	327.6	168.7	86.8	60.3	60.2	80.0	113.4	114.6
Coconut Oil										
Quantity	921.2	998.3	587.6	650.6	1249.4	1031.2	792.9	763.5	1134.5	839.9
Value	401.0	515.8	580.2	347.4	332.8	380.5	408.2	376.8	360.7	298.5
Banana										
Quantity	926.7	643.4	799.6	789.3	855.7	775.0	866.8	851.1	839.8	955.4
Value	141.6	104.7	122.3	113.5	130.2	121.2	146.0	146.2	149.3	173.0
Pineapple Syrup										
Quantity	170.9	145.7	170.9	185.1	172.1	183.7	182.8	191.5	179.1	194.3
Value	87.6	73.6	87.1	88.8	83.5	86.3	83.2	91.3	88.7	95.1
Copra Cake or Meal										
Quantity	588.6	550.8	364.4	443.7	821.6	743.3	531.1	477.1	643.9	612.4
Value	72.1	72.0	41.1	35.5	74.8	73.4	63.4	53.5	54.0	54.9
Dedicated Coconut										
Quantity	90.3	89.4	76.6	64.8	68.0	95.2	88.1	94.5	75.3	80.7
Value	68.3	87.9	106.0	75.7	44.3	75.3	78.3	78.0	60.7	66.2
Tuna, Frozen (exc. fillet)										
Quantity	34.3	37.7	35.2	37.4	35.6	37.3	47.4	52.1	44.7	46.1
Value	64.3	71.0	61.2	61.1	63.1	69.9	113.2	1130.0	95.2	104.5
Coffee, raw or green, not roasted										
Quantity	24.6	21.5	32.9	30.7	42.6	16.5	26.5	25.0	9.1	4.6
Value	49.4	46.7	76.2	68.5	118.8	33.1	49.9	42.0	8.0	4.7
Copra										
Quantity	177.7	16.1	0.0	0.0	125.3	128.7	80.3	79.5	97.3	80.7
Value	49.2	44.4	0.0	0.0	17.5	31.9	28.0	25.2	20.5	18.6
Abaca (1000 bales)										
Quantity	270.0	239.4	251.4	195.3	197.2	184.3	191.5	179.6	177.3	166.7
Value	20.1	18.0	33.0	16.5	13.0	11.8	16.3	17.6	16.5	16.6

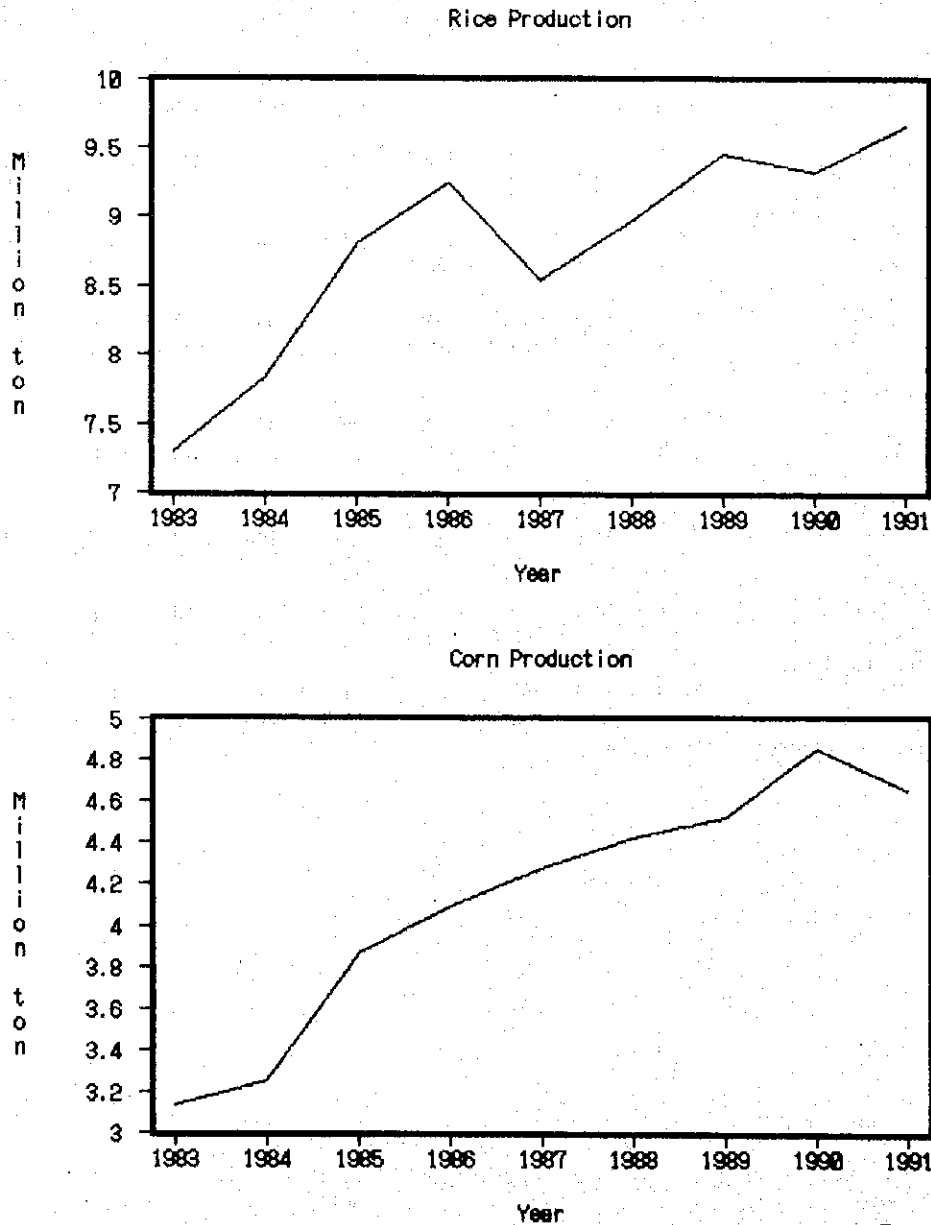
Source: Statistical Yearbook, 1993

B. 6 Crop Production in the Philippines

Since 1983, production of rice and corn have grown at rate of 3.6% and 5.1%, respectively. However these production fluctuate every year, depending on climatic conditions.

The Philippines was formerly an exporting country of paddy. But the country started to import paddy in 1984 to meet increasing demand, and in 1990, some 600 thousand ton of paddy were imported by the country (refer to Table B. 6 and Figure B. 1).

Figure B.1 Trend of Crop Production



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Figure B.1 Cont'd

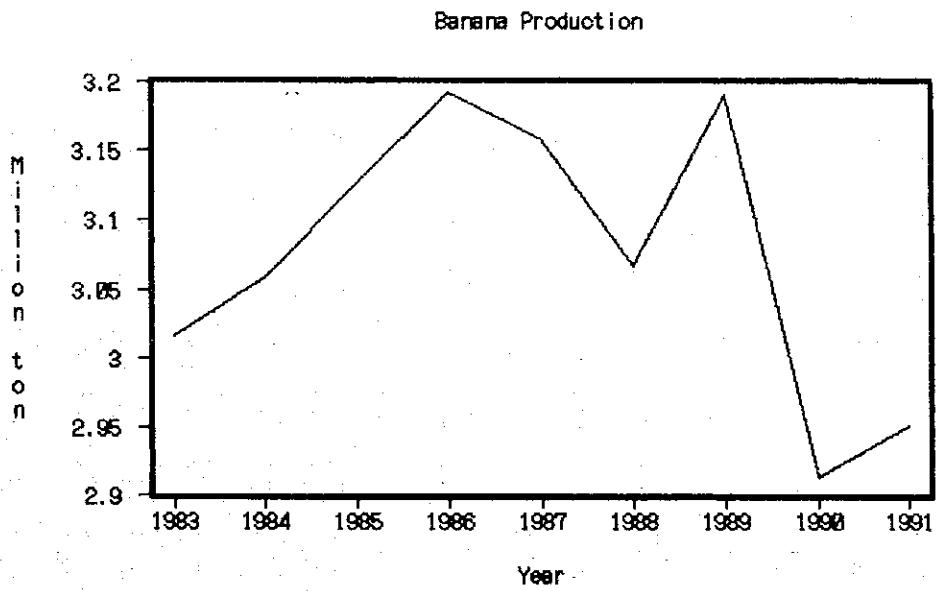
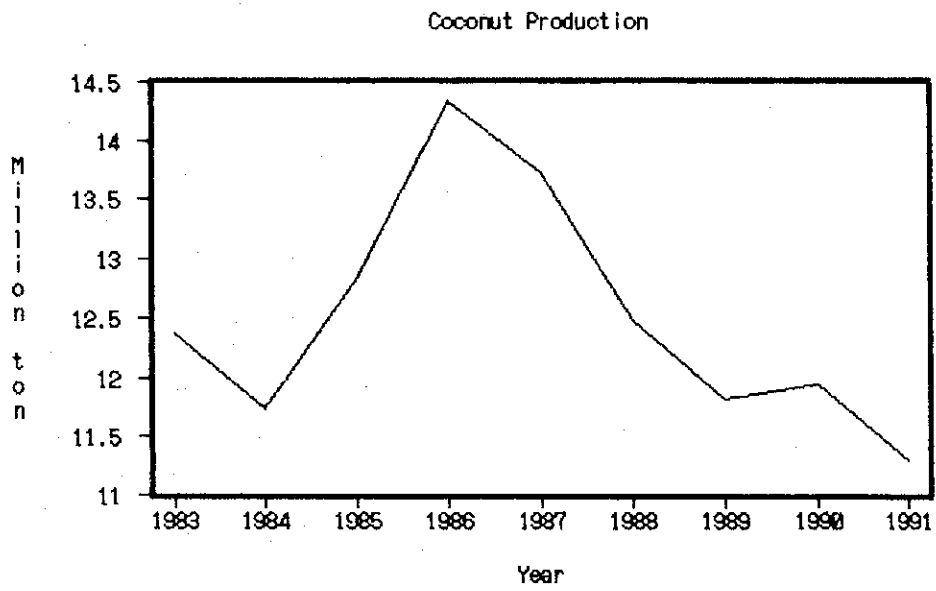


Table B.6 Crop Production in the Philippines

	1983	1984	1985	1986	1987	1988	1989	1990	1991
(Unit: 1,000)									
Paddy									
Area	3054.3	3162.3	3306.5	3464.2	3255.9	3392.7	3487.3	3318.7	3425.0
Production	7294.9	7828.9	8805.6	9246.8	8539.9	8971.0	9458.8	9319.4	9673.3
Corn									
Area	3132.0	3227.0	3510.9	3595.0	3682.5	3745.1	3689.2	3819.6	3589.5
Production	3134.1	3250.3	3862.8	4090.7	4278.1	4428.0	4522.2	4653.9	4654.9
Coconut									
Area	3201.3	3222.9	3270.3	3284.0	3251.6	3221.8	3110.4	3112.0	3093.3
Production	12368.3	11737.6	12827.8	14334.9	13730.5	12481.8	11810.4	11940.4	11290.9
Sugarcane									
Area	411.4	409.5	368.5	300.1	289.3	215.7	261.7	235.3	271.5
Production	24014.1	23944.2	17542.1	14831.1	13797.0	17275.0	21424.8	18666.9	21824.5
Banana									
Area	277.7	285.7	289.8	282.7	298.9	294.6	295.5	300.2	311.3
Production	3015.7	3058.3	3127.1	3192.6	3157.4	3067.3	3196.3	2913.3	2951.1
Pineapple									
Area	61.3	59.0	58.0	60.9	63.1	60.5	61.0	59.7	57.6
Production	967.0	1035.5	1030.0	1273.2	1303.4	1181.2	1178.8	1155.8	1117.1
Coffee									
Area	132.2	138.3	137.2	141.3	143.2	142.5	143.2	143.2	143.1
Production	122.1	124.7	137.3	145.3	140.1	141.9	155.9	134.1	133.4
Mango									
Area	52.0	52.7	53.7	54.4	55.5	55.7	56.4	56.7	56.9
Production	303.3	339.3	355.7	372.9	367.1	361.1	370.1	337.6	307
Tobacco									
Area	66.8	70.0	60.2	64.2	68.7	61.4	63.3	64.6	67.9
Production	86.3	98.1	74.3	74.2	82.8	76.4	79.9	81.7	85.2
Abecca									
Area	131.6	124.6	120.4	116.8	114.8	108.3	107.7	106.7	107.4
Production	84.3	86.2	81.3	83.6	82.0	84.1	88.4	80.5	85.2
Rubber									
Area	76.5	77.8	80.7	82.6	83.9	84.6	86.1	86.3	83
Production	96.0	140.7	145.9	146.0	147.2	156.4	171.9	185.4	180.7
Cacao									
Area	12.8	13.9	15.5	16.8	17.5	17.7	18.2	18.4	17.1
Production	5.6	6.0	7.0	8.0	8.8	9.1	9.4	9.8	9.6
Cassava									
Area	175.5	201.5	204.6	211.4	209.7	217.1	213.1	213.8	211.0
Production	1151.9	1491.1	1586.7	1724.1	1784.3	1865.9	1846.9	1854.0	1815.7
Sweet Potato									
Area	150.6	149.7	150.2	155.2	149.6	144.1	138.3	136.7	136.6
Production	731.4	692.9	701.7	726.2	716.9	695.0	660.3	668.9	662.3
Peanut									
Area	48.1	46.5	50.4	50.9	55.3	51.0	50.4	44.5	39.1
Production	33.7	40.0	41.3	42.2	43.0	39.9	37.6	34.8	31.4
Mungo Beans									
Area	33.6	33.8	35.5	36.0	34.7	36.7	35.7	36.7	34.3
Production	24.9	25.1	25.3	25.9	25.3	26.6	25.1	26.7	25.1
Area	6.5	7.8	7.1	6.6	7.0	5.8	6.5	6.4	6.4
Production	42.5	52.5	53.1	54.2	60.9	46.9	55.3	61.5	60.3
Garlic									
Area	5.9	5.5	6.3	6.8	6.3	5.6	6.1	6.3	4.4
Production	14.6	13.3	15.0	15.5	15.4	14.1	17.2	17.9	12.4
Tomato									
Area	15.3	16.3	16.7	18.1	18.0	18.4	19.7	20.0	19.5
Production	133.3	149.0	150.4	165.7	166.9	167.9	178.7	184.0	177.2
Eggplant									
Area	14.2	14.7	14.4	14.5	14.8	15.3	15.4	16.4	14.5
Production	112.1	110.4	102.7	104.5	107.7	109.8	111.6	112.7	104.0
Cabbage									
Area	6.0	5.9	6.2	6.4	6.5	6.4	6.9	6.4	6.9
Production	63.0	62.1	65.1	69.0	71.3	70.3	75.9	68.3	75.8
Citrus									
Area	27.7	27.3	27.8	27.8	28.7	29.3	29.4	29.2	23.1
Production	122.3	115.8	129.5	139.3	156.3	157.7	149.6	150.2	142.2
Other Fiber Crops									
Area	97.8	81.9	92.2	89.2	85.0	40.0	37.0	33.4	31.5
Production	245.7	198.5	204.8	195.1	88.0	76.0	64.6	58.4	55.1
Other Root Crops									
Area	147.0	125.5	106.8	109.7	112.9	113.5	108.0	108.6	107.6
Production	245.9	197.8	121.1	126.4	126.8	127.5	121.3	132.3	128.7
Tubers									
Area	102.7	96.5	101.0	111.0	109.4	122.0	125.7	135.7	134.9
Production	147.3	140.2	146.8	162.0	159.6	198.0	214.0	201.4	198.4
Spices									
Area	49.6	44.9	42.6	42.6	39.6	35.3	35.9	38.6	36.1
Production	21.3	22.9	25.6	26.1	24.9	25.5	26.3	27.0	26.5
Fruits Bearing Vegt.									
Area	348.9	326.2	333.1	388.1	306.9	304.1	313.2	328.0	314.5
Production	2677.8	2503.4	2633.3	2740.8	2691.4	2680.6	2887.6	2910.2	320.2
Leafy/Stem Vegt.									
Area	151.4	147.0	151.7	159.4	147.4	157.1	166.7	171.2	172.8
Production	1108.9	1092.0	1122.4	1141.7	910.5	1058.0	1097.2	1080.2	1124.6
Other Legumes									
Area	25.2	21.6	25.6	26.0	27.4	28.5	30.2	30.5	31.1
Production	28.6	29.7	30.1	31.8	31.3	32.0	34.0	34.3	35.0
Other Fruits									
Area	274.0	291.3	299.2	304.5	299.6	316.8	331.7	327.7	338.1
Production	2882.5	2852.3	3104.7	3239.6	3451.0	3595.2	3639.3	3764.9	3794.3
Others									
Area	96.9	101.0	89.0	83.1	73.0	80.0	87.2	85.1	86.4
Production	409.8	426.9	474.1	480.7	439.5	481.2	493.7	499.9	507.2

Source: Philippine Statistical Yearbook, 1993

B.7 Medium Term Philippine Development Program (1993 - 1998)

The MTPDP presents the national goals and targets as poverty alleviation, improved income, equitable distribution of wealth, and so on. Target of annual growth for the GNP is 7.3 % at the national level and 8.9 % at the regional level (Region IV) based on the GDP.

In the MTPDP, the CARP is expected to be implemented with the distribution of 2.52 million hectares of lands to farmer beneficiaries (refer to Table B. 7).

Table B.7 Aggregate Targets of the MTPDP
(1993 to 1998)

Items	1993	1994	1995	1996	1997	1998	Annual Average
Growth Rate of GNP (%) (1985 price)	3.5	6.5	7.5	8.0	8.5	10.0	7.3
Growth Rate of Per Capita GNP (%) (1985 price)	1.0	3.9	4.8	5.4	6.0	7.6	4.8
Per Capita GNP (US\$) (1992 price)	855	910	966	1031	1113	1220	
Growth of Exports (%)	4.5	10.0	13.0	15.0	18.0	19.0	13.3
Growth of Imports (%)	6.3	10.0	11.5	12.0	14.0	15.0	11.5
Growth rate of GDP (%)	3.0	6.7	7.7	8.2	8.8	10.0	7.4
Growth Rate of Agriculture in GDP (%)	3.8	3.4	3.9	4.1	4.3	4.6	4.0
Growth Rate of Industry in GDP (%)	2.3	7.7	10.2	10.6	11.1	12.4	9.1
Growth Rate of GDP in the Region 4 (%)	3.4	7.5	8.8	9.9	11.2	12.9	8.9

Source: Medium-Term Philippine Development Plan (1993-1998)

B. 8 Annual Income by Region

As of 1991 the average annual income in the Philippines is estimated at 65,186 pesos per family. There exists big difference between the income level of the urban and rural areas, thus, 89,571 pesos for the former and 41,199 pesos for the latter.

The family income in Region IV is 68,960 pesos per year, considered second highest among the 15 regions next to Region III (refer to Tables B. 8 and B. 9).

Table B.8 Average Annual Income and Expenditures by Region

	1988				1991 (at current price)			
	No. of Families (1000)	Average Income (pesos)	Average Expenditure (pesos)	Savings (pesos)	No. of Families (1000)	Average Income (pesos)	Average Expenditure (pesos)	Savings (pesos)
Philippines	10,534	40,408	32,521	7,887	11,976	65,186	51,991	13,195
Urban	3,985	60,330	47,299	13,031	5,939	89,571	70,551	19,020
Rural	6,549	28,284	23,529	4,755	6,037	41,199	33,733	7,466
NCR	1,435	79,314	60,355	18,959	1,644	138,256	105,731	32,525
CAR	214	33,838	28,722	5,116	228	58,985	43,816	15,169
Region I	625	34,031	27,670	6,361	672	56,678	45,016	11,662
Region II	438	32,939	24,582	8,357	489	50,850	39,991	10,859
Region III	1,038	46,855	38,660	8,195	1,195	76,203	61,904	14,299
Region IV	1,284	37,978	32,058	5,920	1,616	68,960	54,818	14,142
Region V	738	26,570	23,253	3,317	824	39,823	33,911	5,912
Region VI	957	31,164	27,162	4,002	1,070	47,723	42,670	5,053
Region VII	830	27,972	22,157	5,815	904	45,255	35,480	9,775
Region VIII	598	25,345	20,533	4,812	661	38,475	31,760	6,715
Region IX	539	31,984	24,624	7,360	605	43,011	33,175	9,296
Region X	607	35,801	28,865	6,936	686	45,179	37,641	7,538
Region XI	738	37,132	30,061	7,071	830	51,722	41,011	10,711
Region XII	493	35,090	27,696	7,394	552	43,971	35,354	8,617

Source: Family Income and Expenditures Survey, 1991. NSO

Table B.9 Average Annual Family Income and Expenditure
(current price)

		(Pesos)	
	Average Income	Average Expenditures	Savings
Philippine			
1985	31,052	26,865	4,187
1988	40,408	32,521	7,887
1991	65,186	51,991	13,195
Philippine (urban)			
1985	46,127	39,134	6,993
1988	60,330	47,299	13,031
1991	90,097	70,880	19,217
Philippine (rural)			
1985	21,875	19,397	2,478
1988	28,284	23,529	4,755
1991	41,430	34,400	7,030
Region IV			
1985	29,985	26,459	3,526
1988	37,978	32,058	5,920
1991	68,960	54,818	14,142
1991 (urban)	87,203	68,087	19,116
1991 (rural)	49,502	40,666	8,836
Palawan			
1985	20,746	17,243	3,503
1988	27,722	23,311	4,411
1991	41,415	31,081	10,034

Source: Family Income and Expenditures Survey 1991, NSO

B. 9 Gross Regional Domestic Products (GRDP) in Region IV

The GRDP in Region IV in 1990 was 102,513 million pesos, representing about 14.4% of the national total. The regions overall ranking is second, next to the Metro Manila in terms of GRDP share (refer to Table B. 10).

Table B.10 GRDP (at Constant 1985 price)

Year	GDP (A)	GRDP (B)	(1000 pesos) Share
	Philippine	Southern Tagalog	(B/A)
1985	571,884,573	79,554,111	13.91
1986	591,423,280	82,918,028	14.02
1987	619,707,817	87,875,625	14.18
1988	660,200,527	93,523,215	14.17
1989	699,845,190	100,295,439	14.33
1990	717,257,535	102,760,580	14.33
1991	712,874,547	102,513,195	14.38

Source: NSCB

Per Capita GRDP, Southern Tagalog

Year	At Constant 1985 Price
1986	11378 Pesos
1987	11736
1988	12159
1989	12734
1990	12679
1991	12332

Source: NSCB

B. 10 GRDP by Industrial Origin in Region IV

GRDP in 1991 in Region IV is composed of 28% in agriculture, forestry and fishery sector, 40% in the industrial sector, and 32% in the services sector (refer to Table B. 11).

Table B.11 GRDP by Industrial Origin, Southern Tagalog
(at current price)

Sector	Million Pesos					
	1986	1987	1988	1989	1990	1991
Agriculture and Forestry	26,637	28,780	34,037	38,659	43,339	49,655
Agriculture	26,043	27,962	33,102	37,678	42,170	49,647
Forestry	594	819	935	982	1,170	9
Industry	29,838	34,052	41,041	46,176	56,685	69,182
Mining & Quarrying	994	821	952	1,245	1,195	1,209
Manufacturing	23,943	27,353	33,405	36,120	45,257	58,061
Construction	3,934	4,936	5,542	7,599	8,919	8,235
Electricity, Gas and Water	967	943	1,143	1,212	1,313	1,678
Service	27,315	30,525	33,905	39,430	46,588	56,873
Transport, Communication & Storage	3,219	3,420	3,657	3,885	4,851	6,639
Trade	12,931	14,387	15,172	17,166	19,196	22,718
Finance	1,652	1,832	2,091	2,590	3,111	3,738
Ownership of Dwelling & Real Estate	4,048	4,512	5,192	6,569	8,109	10,541
Private Services	3,319	3,896	4,565	5,361	6,370	8,085
Government services	2,147	2,477	3,229	3,858	4,951	5,152

Source: NSCB

B. 11 Agricultural Production in Region IV

The major crops produced in Region IV are coconut, paddy, sugarcane, corn, and banana. Production of paddy, corn and coconut in the Region were 11.6%, 4.5%, respectively, of the national total in 1991. However, productions are unstable and have been fluctuating every year (refer to table B. 12).

Table B.12 Selected Crop Production
(Southern Tagalog)

	1986	1987	1988	1989	1990	1991
<u>Area (ha)</u>						
Abaca	2,515	2,610	1,810	1,800	1,172	1,165
Banana	51,030	50,027	46,232	44,021	42,887	43,582
Cabbage	190	177	176	196	210	269
Cacao	502	469	466	453	471	484
Calamansi	5,928	5,763	6,093	6,113	6,201	6,020
Camote	8,739	8,640	8,717	8,708	8,693	8,688
Cassava	8,225	8,183	9,707	10,003	10,241	10,264
Coconut	568,515	560,612	550,164	542,517	542,542	542,967
Coffee	21,563	20,797	22,318	22,416	22,452	21,240
Corn	250,480	255,140	248,530	237,530	237,170	230,130
Eggplant	1,931	1,883	2,022	2,029	2,060	2,062
Garlic	1,134	1,024	1,084	1,231	1,344	957
Mango	6,190	6,180	6,164	6,470	6,453	NA
Mongo	2,256	2,281	2,269	2,254	2,611	1,980
Onion	187	176	172	123	153	177
Paddy	383,220	361,010	392,860	402,380	381,380	411,880
Peanut	3,120	3,057	3,096	3,076	3,369	2,849
Pineapple	4,460	4,050	3,969	4,010	4,124	5,167
Sugarcane	38,713	35,095	30,209	26,631	22,704	NA
Tobacco	723	1,646	1,623	1,183	1,778	1,774
Tomato	2,437	2,409	2,519	2,634	2,743	2,294
<u>Production (ton)</u>						
Abaca	399	254	161	168	109	105
Banana	160,523	165,226	152,784	164,667	153,439	158,927
Cabbage	557	522	523	570	615	673
Cacao	138	131	127	131	146	110
Calamansi	21,415	21,154	20,924	21,788	22,104	20,546
Camote	45,129	43,963	44,821	39,565	43,125	41,773
Cassava	50,046	48,151	62,810	61,611	63,036	62,800
Coconut	2,630,255	2,553,744	2,334,529	1,936,242	1,957,580	1,929,274
Coffee	34,391	28,931	24,480	26,853	27,132	24,464
Corn	250,030	248,084	235,185	222,179	219,628	211,206
Eggplant	20,169	19,982	21,217	21,359	21,648	18,231
Garlic	4,392	4,013	4,022	5,514	5,763	4,249
Mango	29,151	30,200	26,345	26,999	22,090	13,191
Mongo	1,503	1,494	1,527	1,523	1,766	1,388
Onion	613	566	535	447	313	521
Paddy	966,305	866,513	998,809	1,028,411	957,286	1,118,085
Peanut	2,565	2,466	2,284	2,089	2,335	2,024
Pineapple	37,510	40,553	43,654	32,239	38,724	57,586
Sugarcane	1,892,759	1,876,341	2,447,596	2,190,532	1,789,633	1,415,129
Tobacco	631	1,342	1,676	1,298	1,485	1,670
Tomato	21,815	21,716	19,921	21,733	23,760	19,097

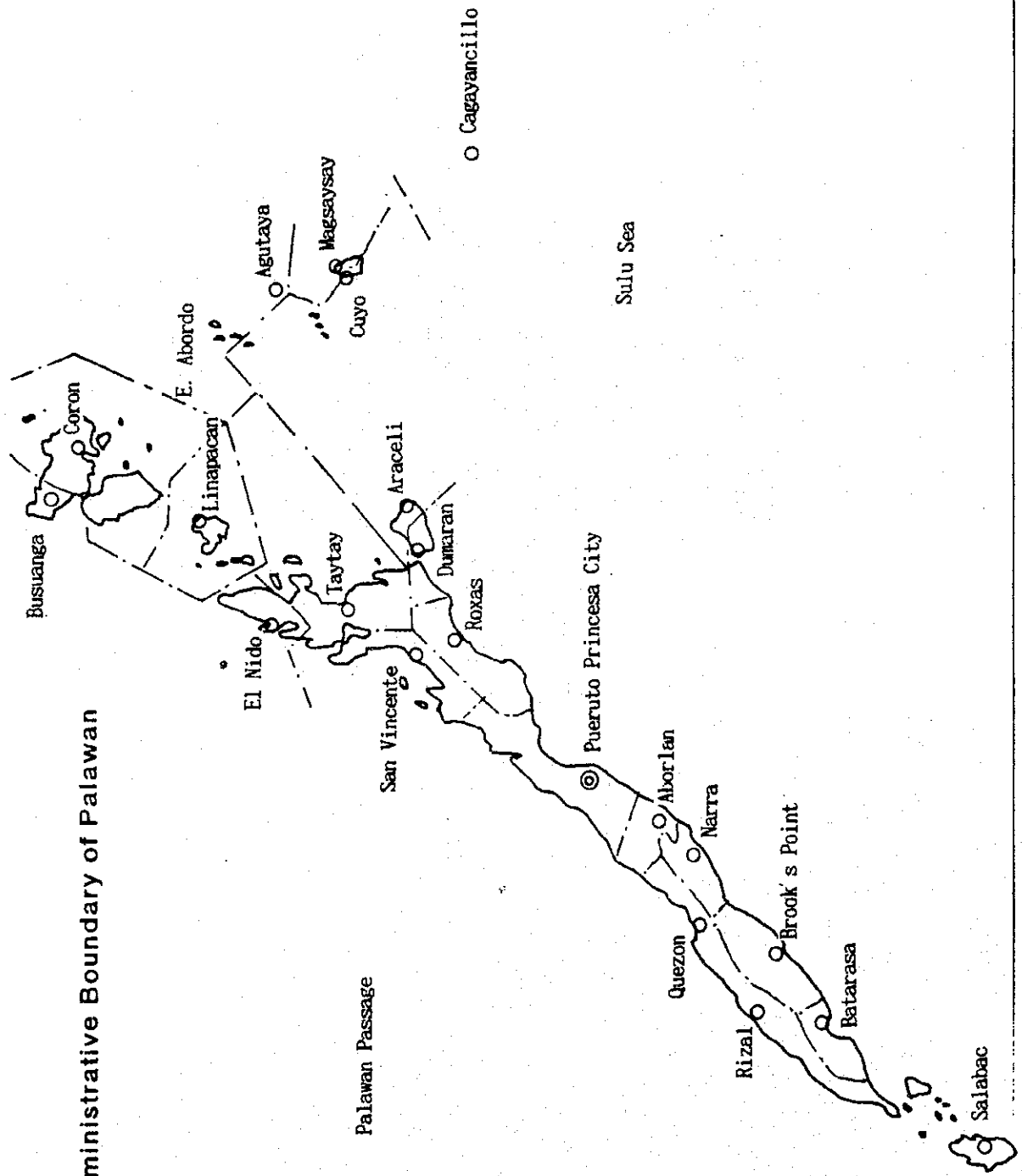
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Table B.12 Cont'd

Yield (ton/ha)						
Abaca	0.16	0.10	0.09	0.09	0.09	0.09
Banana	3.15	3.30	3.30	3.74	3.58	3.65
Cabbage	2.93	2.95	2.97	2.91	2.93	2.50
Cacao	0.27	0.27	0.27	0.29	0.31	0.23
Calamansi	3.61	3.67	3.43	3.56	3.56	3.41
Camote	5.16	5.09	5.14	4.54	4.96	4.81
Cassava	6.08	5.88	6.47	6.16	6.16	6.12
Coconut	4.63	4.56	4.24	3.57	3.61	3.55
Coffee	1.59	1.39	1.10	1.20	1.21	1.15
Corn	1.00	0.97	0.95	0.94	0.93	0.92
Eggplant	10.44	10.61	10.49	10.53	10.51	8.84
Garlic	3.87	3.92	3.71	4.48	4.29	4.44
Mango	4.71	4.89	4.27	4.17	3.42	Na
Mongo	0.67	0.65	0.67	0.68	0.68	0.70
Onion	3.28	3.22	3.11	3.63	2.05	2.94
Paddy	2.52	2.40	2.54	2.56	2.51	2.71
Peanut	0.82	0.81	0.74	0.68	0.69	0.71
Pineapple	8.41	10.01	11.00	8.04	9.39	11.14
Sugarcane	48.89	53.46	81.02	82.25	78.82	Na
Tobacco	0.87	0.82	1.03	1.10	0.84	0.94
Tomato	8.95	9.01	7.91	8.25	8.66	8.32

Source: BAS, IV

Figure B.2 Administrative Boundary of Palawan



B. 12 Population and Number of Households in Palawan Province

The population in the province has grown at a rate of 3.58% between 1980 and 1991, with a total population of 528,287 and a household of 101,117 in 1991. The high growth rate of population is attributed to the number of immigrants from other provinces, amounting to 3,000 to 4,000 persons annually (refer to table B. 13).

Table B.13 Population and Household by Municipality
(Palawan Province)

	Population			Households			Annual Growth Rate of Population	
	1980	1988	1990	1980	1988	1990	1980~198	1980~1990
Abordo	4428	5383	5835	794	1,014	1,146	2.47	2.80
Aborlan	11,799	15,701	18,751	2,185	3,026	3,565	3.64	4.74
Agutaya	4,684	4,842	6,052	863	1,085	1,135	0.42	2.60
Araceli (Dumaran)	6,030	10,231	8,708	1,089	1,697	1,581	6.83	3.74
Balabac	15,044	16,210	20,056	2,269	2,699	3,635	0.94	2.92
Bataraza	17,973	20,794	29,142	3,845	4,320	6,056	1.84	4.95
Brooke's Point	46,320	53,644	57,934	8,926	10,357	11,419	1.85	2.26
Busuanga	10,348	10,875	11,007	1,396	2,059	2,081	0.62	0.62
Cagayancillo	3,992	4,625	5,082	528	660	764	1.86	2.11
Coron	25,129	31,440	33,228	4,680	5,881	6,221	2.84	2.83
Cuyo	14,692	15,175	15,294	3,595	2,876	2,897	0.41	0.40
Dumaran	8,402	10,709	12,624	1,647	2,139	2,403	3.08	4.16
El Nido	11,657	15,991	18,832	2,185	3,030	3,575	4.03	4.91
Magsaysay	9618	9609	10028	1791	1,606	1,941	-0.01	0.42
Narra	30,099	36,436	41,326	5,383	7,102	7,881	2.42	3.22
Puerto Princesa	60,234	82,058	92,147	10,084	14,951	17,616	3.94	4.34
Quezon	33,032	28,884	32,538	6,653	5,846	6,354	4.65	4.94
Roxas	24,890	33,894	36,604	4,623	6,458	6,969	3.94	3.93
Rixal		13,636	16,819		3,072	3,587	0.65	2.65
San Vincento	10,097	16,501	17,795	1,888	3,282	3,376	6.33	5.28
Taytay	22,980	34,370	38,435	4,169	6,480	6,915	5.16	5.28
Kalayaan	334	50	50					
Total	371,782	471,058	528,287	68,593	89,640	101,117	3.00	3.58

Source: NSO

B. 13 Employment in Palawan

Of the total gainful workers of 163,566, some 66% are engaged in the agriculture, fishery and forestry sector, followed by the community, social and personal services sector.

There are 2,963 business establishment as of 1993. Most of this are engaged in the manufacturing sector, wholesale and retail trade, and community, social and personal services sectors (refer to Tables B. 14 and B. 15).

Table B.14 Employment of Gainful Workers by Sector, Palawan

Sector	Persons	
Agriculture, fishery & forestry	108,741	(66.4)
Mining & quarrying	1,048	(0.6)
Manufacturing	4,664	(2.9)
Electricity, gas & water	344	(0.2)
Construction	4,956	(3.0)
Wholesale & retail trade	11,084	(6.8)
Transportation, communication and storage	4,836	(3.0)
Financing, real estate and business services	1,124	(0.7)
Community, social & personnal services	19,967	(12.2)
Not defined	6,802	(4.2)
Total	163,566	(100.0)

Source: Fact & Figures, Palawan

Table B.15 Business Establishments by Sector in Palawan, 1993

Sector	Number
Agriculture, fishery & forestry	7
Mining & quarrying	12
Manufacturing	1010
Electricity, gas & water	15
Construction	6
Wholesale & retail trade	963
Transportation, communication and storage	16
Financing, real estate and business services	89
Community, social & personnal services	845

Source: Fact & Figures, Palawan

B. 14 Consumer Price Index

Annual price escalation rates in the Southern Tagalog and Palawan province between 1981 and 1989 are 1.14 and 1.15%, respectively (refer to Tables B. 16 and B. 17).

Table B.16 Consumer Price Index, (Southern Tagalog)
(1978=100)

Commodities	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994
All Items	152.7	170.4	187.8	273.4	332.6	338.7	349.9	381.2	428.4	490.3	561.0	642.0	734.7	840.8
	5.51	4.93	4.48	3.08	2.53	2.48	2.40	2.21	1.96	1.72	1.50	1.31	1.14	1.00
Average/year		1.12	1.10	1.46	1.22	1.02	1.03	1.09	1.12	1.14 (average/year)				
Food	149.6	164.8	179.2	268.1	327.5	327.6	338.7	376.3	431.9					
Clothing	153.2	173.2	192.4	296.4	376.1	402.2	420.4	445.2	479.1					
Housing & Rep	145.3	165.3	167.3	238.5	281.2	291.0	300.3	322.3	377.4					
Fuel, Light & Water	201.5	243.9	284.9	391.2	467.0	432.0	432.5	443.0	444.0					
Services	160.7	180.7	204.9	277.1	327.9	362.1	376.3	399.8	431.8					
Miscellaneous	147.2	159.9	175.0	270.2	334.4	348.3	358.8	386.2	419.1					

Source: Provincial Profile, Palawan, NSO

Table B.17 Consumer Price Index, Palawan
(1978=100)

Commodities	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994
All Items	150.2	162.5	173.6	260.8	334.8	378.7	367.6	399.1	432.6	497.5	572.1	657.9	756.6	870.1
	5.79	5.35	5.01	3.34	2.60	2.30	2.37	2.18	2.01	1.75	1.52	1.32	1.15	1.00
Average/year		1.08	1.07	1.50	1.28	1.13	0.97	1.09	1.08	1.15 (average/year)				
Food	150.3	158.2	168.7	248.0	301.6	316.1	332.3	371.8	403.2					
Clothing	157.8	170.1	182.5	284.0	368.1	403.8	440.0	468.5	516.5					
Housing & Rep	137.1	153.1	146.0	210.7	297.1	350.5	336.4	356.9	377.7					
Fuel, Light & Water	183.7	233.2	268.0	479.2	666.0	672.8	693.8	759.2	812.5					
Services	148.7	157.0	184.8	271.3	344.1	356.5	362.2	380.8	420.6					
Miscellaneous	157.3	165.5	174.1	255.7	347.8	365.5	380.6	399.4	435.7					

B. 15 Trade at Puerto Princesa Port

According to the data of six (6) years, the province has been experiencing a surplus balance of trade, except in 1988.

As to food commodities, Palawan province imports dairy products, paddy, wheat flour, fruit and vegetables, sugar and so on, and exports fish, paddy, corn cashew nut, copra, rattan and so on (refer to Tables B.17 and B. 18).

Table B.18 Trade at Puerto Princesa Port

	Total Value (P1000)	Export Value (P1000)	Import Value (P1000)	Reexport Value (P1000)	Balance (P1000)
1985	18552	18486	66		18420
1986	16940	11837	5103		6734
1987	33838	32991	877		32114
1988	19643	6219	13424		-7205
1989	16936	16712	225	3706	12781
1990	18301	17619	682	8	16929

Source: Central Bank

Commodities	1991		1992		1993	
	Outbound	Inbound	Outbound	Inbound	Outbound	Inbound
Live Animal	1395.0	83.0	1526	135	1154	270
Dairy Products		767.0		2070		3551
Fish	6224.0	115.0	5532	151	7809	455
Paddy/Rice	1228.0	770.0	3087	522	8471	1231
Corn	8348.0	263.0	8316	45	8268	54
Wheat Flour	32.0	1990.0	212	3321	17	4904
Fruits/Vegetables	2287.0	1154.0	1406	1260	68	1927
Sugar	118.0	3618.0	48	5135	39	6903
Molasses				7		5
Peanut			48			144
Coffee						118
Cashew nut			752		1004	59
Coco Oil		363.0	67	720		634
Tobacco	1.0	750.0	56	661		1142
Copra	10137.0	388.0	10753	316	12190	153
Fertilizer	30.0	2693.0	153	2224	3	3554
Animal Feeds	72.0	179.0	304	619	266	701
Logs			72	283		567
Lumber	276.0	271.0	53	1131	85	387
Paper Pulp		58.0		163		2
Charcoal						18
Alamciga (Resin)	1217.0		1156			1693
Plywood & Veneer	7.0	248.0	15	1349	10	518
Furniture	557.0	15.0	200	107	260	727
Rattan	4500.0	23.0	2649	20	4015	20
Seaweeds	1204.0	227.0	203	150	335	59
Sea Cucumber	195.0	6.0	141	97	216	
Napocor Fuel						5256
Crude Petro	309.0	386.0	193	705	27	635
Refined Petro	156.0	261.0			248	404
LPG	10.0	275.0	33	384	15	727
Crude Mineral (Salt)	299.0	886.0	42	1081	29	1357
Chromite						809
Metal Scrap	728.0	29.0	695		312	20
Bottled Cargo	1119.0	19636.0	1622	13718	339	20132
Chemicals	28.0	406.0	27	555	3	1155
Textile & Garment	0.2	23.0			12	106
Cement	387.0	26245.0	400	23354	432	31165
Iron & Steel	210.0	2379.0	132	3073	145	1438
MFG of Steel	31.0	1390.0	378	3166	57	3114
Machine & Elect. Equip.	59.0	938.0	53	531	137	1409
Transport Equip.	743.0	1402.0	170	642	876	2597
General Cargo	13809.0	45660.0	8444	15662	8621	25139
wt. Bottle	13056.0	1073.0	15530	827	15419	179
Total	37828.0	13981.0	36749.0	20486.0	36190.0	33242.0

Source: Philippine Ports Authority

B. 16 Crop Production in Palawan Province

Paddy still occupies the biggest area of cultivated lands, followed by coconut and corn. The Province is known as a producing province of cashew nut. The provincial government has promoted the expansion and development of cashew nut and mangoes (refer to Table B.19) in line with the medium term agricultural development of the province where the Key Production Area approach is introduced (refer to Table B.19).

Table B.19 Selected Crop Production, Palawan

	1986	1987	1988	1989	1990	1991
<u>Area (ha)</u>						
Banana	2,366	2,567	2,320	2,209	2,090	1165
Cacao	6	6	6	2	2	6
Calamansi	36	40	50	57	58	40
Camote	708	750	805	819	630	663
Cassava	552	670	930	794	367	760
Coconut	27,485	27,261	26,930	26,697	26,698	24999
Coffee	199	201	330	331	325	238
Corn	13,320	13,720	12,680	14,950	10,670	23010
Eggplant	27	29	60	66	79	97
Mango	91	91	91	94	94	NA
Mongo	16	18	17	18	27	29
Paddy	33,050	34,530	34,780	39,190	33,530	44820
Peanut	360	400	242	370	332	355
Pineapple	10	11	12	6	6	9
Tomato	35	37	40	46	44	42
<u>Production (ton)</u>						
Banana	3,953	5,010	4,438	5,802	4,740	4845
Cacao	1	1	1	1	1	0.8
Calamansi	11	12	13	14	15	16
Camote	3,664	4,000	4,336	3,824	2,750	2810
Cassava	883	1,096	1,634	1,327	620	1266
Coconut	93,798	92,632	87,310	73,666	74,477	74477
Coffee	68	73	86	89	77	58
Corn	23,135	22,225	21,365	26,477	28,499	51623
Eggplant	14	15	20	22	29	38
Mango	946	977	941	998	961	NA
Mongo	4	5	4	4	6	7
Paddy	68,800	66,499	69,934	79,102	71,750	102374
Peanut	216	240	145	223	199	213
Pineapple	52	56	60	31	28	42
Tomato	43	44	43	52	50	62
<u>Yield (ton/ha)</u>						
Abaca						
Banana	1.67	1.95	1.91	2.63	2.27	4.16
Cacao	0.12	0.12	0.13	0.35	0.40	0.13
Calamansi	0.32	0.31	0.25	0.25	0.25	0.40
Camote	5.18	5.33	5.39	4.67	4.37	4.24
Cassava	1.60	1.64	1.76	1.67	1.69	1.67
Coconut	3.41	3.40	3.24	2.76	2.79	2.98
Coffee	0.34	0.36	0.26	0.27	0.24	0.24
Corn	1.74	1.62	1.68	1.77	2.67	2.24
Eggplant	0.52	0.52	0.33	0.33	0.37	0.39
Mango	10.40	10.74	10.34	10.62	10.22	NA
Mongo	0.25	0.28	0.24	0.22	0.22	0.24
Paddy	2.08	1.93	2.01	2.02	2.14	2.28
Peanut	0.60	0.60	0.60	0.60	0.60	0.60
Pineapple	5.20	5.09	5.00	5.17	4.67	4.67
Tomato	1.23	1.19	1.08	1.13	1.14	1.48

Source: Southern Tagalog Statistical Yearbook, 1991

B. 17 Income Status of Palawan Province

The average annual family income in the province of Palawan is estimated at 41,415 pesos, classified as 10th among provinces in Region IV and 30th among provinces in the whole country. However, there exists big difference in income levels of the 11 provinces in the region. (refer to tables B.20 and B.21).

Table B.20 Average Income
by Province in Region IV

Region IV	(Unit Pesos/year/family)
Region IV	68,960
① Rizal	93,046
② Laguna	87,030
③ Cavite	85,416
④ Marinduque	67,761
⑤ Occ. Mindoro	61,132
⑥ Batangas	57,099
⑦ Or. Mindoro	51,725
⑧ Aurora	49,548
⑨ Quezon	47,325
⑩ Palawan	41,415
⑪ Romblon	27,387

Source: family Income & Expenditure Survey 1991, NSO

Table B.21 Average Annual Family Income
by Province, 1991 (Lowest to Highest)

Philippine	(Unit Pesos/year/family)
Philippine	65,186
1 Romlon	27,387
2 Siquijor	28,398
3 Masbate	30,534
4 Abra	30,576
5 Bohol	31,266
6 Samal	31,386
7 Camiguin	32,311
8 Ifugao	33,497
9 Sulu	33,601
10 Zamboanga del Norte	33,827
11 Basilan	34,509
12 Misamis Occidental	34,567
13 Cotabato North	34,769
14 Capiz	35,911
15 Antique	36,183
16 Davao Oriental	36,540
17 Sorsogon	35,766
18 Biliran	36,843
19 Leyte	36,943
20 Camarines Norte	38,182
21 Agusan del Sur	38,390
22 Surigao del Norte	38,614
23 Albay	39,323
24 Quirino	40,508
25 Mt. Province	40,660
26 Surigao del Sur	41,005
27 Leyte Southern	41,029
28 Lanao del Norte	41,239
29 Maguindanao	41,396
30 Palawan	41,415
31 Agusan del Norte	41,721
32 Samar Northern	43,134
33 Davao	43,808
34 Negros Oriental	44,591
35 Camarines Sur	45,591
36 Lanao del Sur	45,732
37 Bukidnon	45,810
38 Samar Eastern	45,972
39 Quezon	47,325
40 Negros Occidental	47,676
41 Zamboanga del Sur	48,281
42 Aklan	48,641
43 Isabela	48,785
44 Aurora	49,548
45 Sultan Kudarat	50,186
46 Cotabato South	50,461
47 Catanduanes	50,965
48 Cebu	51,034
49 Mindoro Oriental	51,725
50 Kalinga-Apayao	51,743

Source: family Income & Expenditure Survey 1991, NSO

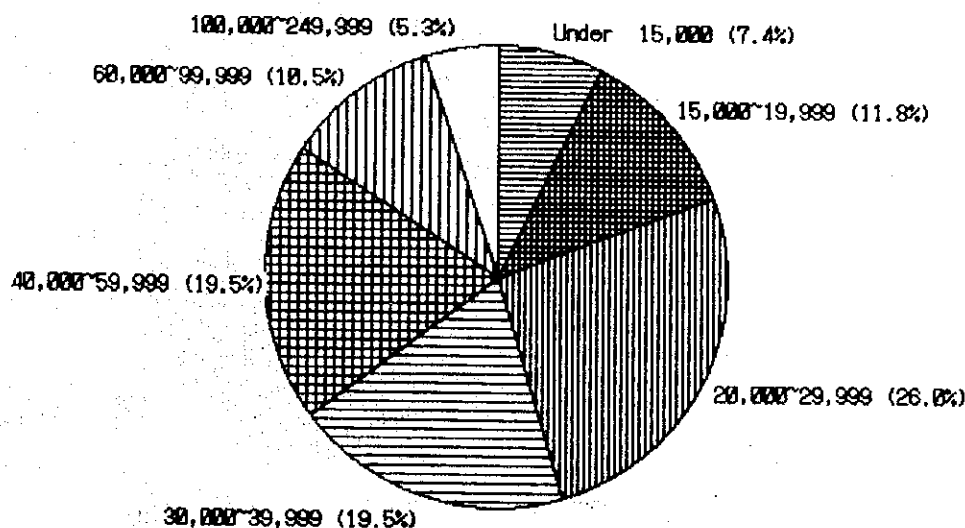
B. 18 Classification of Income in the Province

Of the total household of 101,541 in 1991, some 45% of the family live on incomes below 30,000 pesos. The farm economic survey at the Tagumpay settlement shows that the annual family income received is only 14,900 pesos. Thus, the income of the farm households are generally much lower than the provincial average (refer to Table B. 22).

Table B.22 Total and Average Family Income and Expenditure, Palawan, 1991

Income Class	No. of Families	Income		Expenditure	
		Total (1000 pesos)	Average (pesos)	Total (1000 pesos)	Average (pesos)
Under 15,000	7,479	98,730	13,201	81,000	10,830
15,000~19,999	12,022	216,285	17,991	194,045	16,141
20,000~29,999	26,445	660,847	24,989	585,681	22,147
30,000~39,999	19,776	687,247	34,752	492,344	24,896
40,000~59,999	19,803	949,445	47,944	698,206	35,257
60,000~99,999	10,677	830,586	77,792	565,809	52,993
100,000~249,999	5339	762201	142,774	538898	100,946
250,000 and over	0	0	0	0	0
Total	101,541	4,205,341	41,415	3,155,983	31,081

Source: Family Income and Expenditures Survey, NSO



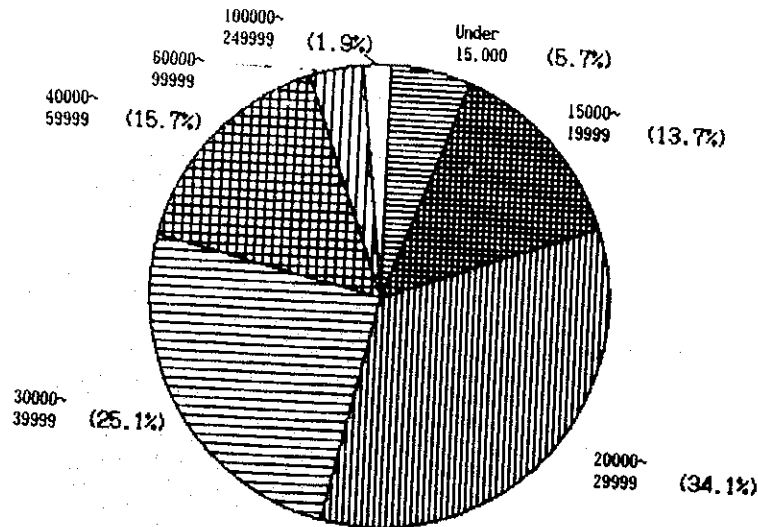
B. 19 Number of Families by Main Source of Income in Palawan

Compared with the average annual income of 41,415 pesos per family, the farm household income in Palawan province is much lower in the Study area as shown below. More than 79% of the farm family are classified as having incomes below 40,000 pesos (refer to Table B. 23).

Table B.23 Number of Families by Main Income Source, Palawan (1991)

	No. of Families	Income Class (pesos)							
		Under 15,000	15000~19999	20000~29999	30000~39999	40000~59999	60000~99999	100000~249999	250000~and over
Wages and Salaries	28490	2360	1180	3156	5750	9305	3966	2772	0
Entrepreneurial Activities	69496	4529	10842	22301	13628	10499	5133	2566	0
Agricultural	57063	3541	10251	19542	11459	8907	1976	1386	0
Crop Farming and Gardening	41665	2360	5723	14204	10471	6533	1578	796	0
Livestock and Poultry Raising	2964	0	590	796	988	0	0	590	0
Fishing	5146	0	590	1784	0	2374	398	0	0
Forestry and Hunting	7287	1180	3349	2758	0	0	0	0	0
Non-Agricultural	12434	988	590	2758	2168	1592	3156	1180	0
Other Source of Income	3554	590	0	988	398	0	1578	0	0
Total	101540	7479	12022	26445	19776	19804	10677	5338	0

Source: Family Income and Expenditures Survey, 1991, NSO



Annual Income of Crop Farming & Gardening

APPENDIX C. CLIMATE AND HYDROLOGICAL CONDITIONS

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C. 1 CLIMATE CONDITIONS

C. 1. 1 Climate Type

According to the PAGASA Coronas classification based on seasonal rainfall distribution, the Philippines is divided into the following four (4) climate types.

- Type I : Two (2) pronounced seasons, dry from November to April, and wet during the rest of the year
- Type II : No dry season with a very pronounced maximum rainfall from November to January
- Type III : Seasons are not very pronounced. Relatively dry from November to April and wet during the rest of the year.
- Type IV : Rainfall is more or less evenly distributed throughout the year.

The Palawan island is climatically divided into two (2) types, Type I and III, and the Study Area belong to Type III. (refer To Figure C.1.1)

C. 1. 2 Climate Observatory and its Observation Period

In Palawan, there are five (5) observatories managed by PAGASA, namely, Coron, Cuyo, Puerto Princesa, Aborlan and Brook's Point. The periods where collected data are available from the above observatories are: 30 years from 1961 to 1990 at Coron, 30 years from 1961 to 1990 at Cuyo, 33 years from 1961 to 1993 at Puerto Princesa, 18 years from 1976 to 1993 at Aborlan, and 10 years from 19981 to 1992 at Brook's Point, respectively. (refer to Table C.1.1 and Figure C.1.2)

Among those observatories, climate data at the Aborlan climate station are adopted for this study as it is the nearest station (19 km) from the Study Area. The 15 climate elements, such as maximum air temperature, minimum air temperature, dry bulb temperature, wet bulb temperature, maximum water temperature, minimum water temperature, cloudiness, wind direction, wind speed, atmospheric pressure, evaporation, daily rainfall,

relative humidity, solar radiation, and sunshine duration, are daily observed since 1976 to date.

C. 1. 3 General Climate Conditions

a) Temperature

The annual mean temperature at the Aborlan station for the 17-year period from 1977 to 1993 is 27.2°C and the annual mean maximum and minimum temperatures at 31.3°C and 22.9°C, respectively. The minimum and maximum monthly mean temperatures are calculated at 26.2°C in January and February and 28.2°C in May, respectively. The difference between the minimum and maximum monthly mean temperature are as little as 2.0°C, thus indicating uniformity in temperatures the year round. (refer to Table C.1.2 and Figure C.1.3)

b) Relative Humidity (RH)

The annual mean relative humidity at the Aborlan station, PGASA, for the 17-year period from 1977 to 1993 is 87.3%. The minimum and maximum monthly mean RHs are calculated at 82.4% in March and 89.3% in July, respectively. The area, therefore, is in humid condition throughout a year. (refer to Table C.1.2 and Figure C.1.4)

c) Wind Speed and Direction

The annual average wind speed at the Aborlan station for the 17-year period from 1977 to 1993 is about 0.9 m/sec. This means the area is quite calm throughout a year. The Prevailing wind directions in wet and dry seasons are south and north-east, respectively. (refer to Table C.1.2 and Figure C.1.5)

d) Cloudiness

The annual mean cloudiness at the Aborlan station for the 17-year period from 1977 to 1993 is 5.1 oktas, and the monthly minimum and maximum cloudiness are 3.6 oktas in March and 6.1 oktas in August, respectively. The sky is mostly in cloudy condition throughout the year (5.0/8.0 of the sky with cloud cover). (refer to Table C.1.2 and Figure C.1.6)

e) Tropical Cyclone

Tropical cyclones are classified by international agreement into three (3) categories by its center wind speed (CWS).

- Tropical depression : CWS up to 63 km/hr
- Tropical storm : CWS between 64 to 117 km/hr
- Typhoon : CWS over 118 km/hr

For 45 years from 1948 to 1992, 34 tropical cyclones have passed the Palawan island of which five (5) were tropical depressions, ten (10) were tropical storms, and 19 were typhoons. According to farmers who are living in the Study Area, only heavy rainfall were observed, and strong wind was not experienced when the tropical cyclones approached Palawan island. This is provably because the Study Area is located At the left side of the tropical cyclone's routes.

C. 1. 4 Rainfall

The Study Area has an annual mean rainfall of 1,587.1 mm for the 17-year period from 1977 to 1993, which consists of 32.4 mm during the four months from January to April, and 1,454.7 mm or equivalent of about 90% during the remaining period from May to December based on the 17 years of observation at Aborlan Climatic Station. (refer to Table C.1.2 and Figure C.1.7)

The following rainfall are calculated based on the 17-year rainfall data from 1977 to 1993 at the said station.

Daily Maximum : 232.7 mm

Consecutive maximum rainfall

- Two (2) days : 327.2 mm
- Three (3) days : 392.1 mm

At the beginning of the wet season, normally in May, and also at the end of the wet season, normally in December, the amount of rainfall is unstable, that is, the monthly rainfall fluctuate year by year. (refer to Figure C.1.8)

C. 1. 5 Climatic Character for Agriculture

From climatic points of view, the Study Area is generally suitable for agricultural production. With almost year round temperature, crops could be cultivated throughout the year. However, with a relatively high humidity, drying and storage of crop grains could become difficult. The average annual cloudiness although slightly lower than the average annual cloudiness of the Philippines and being an influential factor in solar radiation directly affect crop yield.

Although rainfall on an annual basis appears to support crop production, rainfall pattern vary to some extent even within both seasons thereby requiring irrigated agriculture to ensure stable crop production and to increase crop production.

Table C.1.1 Location of Observatories and Observed Elements in Palawan

Station	Coron	Cuyo	Puerto Princesa	Aborlan	Brook's Point
Location					
- Longi.	121° 12' E	121° 02' E	118° 44' E	118° 33' E	117° 57' E
- Lat.	12° 00' N	10° 51' N	09° 45' N	09° 26' N	08° 45' N
- Alt.	14.0m	4.0m	16.0m	4.0m	0.0m
Observation Period					
- From	1961	1961	1961	1976	1981
- To	Date	Date	Date	Date	Date
Observation Items					
Temperature					
- Max.	○	○	○	○	
- Min.	○	○	○	○	
- Dry Bulb	○	○	○	○	
- Wet Bulb	○	○	○	○	
Cloudiness	○	○	○	○	
Rainfall	○	○	○	○	○
Wind					
- Speed	○	○	○	○	
- Direction	○	○	○	○	
Pressure	○	○	○		
Relative Humidity	○	○	○	○	
Evaporation				○	
Thunderstorm	○	○	○		
Lightning	○	○	○		

note: ○ is available

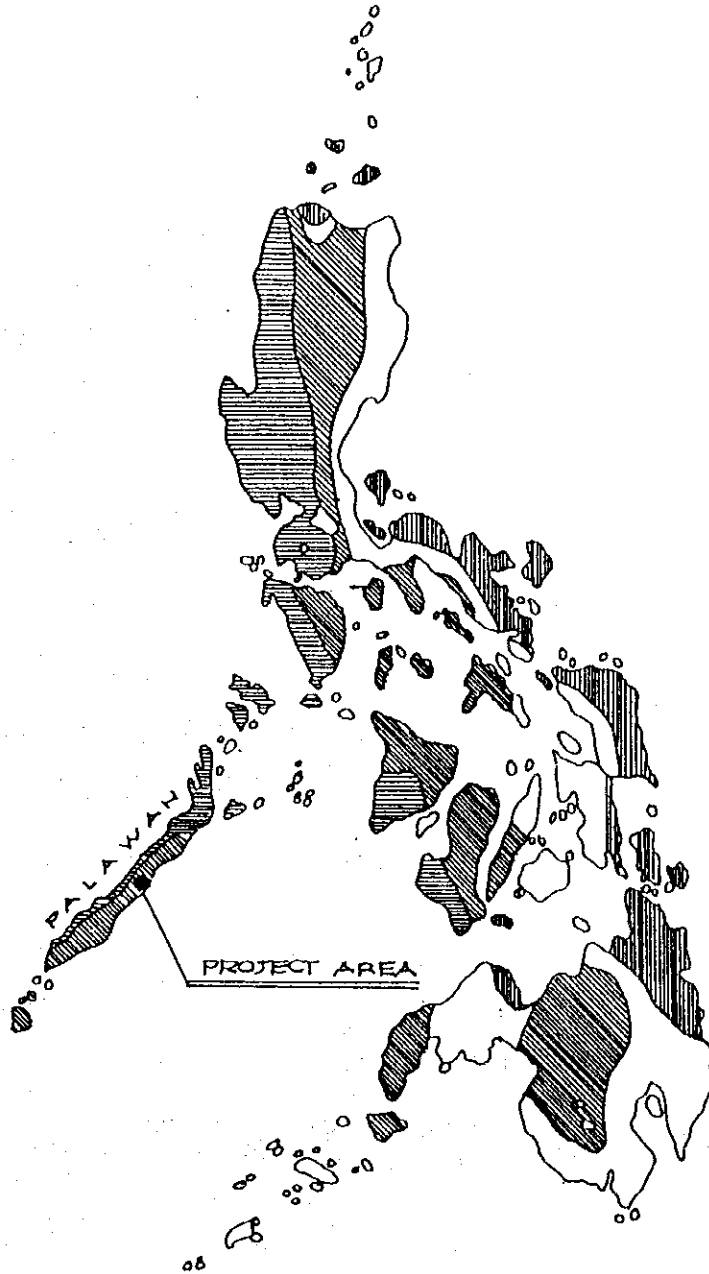
Source: PAGASA

Table C.1.2 Summary of Climatological Conditions

Item	Jan.	Feb.	Mar.	Apr.	May	Jun	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Annual
M. Rainfall													
Mean(mm)	37.1	15.5	34.8	45.0	126.3	164.2	187.2	173.2	180.6	212.1	282.5	128.6	1,587.1
Max. (mm)	152.3	70.1	295.0	129.2	387.5	374.9	296.4	328.6	322.2	349.5	477.1	576.7	576.7
Min. (mm)	2.2	0.0	0.0	5.4	4.7	43.2	49.0	60.5	69.8	112.0	99.6	14.2	0.0
D. Rainfall													
Max. (mm)	76.7	25.0	111.4	55.2	91.2	80.2	120.9	77.2	90.2	125.5	208.2	232.7	232.7
Temperature													
Mean(°C)	26.2	26.2	26.8	27.9	28.2	27.7	27.2	27.3	27.4	27.3	27.1	26.6	27.2
Max. (°C)	30.5	30.8	31.7	32.6	32.3	31.4	31.1	31.2	31.5	31.2	31.0	30.5	31.3
Min. (°C)	21.8	21.6	21.8	23.1	24.1	23.9	23.2	23.3	23.2	23.4	23.2	22.7	22.9
Cloudiness (okta)	4.9	4.6	3.6	3.8	4.6	5.9	6.0	6.1	5.9	5.7	5.3	4.8	5.1
Wind Speed													
Direction	NE	NE	NE	NE	SE	SE	S	S	SW	NE	NE	NE	NE
Speed(m/sec)	1.2	1.2	1.4	1.1	0.6	0.6	0.6	0.8	0.7	0.9	0.9	1.3	0.9
R. Humidity (%)	88.6	87.6	84.4	82.4	84.1	87.6	89.3	89.2	88.7	88.2	89.1	88.5	87.3
Pan Evap. (mm/day)	4.3	5.1	5.9	5.8	4.7	3.4	3.3	3.4	3.5	3.4	3.3	3.7	4.2

Source: 1977 to 1993, Aborlan, PAGASA

Figure C.1.1 Coronas Climatic Classification Map



LEGEND





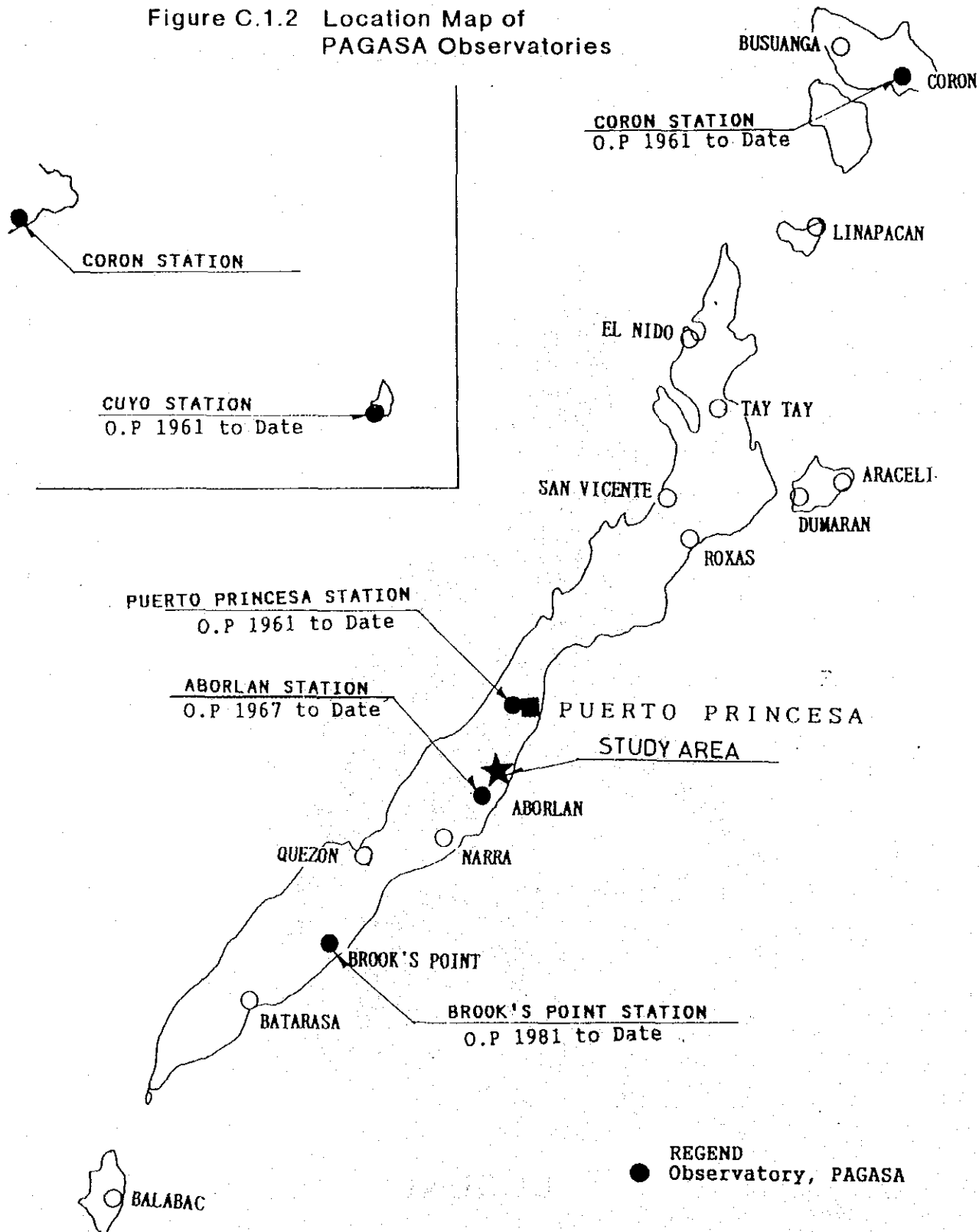
- | | |
|--|---|
| <p>  TYPE I TWO PRONOUNCED SEASON DRY FROM NOVEMBER TO APRIL DURING THE REST OF THE YEAR </p> | <p>  TYPE III SEASON ARE NOT VERY PRONOUNCED RELATIVELY DRY FROM NOVEMBER TO APRIL AND WET DURING THE REST OF THE YEAR </p> |
| <p>  TYPE II NO DRY SEASON WITH A VERY PRONOUNCED MAXIMUM RAINFALL FROM NOVEMBER TO JANUARY </p> | <p>  TYPE IV RAINFALL IS MORE OR LESS EVENLY DISTRIBUTED THROUGH OUT THE YEAR </p> |

Figure C.1.2 Location Map of
PAGASA Observatories



Note: O.P - Observation Period

Figure C.1.3 Monthly Mean Temperature
(1977 to 1993, Aborlan, PAGASA)

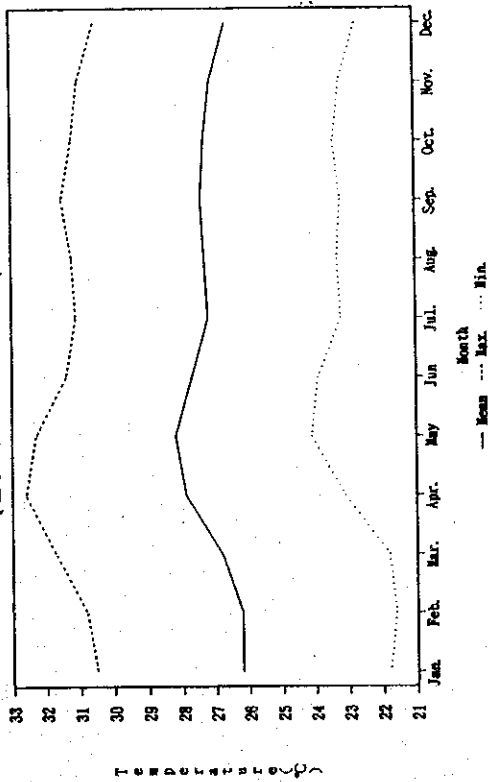


Figure C.1.5 Monthly Mean Wind Speed
(1977 to 1993, Aborlan, PAGASA)

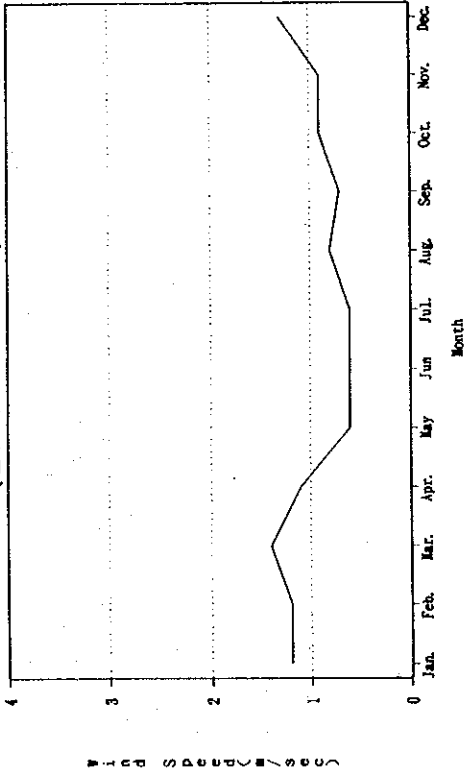


Figure C.1.4 Monthly Mean Relative Humidity
(1977 to 1993, Aborlan, PAGASA)

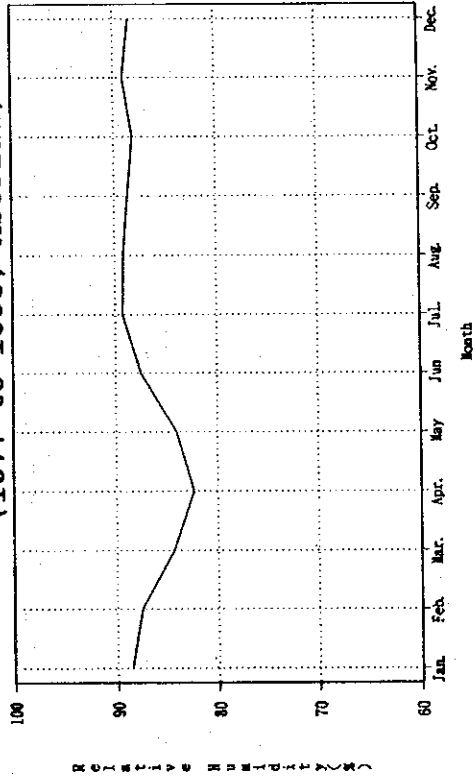


Figure C.1.6 Monthly Mean Cloudiness
(1977 to 1993, Aborlan, PAGASA)

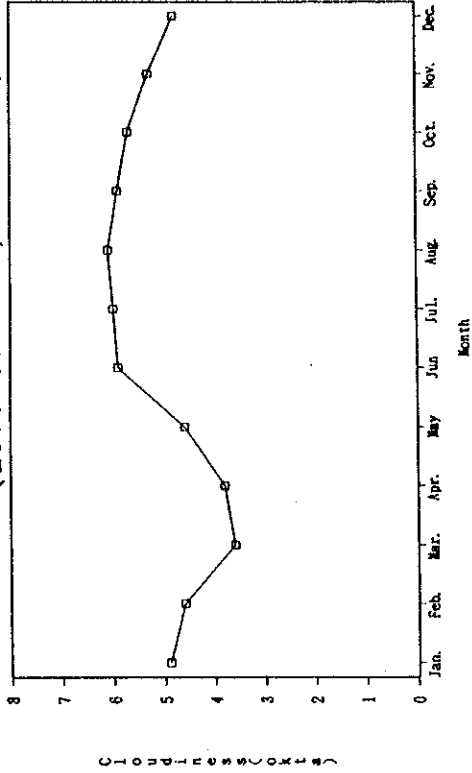


Figure C.1.7 Monthly Mean Rainfall
(1977 to 1993, Aborlan, PAGASA)

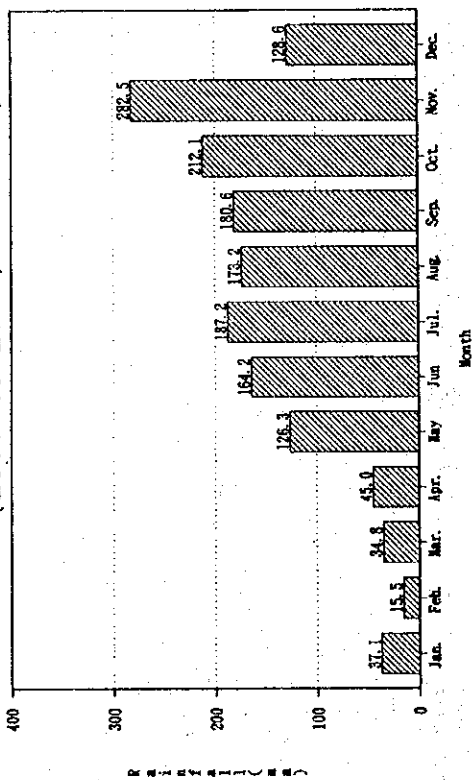
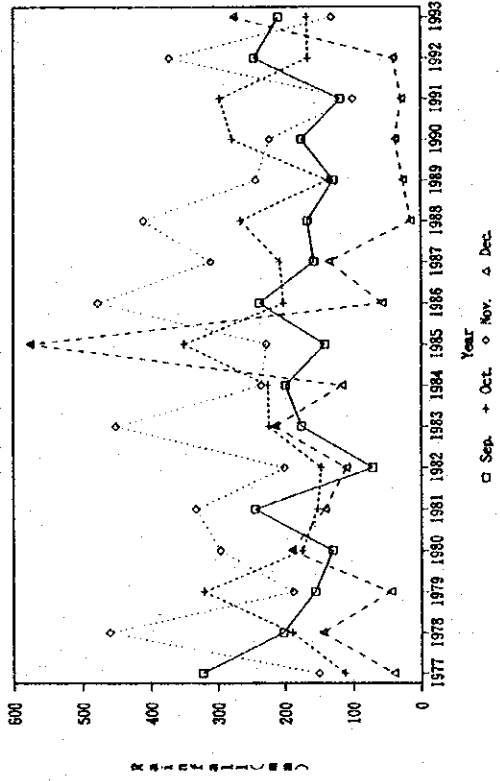
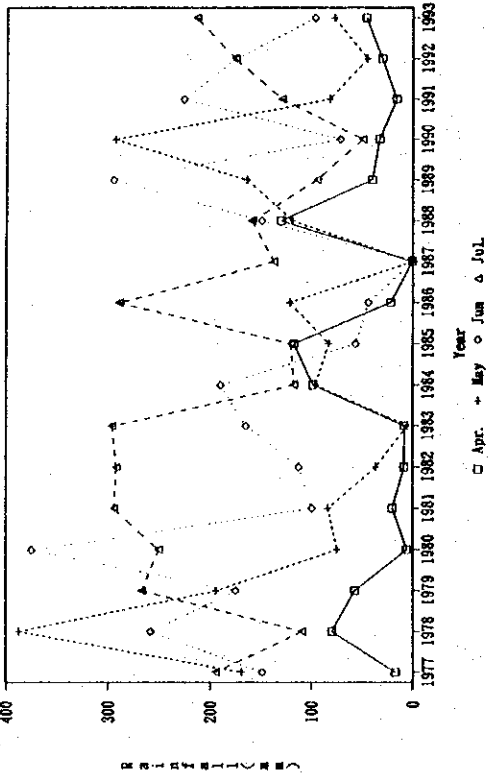


Figure C.1.8 Fluctuation of Monthly Rainfall
(1977 to 1993, Aborlan, PAGASA)



C. 2. HYDROLOGICAL CONDITIONS

C. 2. 1 Present Conditions of Streams

The Inagawan river originates from the mountainous area which is located at almost the center of the Palawan island. It is meandering and flows down through the northern part of the Study Area. The river with a drainage area of 179.3 sq.km at the river mouth and with a length of 46.5 km, drains into the Sulu sea. The river bed has steep slope of about 1/100 at the mountainous area, about 1/200 in the middle portion and about 1/500 in the plain area. The Inagawan river within the section of about 2 km from the river mouth is tidal. (refer to Figures C.2.1 and C.2.2)

Vegetation of the drainage area at the mountain part is in good condition because of the reserved forest. Therefore, the river continues to have discharge even during the dry season. However, in its tributaries (with four streams) having small drainage area (maximum drainage area of 33 sq.km), little or no discharges are observed during the dry season. These streams, such as Isog, Isaub and two (2) small other streams, originate from within the Study Area. These streams mostly function as drainage canal having natural earth banks. Except the Isaub river, these streams have not been improved nor utilize for agricultural purposes. (refer to Figure C.2.3)

C. 2. 2 Water Level Gauging Station and its Observation Period

The Palawan Integrated Area Development Project Office (PIADPO) had measured daily water levels during two (2) years from March, 1985 to September, 1986 at a site presently designed as No.2 station. A rating curve based on eleven (11) actual discharge measurements from May, 1985 to December, 1986 was developed in order to calibrate the water level data. (refer to Figure C.2.4)

On May 24, 1993, DAR established three (3) water level gauging stations with automatic record equipment comprising of a KADEC-UN automatic water level sensor and a recorder provided by JICA. The water level observations are still on-going, to date. The lower station, referred to as No.1 station, was installed at the existing diversion dam of the Inagawan CIS,

the middle station referred to as No.2 station was located at the same point of the above PIADP station, and the upper one, referred as No.3 station, was constructed at the foot of the mountainous area. (refer to Figure C.2.2)

Results of inspection show that measurement data of No.1 gauging station indicated an abnormal condition since May 3, 1994. However, for the two other stations, No.2 and No.3 gauging stations, data observed appear to be more accurate. (refer to Figure C.2.5)

C. 2.3 Discharge Measurement

The current measurements at No.2 and 3 stations were conducted by the DAR up to the Study Team's arrival at the Study Area. The Study Team executed the discharge measurement six (6) times during the dry season from late January to the end of February, 1994 and during the wet season in August, 1994. (refer to Table C.2.1)

The rating curve have been developed at No.2 and 3 gauging stations. As a result of examination, the coefficient of correlation obtained was 0.982 at No.2 gauging station and 0.518 at No. 3 station. The low coefficient of No.3 gauging station, may be due to the fact that measurement of the water depth was concentrated within 1.0 m and below and also because the station is affected by backwater. (refer to Figure C.2.6)

C. 2.4 Design Flood Discharge

Design flood discharge were verified by the Rational Method and Fukushima and Kadoya's Formula at Site D. The maximum rainfall with a 100 years return period was calculated at 236.1 mm/day by Iwai Method. Runoff coefficient was calculated at 60% based on DPWH planning guidelines. Design flood discharge were calculated as follows;

$$\text{Rational Method : } Q_{\max} = 0.2778 \times C \times R_t \times A$$

Where: Q_{\max} = discharge in cum/sec

C = runoff coefficient = 0.60

A = watershed area = 118.1 sq.km

Rt = rainfall intensity in mm/hr

Mononobe Formula

$$R_t = R_{24}/24 \times (24/T)^{(2/3)}$$

Where: Rt = intensity rainfall in mm/day
R24 = design rainfall of 236.1 mm/day
T = duration of rainfall equal to the time of concentration in hours

Fukushima and Kadoya's Formula

$$T = 150A^{0.22} \times R_t^{(-0.35)} = 1.7 \text{ hr}$$

$$R_t = (236.1/24 \times (24/1.7)^{(2/3)}) = 57 \text{ mm/hr}$$

$$Q_{\max} = 0.2778 \times 0.60 \times 57 \times 118.1 = 1,130 \text{ cum/sec}$$

The design flood based on probable rainfall would be calculated as follows: (refer to Table C.2.2)

Site Eu Watershed	= 14.5sq.km	Design Flood	= 200 cu.m/sec
Site El Watershed	= 15.0sq.km	Design Flood	= 210 cu.m/sec
Site D Watershed	= 118.1sq.km	Design Flood	= 1,130 cu.m/sec
Site C Watershed	= 110.7sq.km	Design Flood	= 1,060 cu.m/sec
Site EuM Watershed	= 13.9sq.km	Design Flood	= 190 cu.m/sec
Site LD Watershed	= 118.5sq.km	Design Flood	= 990 cu.m/sec

(With a 50 years return period)

C. 2. 5 Long-Term Runoff Analysis

The long-term runoff analysis was carried out by using available climatic data, since discharge data of the Inagawan river is not available.

a) Rainfall Analysis

Rainfall data at the Aborlan station (from PAGASA) for the period 1977 to 1993 (17 years) were used for the analysis of the long-term runoff. However, data gathered were incomplete as there are missing rainfall data in July 1977, January to June and November in 1987, in April 1988 and in March 1991. These missing data were figured out by using the following procedure for the long-term analysis. (refer to Figure C.2.7)

1) Correlation analysis

In order to complement the missing data at the Aborlan station, correlation analysis of rainfall data between the Aborlan and Puerto Princesa stations were carried out. The linear and power regression equations on the correlation analysis were used. The analyzed data were on a daily and monthly basis. Based on the results of the correlation analysis, the highest correlation efficient on a monthly basis by the power regression equation is the value of 0.808. To complement the missing rainfall data this power regression equation was applied. (refer to Table C.2.3 and Figure C.2.8)

2) Complement of rainfall data

In cases of non-availability of monthly data, the power regression equation was applied by using the rainfall data of Puerto Princesa station. In cases of non-availability of daily data, the following equation was applied to complement the non-available data. (refer to Table C.2.4)

$$R = TRa \times Rp / (TRp - Rp')$$

Where: R = Daily rainfall at Aborlan (mm)
TRa = Monthly rainfall amount excluding data not available at Aborlan station (mm)
Rp = Daily rainfall at Puerto Princesa Station (mm)
TRp = Monthly rainfall at Puerto Princesa station (m)

Rp' = Sum of rainfall at Puerto Prince-sa during the period of non-available data at Aborlan station (mm)

3) Result of analysis

Based on the complemented rainfall data from 1977 to 1993 at the Aborlan station, the annual rainfall calculated was 1,581.7 mm. The various probable years at nearly 1/10 probable year by the Iwai method, were 1990 on an annual rainfall basis, 1990 on the dry season rainfall basis, 1989 on the wet season rainfall basis, and 1978 on the continuous drought days basis. Based on the overall justification of the results, 1990 is equivalent to the 1/10 probability. (refer to Tables C.2.5 and C.2.6)

b) Runoff Analysis

1) Runoff discharge for verification

There are actual observation data on water level for two (2) years in 1985 and 1986 by foreign assistance and for nearly one (1) year by this study in 1993. There is a big difference in the results of the former data on runoff coefficient, especially during the dry season, with the runoff coefficient fluctuating between 18 to 753%. The Study Area has a problem and constraint on the amount of discharge during the dry season. Because of the low reliability of the former data, this discharge data is not suitable for this study.

On the other hand, results of runoff data undertaken in 1993 show a reliable runoff coefficient, from about 30 to 81%. Therefore, for the long-term runoff analysis, this data will be used as verification data. (refer to Table C.2.7)

2) Runoff analysis

For the long-term runoff analysis, many methods such as the tank model method, storage function method, etc. maybe used. For the Study Area, daily rainfall, evaporation rate and discharge data are available at the Aborlan station. Taking into consideration the non-