SAMAR
INTEGRATED RURAL DEVELOPMENT PROJECT

THE MASTER PLAN

FOR

THE INTEGRATED AGRICULTURAL/ RURAL DEVELOPMENT PROJECT IN WESTERN SAMAR

APPENDIX I

DECEMBER 1988

JAPAN INTERNATIONAL COOPERATION AGENCY

SAMAR
INTEGRATED RURAL DEVELOPMENT PROJECT

THE MASTER PLAN

FOR

THE INTEGRATED AGRICULTURAL/ RURAL DEVELOPMENT PROJECT IN WESTERN SAMAR

APPENDIX I

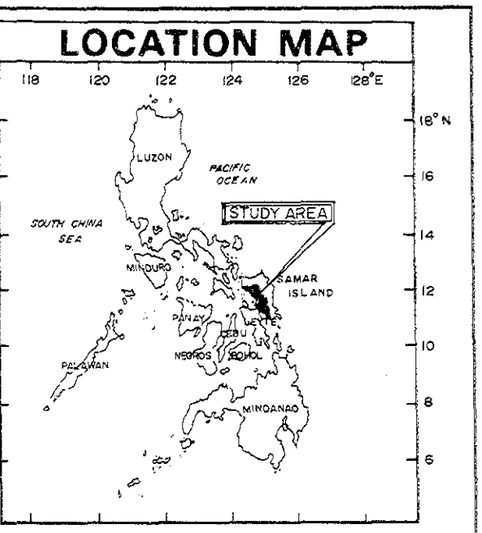
(DEVELOPMENT PROGRAM FOR MASTER PLAN)

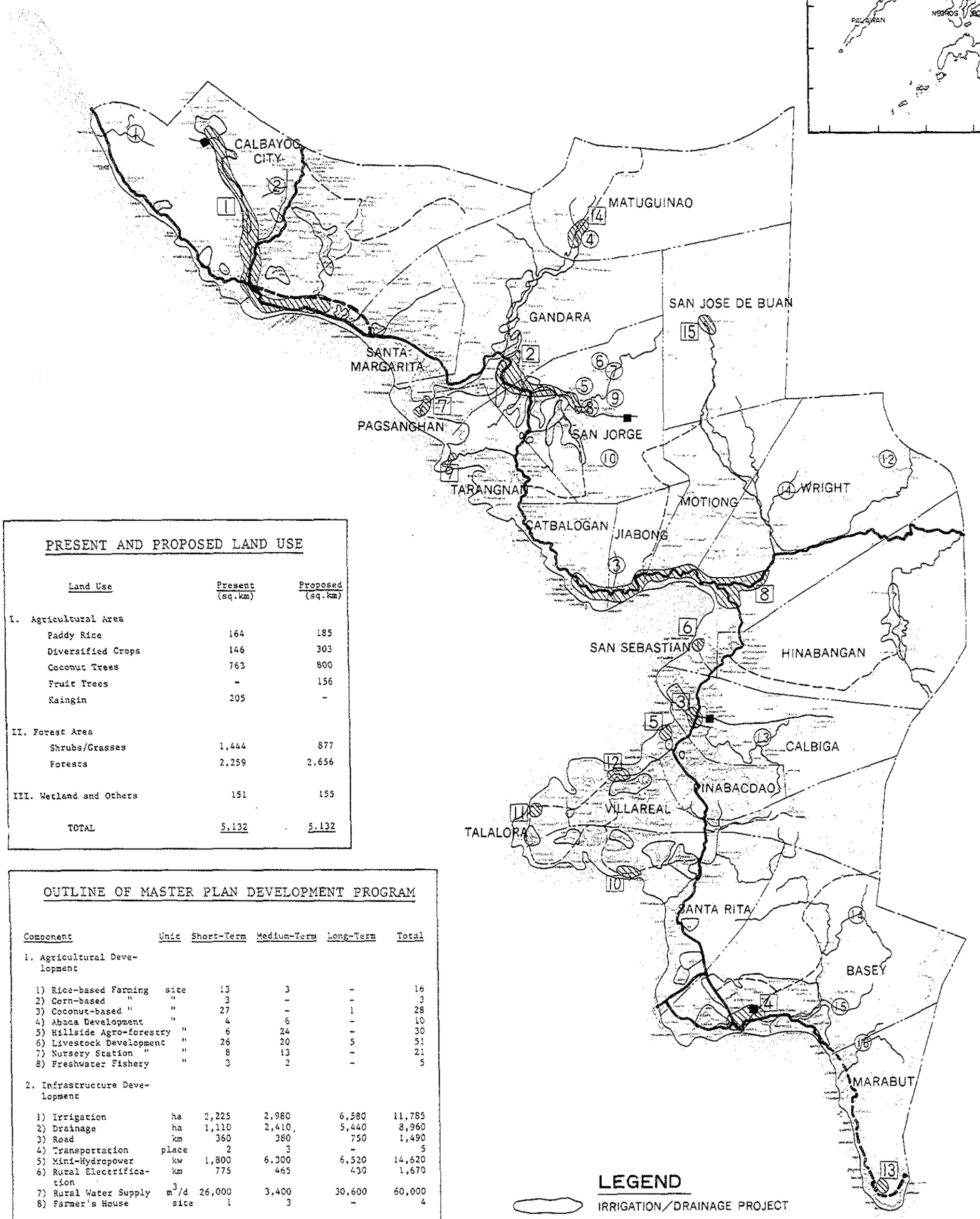
DECEMBER 1988

JAPAN INTERNATIONAL COOPERATION AGENCY

GENERAL PLAN

THE INTEGRATED AGRICULTURAL/
RURAL DEVELOPMENT PROJECT
IN WESTERN SAMAR





PRESENT AND PROPOSED LAND USE

Land Use	Present (sq.km)	Proposed (sq.km)
I. Agricultural Area		
Paddy Rice	164	185
Diversified Crops	146	303
Coconut Trees	763	800
Fruit Trees	-	156
Kaingin	205	-
II. Forest Area		
Shrubs/Grasses	1,444	877
Forests	2,259	2,656
III. Wetland and Others	151	155
TOTAL	5,132	5,132

OUTLINE OF MASTER PLAN DEVELOPMENT PROGRAM

Component	Unit	Short-Term	Medium-Term	Long-Term	Total
1. Agricultural Development					
1) Rice-based Farming	site	13	3	-	16
2) Corn-based "	"	3	-	-	3
3) Coconut-based "	"	27	-	1	28
4) Abaca Development	"	4	6	-	10
5) Hillside Agro-forestry	"	6	24	-	30
6) Livestock Development	"	26	20	5	51
7) Nursery Station "	"	8	13	-	21
8) Freshwater Fishery	"	3	2	-	5
2. Infrastructure Development					
1) Irrigation	ha	2,225	2,980	6,580	11,785
2) Drainage	ha	1,110	2,410	5,440	8,960
3) Road	km	360	380	750	1,490
4) Transportation	place	2	3	-	5
5) Mini-Hydropower	kw	1,800	6,300	6,520	14,620
6) Rural Electrification	km	775	465	430	1,670
7) Rural Water Supply	m^3/d	26,000	3,400	30,600	60,000
8) Farmer's House	site	1	3	-	4
3. Social Services Development					
1) Health Services (BHS)	place	30	40	120	190
2) Education	room	610	770	820	2,200
3) Housing	D.U.	1,350	1,350	2,600	5,300
4) Communication	sta.	76	41	28	145
4. Small-Scale and Cottage Industry	place	7	2	2	11
5. ADPP	place	1	-	-	1

LEGEND

- IRRIGATION/DRAINAGE PROJECT
- RURAL WATER SUPPLY PROJECT AND WATER SOURCE
- MINI-HYDROPOWER GENERATION PROJECT
- ROAD DEVELOPMENT
  - National Roads (Existing, Proposed)
  - Other Roads (Existing, Proposed)
- BOUNDARY OF MUNICIPALITY
- MAJOR RIVER

CONTENTS

ABBREVIATION

ABBREVIATIONS

AGENCIES, INSTITUTIONS AND ORGANIZATIONS

BAEcon	Bureau of Agricultural Economics
BAPA	Barangay Power Association
BAS	Bureau of Agricultural Statistics
BAEx	Bureau of Agricultural Extension
BAT	Bureau of Air Transportation
BCGS	Bureau of Coast and Geodetic Survey
BDT	Bureau of Domestic Trade
BFD	Bureau of Forest Development
BFT	Bureau of Foreign Trade
BIR	Bureau of Internal Revenue
BL	Bureau of Lands
BMG	Bureau of Mines and Geo-Sciences
BOI	Board of Investment
BOP	Bureau of Posts
BOS	Bureau of Soils
BSMI	Bureau of Small and Medium Industries
BUTEL	Bureau of Telecommunications
CB/CBP	Central Bank of the Philippines
DA	Department of Agriculture
DAR	Department of Agrarian Reform
DBM	Department of Budget and Management
DECS	Department of Education, Culture and Sports
DFA	Department of Foreign Affairs
DLG	Department of 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
ELCO	Electric Cooperative
EOJ	Embassy of Japan
FDC	Forestry Development Center
FIDA	Fiber Industry Development Authority
FNRI	Food and Nutrition Research Institute
FORI	Forest Research Institute
FPOP	Family Planning Organization of the Philippines
FPRDI	Forest Products Research and development Institute
FSDC	Farm System Development Corporation

GCMCC	Government Corporation Monitoring Coordinating Committee
GSIS	Government Service Insurance System
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 the Promotion of Science
LBP	Land Bank of the Philippines
LWUA	Local Water Utilities Administration
MWSS	Metropolitan Waterworks and Sewerage System
NACIAD	National Council on Integrated Area Development
NACIDA	National Cottage Industries Development Authority
NDC	National Development Corporation
NCSO	National Census and Statistics 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
NWRC	National Water Resources Council
OEA	Office of Energy Affairs
OECF	Overseas Economic Cooperation Fund
PAGASA	Philippine Atmospheric Geophysical and Astronomical Service Administration
PCA	Philippine Coconut Authority
PCARRD	Philippine Council for Agricultural Resources Research and Development
PCCI	Philippines Chamber of Commerce and Industry
PCIERD	Philippine Council for Industry and Energy Research and Development
PCGG	Presidential Commission on Good Government
PCGR	Presidential Commission on Government Reorganization
PNB	Philippine National Bank
PNOC	Philippine National Oil Corporation
PPA	Philippine Ports Authority

RDC	Regional Development Council
RWDC	Rural Waterworks Development Corporation
SAMELCO I	Samar I Electric Cooperation Inc.
SAMELCO II	Samar II Electric Cooperation Inc.
SIRDP	Samar Integrated Rural Development Project
SSS	Social Security System
TBAC	Technical Board for Agricultural Credit
UEP	University of the Eastern Philippines
UN	United Nations
UNDP	United Nations Development Program
UNESCO	United Nations Educational Scientific and Cultural Organization
UNICEF	United Nations Children's Fund
UNIDO	United Nations Industrial Development Organization
UP	University of the Philippines
ViSCA	Visayas State College of Agriculture

OTHER TERMS

A & D	Alienable and Disposable
AFF	Agro-Forestry Farms
APD	Areas for Priority Development
AITTP	Agro-Industrial Technology Transfer Program
BHS	Barangay Health Station
CAL	Certificate of Agricultural Leasehold
CCHP	Comprehensive Community Health Program
CBR	Crude Birth Rate
CDR	Crude Death Rate
CEDP	Community Employment and Development Program
CLT	Certificate of Land Transfer
CPI	Consumer Price Index
CSME	Cottage, Small and Medium Enterprise
CSMI	Cottage, Small and Medium Industries
EO	Executive Order
FB	Farmer Beneficiary
FIES	Family Income and Expenditure Survey
FOB	Free on Board
GDP	Gross Domestic Product
GNP	Gross National Product
GO	Government Organization
GOJ	Government of Japan
GOP	Government of the Philippines
GRDP	Gross Regional Domestic Product
GVA	Gross Value Added
HNFP	Health Nutrition and Family Planning
IAD	Integrated Area Development
IEC	Information, Education and Communication
IMR	Infant Mortality Rate
ISH	Integrated Survey of Households
KKK	Kilusang Kabuhayan at Kaunlaran
LADP	Local Administration Development Program
LHO	Leasehold Operation
KIT	Land Investment Trust
MCRA	Married Couples of Reproductive Age
MIA	Manila International Airport
MIS	Management Information System
NFE	Non Formal Education
NGO	Non-Government Organization
ODA	Official Development Assistance
OECF	Overseas Economic Cooperation Fund
OSY	Out-of School Youth
PD	Presidential Decree
PFNP	Philippine Food and Nutrition Program
RA	Republic Act
R & D	Research and Development
RDIP	Regional Development Investment Program
RDF	Regional Development Fund
RHU	Rural Health Unit
TB	Tuberculosis
TFR	Total Fertility Rate
TLA	Timber Lease Agreement
WFP	World Food Program

CONVERSION FACTORS, MEASUREMENT AND GLOSSARY

CONVERSION FACTORS

Unit		Comparison	English Equivalent
Unit of Length:			
Millimeters	(mm)	0.001 m	0.0394 inch
Centimeter	(cm)	0.01 m	0.3937 inch
Meter	(m)		3.2809 feet
Kilometer	(km)	1,000 m	0.6214 mile
Unit of Area:			
Square centimeter	(cm^2)	0.0001 m^2	0.155 square inch
Square meter	(m^2)		10.764 square feet
Hectare	(ha)	10,000 m^2	2.471 acres
Square kilometer	(km^2)	1,000,000 m^2	0.3861 square mile
Unit of Volume:			
Cubic centimeter	(cm^3)		0.061 cubic inch
Liter	(lit)	1,000 cm^3	0.264 US gallons (0.21997 gallons)
Cubic meter	(m^3)	1,000 lit	35.3147 cubic feet
Unit of Weight:			
Gram	(g)		0.0353 ounce
Kilogram	(kg)	1,000 g	2.2046 pounds
Metric ton	(ton or mt)	1,000 kg	2,204.6 pounds

UNIT OF MEASUREMENT

mm	:	millimeter(s)
cm	:	centimeter(s)
m	:	meter(s)
km	:	kilometer(s)
cm^2	:	square centimeter(s)
m^2	:	square meter(s)
km^2	:	square kilometer(s)

lit	:	liter(s)
m^3	:	cubic meter(s)
MCM or 10^6	:	million cubic meter(s)
lit/sec	:	liter per second
m/sec	:	meter(s) per second
PPM or ppm	:	part(s) per million
g	:	gram(s)
kg	:	kilogram(s)
ton	:	ton(s)
cavan	:	50 kg
m^3/sec	:	1,000 lit/sec = 35.3145 cubic feet per second = 15,850 US gallons per minute
knot(s)	:	1.86 km/hr = 0.515 m/sec
lit/sec/day	:	8.64 mm depth over one hectare
10 mm depth over one (1) hectare		= 1.157 lit/sec/day = 3,532 cubic feet
sec	:	second(s)
min	:	minute(s)
hr	:	hour(s)
Max. or max.	:	maximum
Min. or min.	:	minimum
%	:	percent(s)
No.	:	number
°C	:	degree centigrade
°F	:	degree fahrenheit
Cl	:	chlorine
HP	:	horse power
W	:	watt(s)
KW	:	kilowatt(s)
MW	:	megawatt(s)
WH	:	watt(s) hour
KWH	:	kilowatt(s) hour = 1,000 WH

MWH	:	megawatt(s) hour = 1,000 KWH
EL	:	elevation above MSL
MSL	:	mean sea level
FWL	:	full water level
HWL	:	high water level
LWL	:	low water level
ET	:	evapotranspiration
ETcrop	:	evapotranspiration of crop
N	:	nitrogen
P	:	phosphorus
K	:	potassium
LV	:	local variety
LIV	:	local improved variety
HYV	:	high yielding variety
O & M	:	operation and maintenance
EIRR	:	economic internal rate of return
B/C	:	benefit cost ratio
FY	:	fiscal year (1st of January to 31st of December)
₱	:	peso(s) = US$ 0.049 (as of June, 1987)
$	:	dollar(s) = 20.50 pesos (as of June, 1987)

GLOSSARY

Study Area	:	Area of 5,132 km^2 covered by the Master Plan of the Integrated Agricultural/Rural Development Project in Western Samar
province	:	A political subdivision of a country comprising several municipalities
municipality	:	A political subdivision of a province comprising several barangays
Barangay	:	A political subdivision of a municipality comprising several villages
poblacion	:	A political center of a town
Monsoon	:	Periodic wind that blows from the sea to the continent and oppositely in rainy season

Trade wind	:	One of three Philippines air currents, comprising from a generally easternly direction reaching the island during the period from February to April.
Tropical cyclone	:	PAGASA classifies the tropical cyclone by the wind speed as follows; - Tropical Depression ; up to 17.1 m/sec (33 knots) - Tropical Storm ; 17.2 m/sec (34 knots) to 32.6 m/sec (63 knots) - Typhoon ; over 32.7 m/sec (64 knots)
Paddy (Oryza sativa)	:	The rice plant which bears a staple cereal, or the cereal itself unhulled.
IR62 or 64	:	High yielding varieties from IRRI, Los Baños, Philippines
Cogon (Imperata cyclindrica)	:	A coarse grass which usually covers idle lands or abandoned clearing.
Ganta	:	A common unit of volume for rice equivalent to 2.24 kg of milled rice
Bamboo (Bambusa spinosa)	:	A woody grass with a big hollow in the center of the internodes, growing in groves or clumps reaching a height of about 25 m or more.
Nipa (Nypa fructicans)	:	Heave-leafed type of palm used in thatching huts.
Share Tenancy	:	A practice where operators rent the land they work and pay as rent a share of the cash or crops grown.
Carabao	:	The animal that most farmers used for plowing and other farm works. It is about the size of an ox and its similar to the water buffalo in other countries.
Fiesta	:	Spanish term for feast, celebrated pompously once a year to honor the patron saint.
Payatak	:	Traditional land preparation method, by trampling by using more than two carabaos without any other instruments.
Kaingin	:	Deforestration by shifting cultivation with slashing and burning forest/brush.
Banca	:	small boat
Survival rate	:	The number who graduate/ the number who enroll
Intra-regional	:	Within a region
Inter-regional	:	Between regions

APPENDIX A. GENERAL

APPENDIX A. GENERAL

APPENDIX A. GENERAL

A-1. Implementing Arrangement (I/A) for Master Plan Study

IMPLEMENTING ARRANGEMENT OF THE TECHNICAL COOPERATION
BETWEEN THE JAPAN INTERNATIONAL COOPERATION AGENCY
AND
THE SAMAR INTEGRATED RURAL DEVELOPMENT PROJECT
FOR
THE MASTER PLAN STUDY
ON
THE INTEGRATED AGRICULTURAL / RURAL DEVELOPMENT PROJECT
IN WESTERN SAMAR IN THE REPUBLIC OF THE PHILIPPINES

AGREED
BETWEEN
THE JAPAN INTERNATIONAL COOPERATION AGENCY
AND
THE SAMAR INTEGRATED RURAL DEVELOPMENT PROJECT

MANILA, 3RD DECEMBER, 1986

MR. JOSE A. BALITE III
PROJECT DIRECTOR
THE SAMAR INTEGRATED RURAL
DEVELOPMENT PROJECT

MR. TOSHIKI SAITO
LEADER OF THE PRELIMINARY
STUDY TEAM
THE 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 Master Plan Study on the Integrated Agricultural/Rural Development Project in Western Samar (hereinafter referred to as "the Study"), and exchanged the Note Verbales with GOP concerning the implementation of the Study.

The Japan International Cooperation Agency (hereinafter referred to as "JICA"), the official agency responsible for the implementation of the technical cooperation programmes of GOJ, will undertake the Study, in accordance with the relevant laws and regulations in force in Japan.

On the part of GOP, the Samar Integrated Rural Development Project (hereinafter referred to as SIRDP) shall act as counterpart agency to the Japanese study team and also as coordinating body in relation with other governmental and non-governmental organizations concerned for the smooth implementation of the Study.

The present document consitutes the implementing arrangement betweenJICA and SIRDP under the above-mentioned Notes Verbales excharged between two governments.

II. OBJECTIVES OF THE STUDY

The objectives of the Study is to formulate the Master Plan for rural development of the Samar Province of Samar Island.

III. OUTLINE OF THE STUDY

III-1. STUDY AREA

The study area covers the rural area of the Samar Province except mountaneous land and small islands.

III-2. OUTLINE OF THE STUDY

The Study consists of two stages. At the first stage, data collection and field survey will be conducted in order to obtain basic data necessary for formulation of Master Plan. The second stage will cover supplementary field survey mainly for selected project components and areas in the province to finalize the Master Plan.

1. First Stage

1-1. Data collection and field survey

To collect and review available data and information relevant to the Study and to carry out feild survey on the following items:

(1) Natural condition
   a. Topography
   b. Meteorology
   c. Hydrology
   d. Geology
   e. Soil

(2) Social condition
   a. Population and habitation
   b. Social organization
   c. Industry and economy

(3) Agriculture
   a. Farming
   b. Land use
   c. Land holding
   d. Cropping
   e. Agricultural organization
   f. Storage facilities
   g. Processing of agricultural products

(4) Agricultural infrastrucure
   a. Irrigation and drainage system
   b. Farm land conservation
   c. Farm road and rural road

(5) Agro-economy
   a. Marketing system
   b. Farmer's income and productivity
   c. Agricultural credit
   d. Farmars organization
   e. Extension service
   f. Agro-industry

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(6) Rural infrastructure
   a. Rural electrification
   b. Communication
   c. Rural water supply
   d. Welfare
   e. Education

1-2. To select priority project components and areas in the province based on the findings and discussions with authorities concerned of the Government of Philippines.

1.3. Preliminary Study and Analysis
Based on the result of the above-mentioned survey, the preliminary study and analysis will be conducted.

1.4. Preliminary formulation of the Master Plan

2. Second Stage

On the basis of the results of the first stage, the following will be carried out.

2-1. Supplementary survey and additional data collection

2-2. Comprehensive studies and analysis
(1) To formulate the Master Plan for development, taking into consideration such components as follows:
   a. Development of irrigation and drainage system
   b. Improvement of rural roads and farm roads
   c. Improvement of rural water supply
   d. Rural electrification
   e. Institutional development
   f. Rural health services
(2) To formulate priority project(s)
   a. Preliminary design of the major structures
   b. Approximate estimation of development cost

IV. STUDY SCHEDULE

The Study will be executed in accordance with the attached tentative work schedule.

J. S.

V. REPORTS

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

(1) Inception report
Twenty (20) copies at the commencement of the first stage field work.

(2) Field report (I)
Twenty (20) copies at the end of the first stage field work.

(3) Interim report
Twenty (20) copies at the commencement of the second stage field work.

(4) Field report (II)
Twenty (20) copies at the end of the second stage field work.

(5) Draft final report
Twenty (20) copies within one (1) month after the end of the second stage home office work.
GOP is requeted to provide its comments on the draft final report within one (1) month after its receiving.

(6) Final report
Fifty (50) copies within two (2) months after receiving the comments on the Draft Final Report.

VI. UNDERTAKING OF GOP

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

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

J.8.

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I-8.

2. SIRDP shall, at its own expence, 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 Manila and the Study area;
(4) Credentials or identification cards to the members of the Japanese study team;
(5) Appropriate number of vehicles with drivers.

3. SIRDP 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 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 emolument or allowance 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 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 photographs) related to the Study out of the Philippines to Japan by the Study team;
(8) to provide medical services as needed and its expenses will be chargeable on members of the Japanese study team.

7.8.

Ⅶ. UNDERTAKING OF GOJ

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

1. to dispatch, at its expense, study teams to the Philippines;

2. to pursue technology transfer to the Philippine counterpart personnel in the course of the Study;

3. to provide the necessary equipment for the implementation of the Study, which will remain the property of JICA unless otherwise agreed.

Ⅷ. CONSULTATION

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

T.S.

APPENDIX

TENTATIVE WORK SCHEDULE

Month in Order		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
PHASE I	Field Work	▬	▬	▬	▬																			
	Home office Work				▭	▭	▭	▭	▭															
PHASE II	Field Survey									▬	▬	▬	▬											
	Home office Work												▭	▭	▭	▭	▭							
Reports		△ Inc/R			△ F/R(I)							△ Int/R			△ F/R(II)				△ D.F.R.			△ F.R.		

▬ Works in Philippine

▭ Home Office Works in Japan

Remarks
- Inc/R : Inception Report
- F/R(I): Field Report(I)
- Int/R : Interim Report
- F/R(II): Field Report(II)
- D.F.R. : Draft Final Report
- F.R. : Final Report

A.2. List of Personnel Contacted by the Study Team

SIRDP:
- Dr. Abercio V. Rotor: Project Director (Until 1987)
- Mr. Mario L. Relampagos: Office Manager
- Mr. Wilfredo A. Dones: Asst. Office Manager
- Mr. Lydio G. Reyes: Project Development Officer
- Dr. Rogelio M. Lopez: Consultant, SIRDP
- Mr. Anthony Ponce de Leon: Acting Project Director (Jan. 1988)
- Mr. Sergio Fortaleza: Civil Engineer
- Ms. Belen Q. Abrigo: Chief, Information & Research Section
- Mr. Julian R. Esquillo Jr.: Consultant, SIRDP
- Mr. Leonardo C. Cruz: Chief, Project Management and Development Staff
- Mr. Tomas A. Cabuenos Jr.: Program Officer
- Mr. Zacarias M. Tizon: Chief Field Officer
- Mr. Diego O. Espina: Supervising Civil Engineer
- Ms. Rumia S. Velarde: Executive Secretary
- Ms. Elena Maniego: Liaison Officer
- Mr. Edgardo Barrios: Architect
- Mr. Ariel Nunez: Research Assistant
- Mr. Nelson Ballejos: Researcher
- Mr. Dick A. Perez: Researcher
- Ms. Marilyn Gonzaga: Researcher
- Ms. Melinda Rocanora: Clerk
- Mr. Rolando S. Quimbo: Chief of Administrative Staff
- Ms. Erlinda J. Oriza: Administrative Staff
- Ms. Pacita Espano: Researcher
- Ms. Flor Potot: Researcher
- Mr. Clars Sanchez: Electrical Engineer
- Mr. Ruben Basista: Civil Engineer
- Mr. Diody Lelis: Civil Engineer
- Ms. Cherlita Giray: Farmer's Organizer
- Mr. Norcio Ortiz: Agro-economist
- Mr. Dennis Rafels: Researcher
- Ms. Chato Capadocia: Secretary
- Ms. Madelyn Cerbito: Secretary
- Ms. Linnae June C. Lao: Secretary
- Ms. Nelda Tarrayo: Secretary
- Ms. Susan D. Galit: Secretary
- Ms. Emily Froilan: Typist
- Mr. Carlito Bonabon: Copy Operator

NEDA:
- Mr. Vicente D. Salazar Jr.: Acting Director, External Asst. Staff
- Dr. Marietta S. Adriano: Director, Agriculture Staff
- Ms. Jana Ricusio: Asst. Director, Public Investment System
- Ms. Mariles Navarro: Desk Office Japan
- Mr. Remigio A. Mercado: Acting Chief, Physical Planning Div.
- Mr. Alfred I. Feliciano: Specialist, Economic Div.
- Mr. Adriano: Office Manager
- Mr. Jojo Gomez

Ms. Josefina Esguerra
Ms. Pauline Lazaro
Mr. Clarita Lantican
Mr. Eman Lopez Dee
Mr. F. J. Yap
Mr. R. S. Reinoso, Jr.
Mr. Elmer Dorado
Ms. Predade Geron
Mr. Venancio Baclagon: Regional Executive Director Region 8 (Until April 1988)
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Mr. Erlindo P. Laplana: Director

BAS: Mr. Virginia T. Margallo: Leyte Operation Center

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Mr. Amado An. Adona, Municipality Census Officer

Wright: Atty. Felix Babalcon, Jr.: Municipal Mayor
Mr. Deogracias F. Davantes: OIC Mayor
Mr. Nicanor C. Padomes: Local Government Officer

Villareal:
Mr. Agustin V.: Secretary

Calbayog City:
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Dr. Reynaldo S. Wy: Vice Mayor
Mr. Gil Lentejas: City Planning & Development Coordinator
Mr. Ernesto Abasolo: City Engr.
Mr. F. Ricafort: City Counselor
Mr. Jorge Rueda: General Manager, Calbayog Water District

Mr. Clandio B. Buculopta: Municipal Agricultural Officer
Mr. Gil L. Viojan: Sr. Civil Engr., Construction Unit
Mr. Dolores F. Mancol: Project Evaluation Officer
Mr. Meronides R. Mancol: Budget Officer

Motiong: Mr. Armando Mabulac: OIC Mayor
Mr. Manuel Dabuet: Private Secretary to Mayor
Mr. Lamberto Pacanza: Vice Mayor

Hinabangan:
Atty. Jesus Clariza: OIC Mayor
Mr. Mario C. Nablo: Municipal Planning & Development Coordinator
Mr. Dio Aderas: Local Government Officer
Mr. Rodolfo Gadin: Treasurer
Mr. Antonis Abrracaso: Secretary of Sangguniang

Jiabong: Mr. Santiago P. Gabieta: OIC Major
Mr. Santos B. Casurao: Municipal Treasurer
Mr. Arnacdo O. Morabor: Municipal Budget Officer

Calbiga: Mr. Juan C. Teoco Jr.: OIC Mayor

Pinabacdao:
Mr. Fermin S. Macaribla: OIC Mayor

Catbalogan:
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Mr. Peregrin Yboa: Vice Major
Mr. Carlito J. Balote: Manager, Catbalogan Water District

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Mr. Polix V. Yancojom: Municipal Planning & Development Coordinator
Mr. Reynald C. Correche: OIC Mayor
Mr. Poncho Villanueve: Municipal Agricultural Food Officer

San Jorge:
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Mr. Eliseo B. Ramos Jr.: Municipal Planning & Development
Mr. Miguel Mendiola: OIC Mayor
Mr. Antonio Teres: Secretary

Tarangnan:
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Mr. Augusto F. Peñaranda: OIC Mayor

Sta. Margarita:
Mr. Pedro Floresca: Secretary to Mayor

A.3. List of Japanese Government Officials Participated with the Master Plan Study

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- Mr. Masahiko KAMEDA: Head Technical Affairs Div.
- Mr. Masatoshi NAGATOMO: Deputy Head, Technical Affairs Div.
- Mr. Kenichiro KAWAJI: Deputy Head, Technical Affairs Div.
- Mr. Yuji OKAZAKI, Depty Head, Technical Affairs Div.
- Mr. Tsutomu NAKANO
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- Mr. Katsuhiko OSHIMA, Deputy Resident Representative
- Mr. Toichi IWATA
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Ministry of Foreign Affairs
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- Mr. Kazuhiko TODA
- Mr. Satoshi KINUGAWA

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- Mr. Yasuro NAKAJO: First Secretary
- Mr. Naoki HAYASHIDA: First Secretary

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- Mr. Toru SHIMIZU
- Mr. Seiichi TARUISHI
- Mr. Mamoru ISHIKAWA
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- Mr. Yasuhiko MISHIMA
- Mr. Osamu UMEKAWA
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A.4. Member List of the Study Team

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- Dr. Masayuki IMAI: Rural Development/Group Leader
- Mr. Shuichi, YUMOTO: Social Infrastructure
- Mr. Yoshiro TANAKA: Rural Electrification/Mini-Hydro Power
- Mr. Akira NAOTSUKA: Water Supply
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- Mr. Yasunori HASEGAWA: Agriculture/Group Leader
- Mr. Kazuo NAKABAYASHI: Soil & Land Use
- Mr. Teru SASAKI: Rural Sociology & Farmers' Organization
- Mr. Masashi TAKANO: Agro-Economy

APPENDIX B. REGIONAL/RURAL DEVELOPMENT

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B.1. Economic, Social and Administrative Conditions

B.1.1. Economic and Social Aspects

1) Population

Population by municipality is shown in Table B.1.1 by which interpreted some characteristics as comparatively low growth rate and low density of population.

2) Employment

The labor force and employment conditions are shown in Table B.1.2 and B.1.3. The number of unemployment and under-employment has been large. The number of wanting additional works (under-employment number) is estimated by NSCO by counting the labor number whose working days are under certain level, the income through which is not sufficient for satisfying their minimum living standard. (refer to Table B.1.4)

3) Household Income

Regarding to household income, latest statistic figure in 1985 is shown in the Table B.3.5.

B.1.2. Economic Sectoral Overview

1) GRDP (Gross Regional Domestic Product)

Region wide GRDP is shown in Table B.1.5 and the sectoral value added in the past and its projection for Samar island is shown in Table B.1.6. Each sector's contribution to GDP and its projection for Samar Islands is also shown in Table B.1.7. By these figures, sectoral economics in Western Samar could be globaly overviewed.

GRDP was obtained by method of estimating the GDP region wide by concerned parties and not of accumulating GDP of the various provinces in the region. There exists no GDP figure in a Province which does not formulate one unit of economic zone. "Sectoral Value added" was also obtained by the similar method.

2) Employment by Sector

Employment evolution and sectoral share by each item is shown in Table B.1.8 by which the large increase of services sector is observed.

3) Brief Overview of Industries

Rural industrialization is a subject of concern for the related parties and the Governor of Samar province has encouraged the non-formal vocational training to level up the technology for the purpose.

B.1.3. Administration and Policy Making

The subject which might be well known to the Philippine concerned parties, is presented hereby, with the aim to explain briefly more for the partner to understand the process of regional development planning and implementation.

For the above, it shall be noted also the following activities entitled as "Institutional Development for the Implementation". Efforts have been geared towards institutional development at the local level; strengthening of the Office of the Provincial Planning and Development Coordinator (OPPDC) and activating the Provincial Development Council (PDC) wherein both the local offices of central government agencies and the local government offices are represented. In this way, plans and programs shall be coordinated from the inception stage, planning and implementation.

Table B.1.1. Population, Growth Rate, Density by Municipalities in Samar province

Municipality	Area (km^2)	Barangay Number	Population in 1980	Average Annual Growth Rate of Population 1970-1980 (%)	Density of Population 1980 (No./km^2)
1. Basey	572.7	51	36,760	0.4	64.2
2. Calbayog	921.3	155	106,719	1.2	118.2
3. Calbiga	283.7	39	14,201	1.4	50.1
4. Catbalogan	119.8	57	58,737	1.8	490.3
5. Gandara	414.4	56	24,764	2.4	57.2
6. San Jorge	259.6	26	9,123	0.5	37.8
7. Hinabangan	372.2	16	10,786	0.2	29.0
8. Jiabong	67.7	34	11,055	1.8	163.3
9. Marabut	98.9	14	13,288	2.7	134.4
10. Matuguinao	364.2	20	5,020	8.3	13.8
11. Motiong	174.4	27	10,035	0.7	57.5
12. Pinabacdao	82.4	23	9,389	0.3	113.9
13. San Jose de Buan	366.9	12	5,455	7.7	14.9
14. San Sebastian	27.3	11	4,606	0.8	168.7
15. Sta. Margarita	144.4	32	16,922	0.7	117.2
16. Sta. Rita	222.5	31	21,640	0.4	97.3
17. Talalora	32.5	11	6,334	0.5	194.8
18. Tarangnan	81.5	41	15,558	1.8	120.6
19. Villareal	239.5	37	20,505	0.8	85.6
20. Wright	457.4	46	21,556	2.1	47.1
21. Pagsanghan	77.4	12	6,512	5.7	217.1
Total (excluding islands)	5,380.8	751	428,963		
22. Almagro	28.0	14	10,097	1.9	371.2
23. Daram	103.4	48	30,821	0.8	298.1
24. Sto. Nino	31.7	13	11,132	2.0	351.2
25. Zumarraga	37.6	23	12,821	0.6	341.0
26. Tagapul-an	27.9	15	7,605	2.9	265.0
Grand Total/Average	5,609.4	864	501,439	1.3	89.7

Source: Socio-economic Profile of the Western Samar.

Table B.1.2. Evolution of Labour Force in Samar Province

(Unit: persons)

	1970	1975	1980	Projected 1985
Total	174,012	198,839	227,703	256,610
Males	114,713	130,222	148,404	165,892
Females	59,300	68,616	79,299	90,718

Source: NCSO 1980.

Table B.1.3. Labor Force Population and Employment by Sex in Samar Province in 1975

	Overall Persons in the Labor Force	Over all Total			Percentage Total		Percentage of Persons in the labor Force					
							Urban			Rural		
		Total	Males	Females	Males	Females	Both Sexes	Males	Female	Both Sexes	Males	Female
Western Samar	(%)				(%)	(%)	(%)	(%)	(%)	(%)	(%)	(%)
In the labor force	100.00	150891	116973	39918	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
Unemployed	4.37	6600	3236	3364	2.77	9.92	4.37	6.38	6.21	1.93	2.43	10.61
Employed	95.63	144291	113737	30554	97.23	90.08	95.63	93.62	93.79	95.87	97.57	89.39

Note : * excluding self employed number.

Source: NCSO 1977.

Table B.1.4. Labor Force and Employment in Samar Province in 1983

	Total	Urban	Rural
Labor Force (A)	216,640*	23,519	193,121
Employed (B)	200,871	21,648	179,023
(Fully and Part-time)			
Wanting additional work (C)	141,251	9,585	131,666
$\frac{(A - B)/A}{(A)}$ = X (%)	7.4	8.0	7.3
$\frac{C/A}{(A)}$ = Y (%)	65.2	40.8	68.2

Note : * excluding self-employed number.

Source: Socio-Economic Profile of the Province of Samar page 246.

Table B.1.5. GRDP by Major Economic Sector in Région VIII

(Unit: Million Pesos)

	GRDP				Projection			
	1983	%	1985	%	1987	%	1992	%
Agriculture	1,123	(50.1)	1,231	(55.8)	1,298	(55.7)	1,761	(55.1)
Industry	322	(14.1)	322	(10.1)	233	(10.0)	340	(10.6)
Service	797	(35.5)	752	(34.1)	800	(34.3)	1,094	(34.2)
Total GRDP	2,242	(100)	2,205	(100)	2,331	(100)	3,195	(100)

Source: NEDA Regional Development Plan page 53.

Table B.1.6. Sectoral Value Added. Samar Island (three provinces) 1975 - 1987

(In Million pesos. 1977 Prices)

					Reference: Projection	
	1975	%	1987	%	1992	2000
Agriculture	901	62.7	1,688	52.6	2,193	3,332
Industry	254	17.7	854	26.6	1,416	3,178
Mining	31		106		178	405
Manufacturing	127		406		706	1,582
Electricity	2		7		12	27
Construction	94		315		520	1,164
Services	283	19.6	665	20.8	949	1,676
	160		376		537	949
Transportation	8		18		26	45
Services	115		270		386	682
Total	1,438	100	3,207	100	4,558	8,186

Source: NEDA

Table B.1.7. Projection of Growth Annual Rate (G) and Contribution Percentage (C) of Major Economic Sectors to GDP in Samar Island

	1980 - 87		1987 - 92		1992 - 2000	
	G	C	G	C	G	C
Agriculture (Primary)	5.3%	52.6%	6.0%	48.6%	6.5%	42.2%
Industry (Secondary)	10.6	26.6	11.0	30.9	11.5	38.8
Service (Tertiary)	7.4	20.7	7.4	20.4	7.4	19.0
Total	7.2	100	7.7	100	8.3	100

Source: Comprehesive Development Plan by IBRD. Vol I.

Table B.1.8. Conditions and Evolution of Employed (and Self-Employed) Workers by Major Sectors in Samar Province (from 1975 to 1983)

No.	Sector	* in 1975	** in 1983			
		Employed	Employed	Self-Employed	Total	Sector share
	Total	144,291(100 %)	200,670(100 %)	106,110(100 %)	306,780(100 %)	100 %
I	Agriculture / Fishery	110,281 (76.4)	114,405 (57.0)	64,448 (60.7)	198,853 (58.3)	58.3
II	Mining and Quarrying	918 (0.6)	602 (0.4)	-	602 (0.2)	12.2
	Manufacturing	9,385 (6.5)	18,756 (9.3)	13,060 (12.3)	31,816 (10.4)	
	Electricity and Gas	100 (0.1)	749 (0.4)	-	749 (0.2)	
	Construction	2,014 (1.4)	4,230 (2.1)	-	4,230 (1.4)	
III	Wholesalers & Retailers	5,880 (4.1)	32,480 (16.2)	24,901 (23.5)	57,381 (18.7)	29.5
	Transportation & Storage	2,291 (1.6)	7,713 (3.8)	1,626 (1.5)	9,339 (3.0)	
	Community Social Services	12,732 (8.8)	21,735 (10.8)	2,075 (2.0)	23,810 (7.8)	
	Others	690 (0.5)	-	-	-	

Notes : 1. According to the sectoral classification fixed by NEDA statistic yearly book.

2. Number of employed in 1975 does not include the self-employed number, judging from total number.
Therefore, comparison shall be made between employed number in 1975 and in 1983.
In both cases of employed number and total number, increase of shares of manufacturing and wholesalers and retailers is considerably large.

Source: JICA Study Team based on

* Comprehensive Development Plan by IBRD

** Socio-Economic Profile of Samar pages 236-237.

Table B.1.9. Allotment by Province in Region VIII in 1984

(Unit: '000 peso or '000 person)

Province	Allotment	Share (%)	Population	Per Capita Allotment (₱)
Leyte	70,456	44	1,405	50
Southern Leyte	13,973	9	332	43
Samar	36,380	23	538	68
Eastern Samar	19,629	12	354	55
Northern Samar	18,481	12	413	45
Total and average of Region VIII	158,919	100	3,032	52

Source: 1984 Regional Socio-Economic profile and development report, original Bureau of Treasury.

Table B.1.10. Selected Budget Allotment in Samar Province in 1985

(Unit: thousand pesos)

Item	Province	Inter Provincial	Region Wide	Total
Mobilility	9,289	-	270	9,559
Water	3,418 $360	-	1,615	5,033 $360
Education & Technology	19,640	-	1,590	21,230
Medical Service	14,731	-	-	14,731
Ecological Balance	864	-	1,644	2,508
Food	1,182	-	442	1,624
Economic Base & Shelter	-	504	-	504
Total	49,124	504	5,561	55,189

Source: Budget Programs for Regional and Provincial Development Western Samar CY1985, Office of Budget and Management.

There is also the thrust of the government on participatory development wherein formation of local based people's organization (as the Barangay Water Users' Association, Farmers' Association) are encouraged to oversee the efficient and effective implementation of programs. The same organizations likewise take the responsibility of operating and maintaining the installed facilities.

B.1.4. Economic Problems and Constraints

Among four categories of economic problems and constraints, the financial constraint forms the cause directly hinder the development. Samar province receive comparatively large allotment per capita among the provinces in Region VIII (refer to Table B.1.9) but the budget allotment has been more oriented to the social services like education and medical services (refer to Table B.1.10) and less to the productive activities like agriculture and industry. In the later table item of mobility contains repair, rehabilitation and replacement of existing infrastructure facilities.

B.2. Overview of Regional Development Plans

B.2.1. Overview of Three Regional Development Plans

1) Comparison of Plans

In order to see the trend of regional development plan, Table B.2.1 is formed to present a comparison of Regional Development Plans for 3 periods, 1978-1982, 1984-1987 and of the present, 1988-1992. The observation on the comparison between them is described in the main report.

B.2.2. Review of Development Objectives in Samar province

1) RIDP of Samar

In order to review the objectives of development of the Samar province, Table B.2.2 is formed to show the Regional Development Investment Program (RDIP).

2) CEDP of Samar

Another program of public investment named CEDP is shown in Table B.2.3. Public investment amount at present should be computed as the total of RDIP and 100-15% of CEDP (about 252 million Pesos), since 15% of the CEDP Projects were included also in RIDP. However, RIDP is a five years investment program, while CEDP is a short term program of one year, therefore it is hard to make the addition of them.

3) Comparison with Regional and National Program

With the aim to observe the characteristic of investment program of the Samar province, Table B.2.4 is formed to show the comparison with Regional and National investment programs. Some adjustment was made so as to classify the items in the same category. This regional development investment program is not a definite program for 5 years but will be reviewed every year in future.

B.2.3. Regional development Model - Three Development Targets and Inter-relations

1) Definition of Regional Economy

As a prior condition for effectuating the Master Plan Study on rural development in a certain area, it might be required to consider the subjective area as one unit of regional economy.

To apply a method of regional development analysis to some specific area, regarding the definition of "Regional (Rural) Economy", there are three kinds of classification, each of which requires some prior conditions; these are;

- economic theoretical classification, which requires the existence of independent economic zone; that means, in one specific zone, there must exist one sort of auto-economic activities so as to interpret this zone as one unit of regional economy;
- statistical classification, which requires the existence of uniform statistics of all items; that means, even though one area has no economic independence, it will be interpreted as one unit of regional economy with complete sets of all fundamental statistic items; and
- classification by specific economic policy which requires some specific administrative orientation; that means, even without the above mentioned two conditions, it will be considered as unit of regional economy with existence of some specific economic policy.

To handle the problems as well as analyze the objectives of development in the Samar province, it is difficult to apply the above first and second classification, therefore with assumption of existence of some economic policy to develop this specific depressed area it could be considered that the Samar province becomes a subject of regional economic development analysis.

2) Structural Transformation of Regional Development

As model of structural transformation of regional development, some conceptions are demonstrated in the Figure B.2.1. Looking at the realities in the Samar province, it can be observed that the province has features and characteristics of non advantageous structure. This scheme shows the comparative level of development in each item. Therefore, it could be said that the Leyte province has an advantageous structure compared with the Samar province, at the same time Region VIII has a non-advantageous one in comparison

with Metro Manila zone. Hereby, formulated Figure B.2.2 which shows the Coalition and Inter-connection in the objective area. It means that one specific area alone can not achieve the development but it will be transformed always on coalition basis with the nearest another area. Further, one specific zone has always the inter-relation with another zone to have the repercussion on each other.

So as to transform from non advantageous structure to advantageous one, the concerned policy makers raise three fundamental targets of regional development.

3) Three Development Targets

The three fundamental targets for development; growth, equality and welfare target have been considered traditionally as essential development elements but have trade-off relations among them (refer to Figure B.2.3).

- To attain the growth target, public and private investment shall be increased in productive activities and it is also required to speed up the transfer of capital from the one area to the other where productivity is comparatively high. But due to limitations in the budget, it will cause a subsequent slow down of investment in social welfare (social indirect capital stock).

- On the contrary, to pursue the equality target, the speed of transfer shall be accelerated and the stock of social indirect capital will be increased but the investment in productive activities will be inevitably decreased.

- Thirdly, to realize the welfare target, it is necessary to increase the investment in social indirect capital stock. But the investment in productive activities as well as the speed of transfer will be inevitably decreased.

Among the three elements as explained here above there exist the trade-off relations, and to integrate these elements with the aim of attaining the balanced growth is the task for the national and local government as well as the inhabitants. However one should always bear in mind their trade-off relations and the difficulty to pursue the three targets at the same time. In case that there arises some contradiction or imbalance among them, it would be required for the concerned parties to take the adequates measures according to the case.

Table B.2.1. Comparison of former and latest Eastern Visayas (Region VIII) Development Plan by NEDA

The five years Development plan 1978 - 82	The four years Development plan 1984 - 87	Medium Term Development plan 1987 - 92
Overall objectives		
- increase regional contribution to national development	- intensify development activities particularly in the less developed areas	- reduce the poverty
- generate employment	- reduce underemployment	- reduce the underemployment
- increase agriculture	- increase agricultural and industrial productivity	- increase labour productivity
- improve infrastructure	- increase production of non traditional commodities	- minimize insurgency problem
- provide basic services	- achieve a more equitable distribution of income and wealth	- reduce the dependence on traditional agriculture
- improve the order situation	- intensify the provision of basic services	- rehabilitate damaged infrastructure facilities
- provide efficient use of man-power and resources	- construct and improve infrastructure facilities	- upgrade substandard ones and construct new infrastructure
Targets	Targets and Projections	Targets
- GRDP, growth by 9.2% increase to 5,309 million in 1982	- GRDP, growth by 5.4% increase to 2,670 million peso in 1987	- GRDP, growth by 7.7% increase to 3,511 million in 1992
- agricultural GVA uncrease by 5.5%	- agriculture with share of 55.1% in 1984, increase by 4.1% growth rate will have a share of 53.1% in 1987.	- agriculture rise by 5.6% reach 1,771 million in 1992
-	- industry with share of 11.9% in 1984 increase by 13.1% will have a share of 14.7% in 1987	- industry share of 11.9% in 1987 increase to 15% in 1992, with the highest growth
-	- services with share of 3.3% in 1984 increase by 4.5% will have a share of 32.1% in 1987	- services share of 32.5% in 1987 increase to 34.5% in 1992 with the growth of 9%
- population growth by 1.8% GDP per capita from 1033 in 1978 to 1370 in 1982	- population growth, 2,799,534 in 1980, 3,017,715 in 1984, 3,185,283 in 1987 by growth rate of 1.8%	- population growth by 1.8% poverty of 68% in 1987 reduce to 53% in 1992
- unemployment shall be low	- labour participant, 93.1% in 1984, 93% in 1987 means 3.9% annual growth or 62,000 new entrants, unemployment 8% in 1984 shall be 6.2% in 1987	- under employment was targeted to 23% in 1987, expected to decrease to 12% in 1992
- life span would be 62.4 years as average	-	
- increase in school participation, decrease in housing backlog	-	

Source: NEDA Regional Development Plan, for 3 periods from 1978 to 1992.

Table B.2.2. Summary of Provincial Development Investment Program, Province of Samar 1988 - 1992

	Amount ₱ 000	%	No. of Projects		Amount of Required Fund	
			On-going	Proposed	On-going	Proposed (Estimated)
1. Agriculture, Agrarian Reform & Rural Development						
a) Agricultural Production	3,662		7	-	3,662	-
b) Livestock and Poultry Production	11,508		6	-	11,508	-
c) Fisheries Development	738		1	5	12	726
d) Home Management and Extension Services	1,792		-	7	-	1,792
e) Agrarian Reform	25		3	-	25	-
Sub-Total	17,725	3%	17	12	15,207	2,518
2. Natural Resources						
a) Land Classification, Management and Disposition	7,116		4	-	7,116	-
b) Land Surveys and Mapping	13,157		5	6	4,428	8,729
c) Conservation & Development of Natural Resources	17,395		5	2	12,295	5,100
d) Classification and Sub-classification of Forest Lands	11,895		1	-	11,895	-
e) Protection Forest Resources	8,200		1	-	8,200	-
Sub-Total	57,765	10%	16	8	43,934	13,829
3. Industry/Trade						
a) Skills Training	300		-	1	-	300
b) Small and Medium Scale Industries	34,395		-	17	-	34,395
Sub-Total	34,695	6%	-	18	-	34,695
4. Social Services						
a) Health Nutrition and Family Planning	103,454		25	-	103,454	-
b) Education and Manpower Development	3,540		3	6	2,531	1,009
c) Social Services and Community Development	13,543		6	-	13,543	-
d) Housing	22,550		6	4	-	22,550
Sub-Total	143,087	23%	40	10	119,528	23,559
5. Infrastructure/Utilities						
a) Transport	120,812		-	55	-	120,812
b) Communication	42,243		-	50	-	42,243
c) Water Resources	49,875		-	274	-	49,875
d) Social Infrastructure	74,529		-	426	-	74,529
e) Electricity	39,424		10	2	36,524	2,900
Sub-Total	326,883	54%	10	807	36,524	290,359
6. Special Project						
a) LRM Sub Project	16,000		-	-	-	16,000
b) LRM Tecr. Assistance	14,616		-	-	-	14,616
Sub-Total	30,616	4%	-	-	-	31,616
					(31%)	(69%)
T o t a l:	610,769		83	855	215,193	395,574

Remarks: On-going; with budgetal allocation.
Proposed; only proposed, waiting budget allocation.

Source : JICA Study Team, based on the Development Investment Program for Province of Samar.

Table B.2.3. Summary of 1987 CEDP-DPWH Allocation for Samar Province

Projects Title/ Description	Fund Allocation (₱ '000)	No. of Projects
1. Roads and Bridges	18,670	60
2. Ports and Lighthouses	1,246	5
3. Flood Control and Drainage	2,193	12
3.1 Flood Control and Dredging	200	1
3.2 Small Water Impounding Project	1,500	1
3.3 Construction of Mini-dams (W. Samar)	225.9	6
3.4 Construction of Mini-dams (Calbayog)	67.6	2
3.5 Shore Protection	200	2
4. Water Supply	1,106	140
4.1 Construction of Shallow Wells (Calbayog)	1,051	132
4.2 Rehabilitation of Shallow Wells (Calbayog)	55	8
5. School Buildings	35,900	120
5.1 Construction of Academic Buildings (Calbayog)	720	7
5.2 Construction of Academic Buildings (W. Samar)	30,600	26
5.3 Rehabilitation of Academic Buildings (Calbayog)	374	8
5.4 Rehabilitation of Academic Buildings (W. Samar)	1,513	41
5.5 Replacement of Academic Buildings (Calbayog)	385	4
5.6 Replacement of Academic Buildings (W. Samar)	1,540	13
5.7 Construction of Workshops	-	1
5.8 Rehabilitation of Workshops	108	3
5.9 Construction of Toilets (Calbayog)	120	4
5.10 Construction of Toilets (W. Samar)	300	10
Total (for Samar Province)	59,115	337
Total (for Region 8)	252,157	2,398

Remarks: 23.44% of CEDP-DPWH allocation for Region 8 is allotted for Samar Province

Table B.2.4. Public Investment Program (1988 - 1992)

Sector	Proposed Investment Amount and Share (₱ '000)					
	Philippines		Region VIII		Samar	
	Amount	%	Amount	%	Amount	%
1. Agriculture	8,269,576	3.7	793,103.5	17.0	17,725	2.9
2. Natural Resources	-	-	225,513.1	4.8	57,763	9.4
3. Industry/Trade	2,591,470	1.2	146,133	3.1	34,695	5.7
4. Social Services	24,271,901[1/]	10.8	848,547.4	18.2	143,087	23.4
5. Infrastructure	189,061,649	83.8	2,428,699.7	52	326,883	53.6
5.1 Social Infrastructure					74,529	12.2
5.2 Irrigation	16,534,320[2/]	7.3			13,300[3/]	2.2
5.3 Communications	17,422,222	7.7			42,243	6.9
5.4 Flood Control and Drainage	6,171,049	2.7			-	-
5.5 Power, Energy & Electrification	63,510,738	28.2			39,424[4/]	6.5
5.6 Transportation	56,432,746	25.0			120,812	19.8
5.7 Urban Infrastructure	3,623,465	1.6			-	-
5.8 Water Supply/ Sewerage and Sanitation	25,367,109	11.3			36,575	6.0
6. Others	1,150,794	0.5	229,054.11	4.9	30,616	5.0
Total	225,345,190	100	4,671,050.81 (A)	100	610,769 (B)	100
			B/A = 13 %			

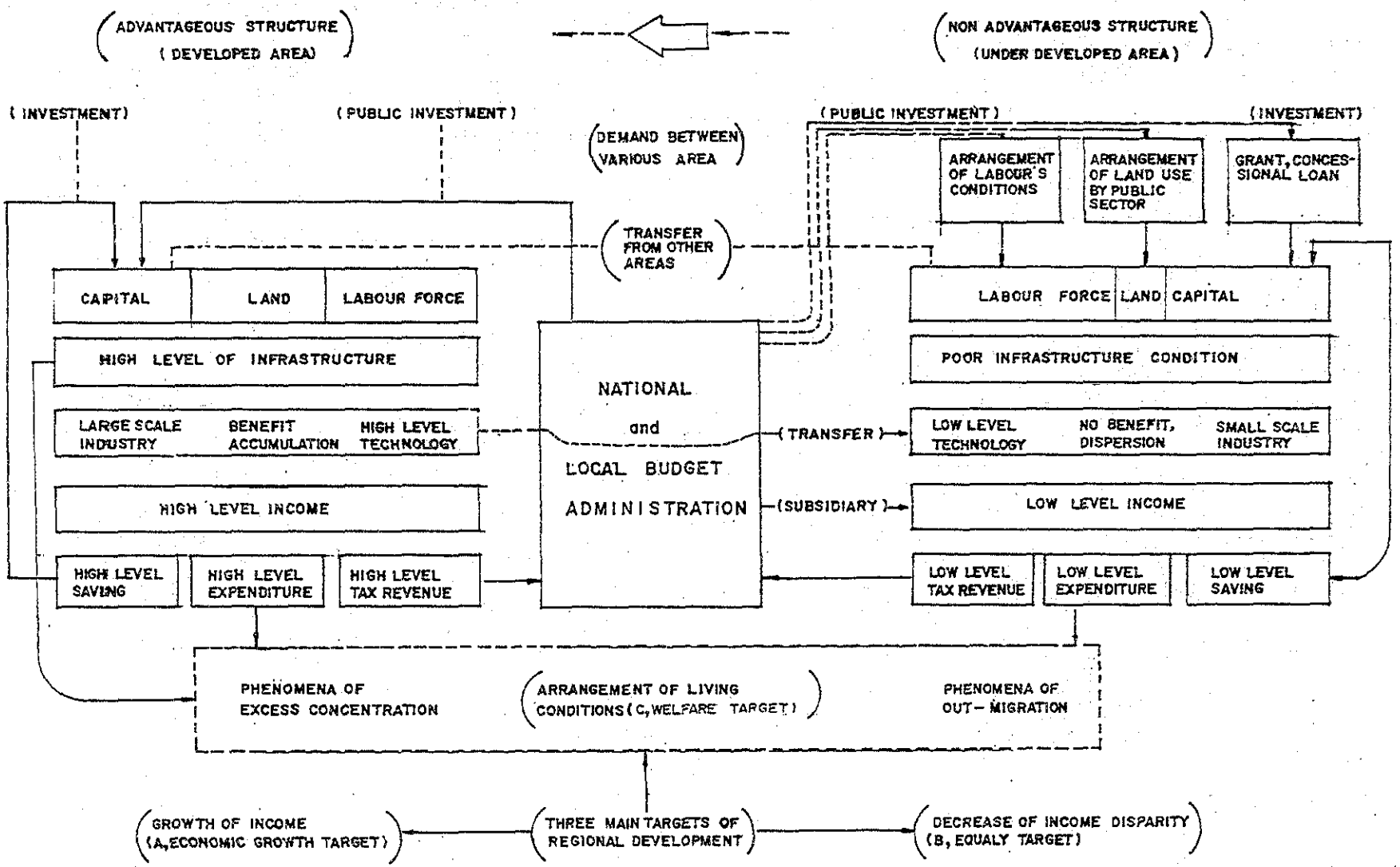
Notes: 1/ Include Social Infrastructure.

2/ Reflected in Summary Table as part of Agriculture in the Medium Term (1987-1992) Public Investment Program. NEDA, Manila.

3/ Reflected as part of Water Resources under Infrastructure/ Utilities Sector in the Regional Development Investment Program (RDIP) 1988 - 1992, Region VIII, Eastern Visayas. Vol. V - Province of Samar.

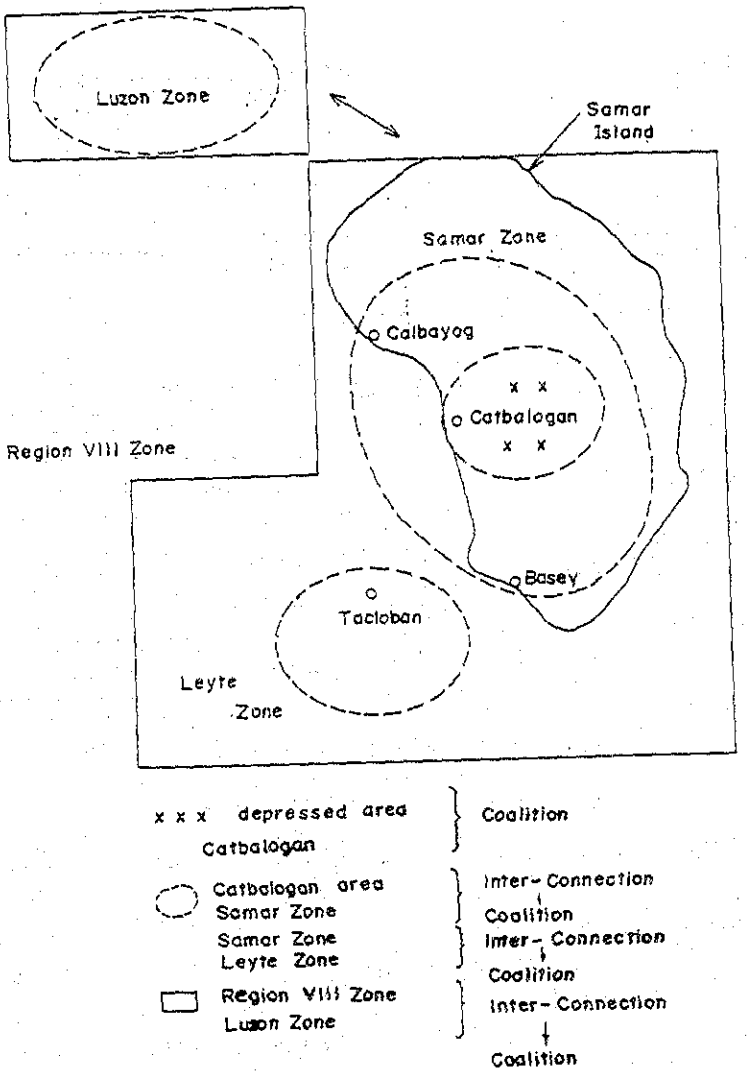
4/ Figure taken from 5-year Program for Rural Electrification of Samar I and Samar II Electric Cooperatives Inc. (Not reflected in RDIP document for Region VIII)

Figure B.2.1. Schema, Rural Development Structural Transformation



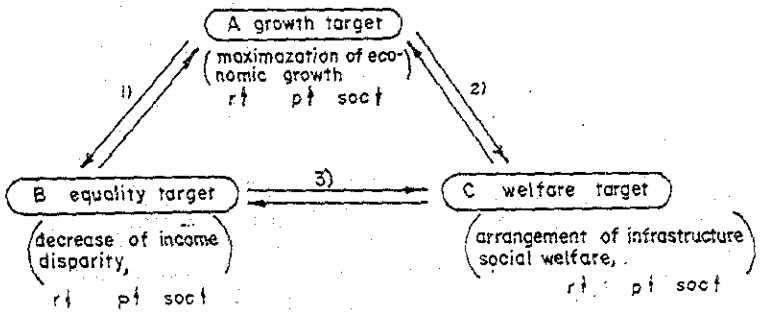
SOURCE: JICA STUDY TEAM CONSULTING WITH
CHIIKIKAIHATSU KEIZAI (REGIONAL DEVELOPMENT ECONOMICS)
BY TAKAO FUKUCHI

Figure B.2.2. Schema, Coalition and Inter-Connection Model



Source: JICA Study Team consulting with SIRDP.

Figure B.2.3. Schema, Three Development Targets and Interrelation



Trade off relation

1. risk of arising the contradiction depending on the growth ratio.
2. risk of arising the contradiction due to the budget limit.
3. risk of arising the contradiction according to the speed of transfer.

Remarks:

r : growth ratio of capital stock
p : transfer speed
soc : social overhead capital

Source: JICA Study Team, consulting with the CHIIKI KEIZAIGAKU (Regional development economics) by TAKAO FUKUCHI.

B.3. Development Strategies and Targets

B.3.1. Development Strategies

The average of Greater Manila zone which is the highest among the average figures of various fields in the Philippines at present, was adopted as target for development. However it does not mean that economic and social structure of the Manila zone such as disparity of income per household, economic sectoral share will not be considered but only various statistic figures of the zone will be applied as target of long terms for development of the subjected area.

B.3.2. Projection on Population, Household and Labour Force

The birth rate might have been lower between 1970 to 1980 than the latest rate of 18.85 per 1,000 persons in 1986. The mortality was higher in 1976 of the figure of 4.0 per 1,000 persons than the latest figure 2.3 in 1985. The out-migration figure for 1970-1980 was not available but estimated as high rate by the gap between the national and the provincial population growth. Therefore, adopting the high growth rate, projection on population is formed in Table B.3.1. Also, projection on labor force and household is shown in Table B.3.2.

B.3.3. Growth Targets of Economics

1) Definition of Concept of Economic Indicators

In order to apply household income as one indicator for formulating the economic growth target, fundamental economic indicators are hereby defined to avoid any confusion of presentation. Related National Income Accounts, several major indicators with definition as well as indicator or household income as used in this Accounts are defined and illustrated in Figure B.3.1.

In general GNP or GDP (GRDP) is commonly applied for economic growth on national basis. (In the Philippine, GRDP is applied on regional basis)

National income is counted by three aspects; Production, distribution and expenditure. Total amount of each factor's account is equal by economic principle. Thus, net national product by sector is equal to National Income which is composed of several element shown in the same figure. Household income is composed of elements (1) - (7) plus net earning from abroad on personal basis.

In principle, household income is hardly used as indicator of economic growth. The subject of increasing household income has been often adopted, however, as one of the targets of economic policy.

Due to lack of GDP and other indicators in the provincial level, and with the above understanding and assumption, the household income and personal consumption expenditure (both of which is one component of the concept of National Income and Net National Expenditure respectively) will be adopted as one sort of economic growth targets.

2) Employment Increase Target

Based on the projection of labor force, and according to the targeted employment ratio, employment number as well as required jobs are estimated in Table B.3.3.

3) Income & Expenditure Increase Target

Household income and expenditure in 1985 are shown in Tables B.3.4 and B.3.5, respectively. Based on these figures, targets of income and expenditure increase are formulated in Table B.3.6.

Table B.3.1. Projection of Population by Municipalities in Samar Province

No.	Municipality	Projected Population					
		1987	1992	1997	2000	2002	2007
1	Basey	41,092	43,673	46,300	47,207	48,155	50,612
2	Calbayog	119,288	126,779	134,399	137,027	139,781	146,911
3	Calbiga	14,319	14,264	14,191	13,985	13,929	13,790
4	Catbalogan	68,990	75,667	82,706	85,688	88,451	95,758
5	Gandara	28,413	30,692	33,066	34,010	34,900	37,228
6	San Jorge	9,742	10,047	10,355	10,414	10,497	10,709
7	Hinabangan	10,928	10,908	10,884	10,756	10,713	10,606
8	Jiabong	12,780	13,873	15,015	15,480	15,916	17,062
9	Marabut	15,958	17,727	19,644	20,528	21,273	23,258
10	Matuguinao	5,671	6,065	6,472	6,625	6,771	7,152
11	Motiong	11,374	12,179	13,022	13,355	13,650	14,417
12	Pinabacdao	11,028	12,095	13,221	13,698	14,139	15,307
13	San Jose de Buan	7,663	9,399	11,476	12,628	13,579	16,284
14	San Sebastian	5,103	5,394	5,688	5,782	5,886	6,156
15	Sta. Margarita	18,939	19,780	21,363	21,796	22,234	23,368
16	Sta. Rita	21,966	21,940	21,918	21,681	21,793	21,379
17	Talalora	6,876	7,167	7,463	7,547	7,637	7,869
18	Tarangnan	18,367	20,185	22,132	22,997	23,738	25,699
19	Villareal	22,823	24,167	25,552	26,042	26,512	27,727
20	Wright	25,273	27,698	30,240	31,300	32,309	34,978
21	Pagsanghan	8,227	9,452	10,807	11,463	12,043	13,625
	Total (excluding islands)	484,821	519,151	555,914	570,009	583,906	619,895
22	Almagro	11,608	12,549	13,535	13,937	14,301	15,255
23	Daram	33,884	35,633	37,390	37,917	38,526	40,091
24	Sto. Niño	12,130	12,686	13,240	13,387	13,575	14,056
25	Zumarraga	13,630	14,033	14,423	14,469	14,584	14,879
26	Tagapul-an	8,705	9,394	10,105	10,380	10,651	11,362
	Grand Total	564,778	603,446	644,607	660,099	675,543	715,538

Source: Socio-economic Profile of the Western Samar, 1984.

Table B.3.2. Projection on Numbers of Labor Force and Household

		1985	1987	1992	1997	2002	2007
Population	(A)	546,743	564,778	603,496	644,607	675,543	715,538
Annual growth rate	(%)		1.6	1.3	1.3	0.9	1.2
Household number	(B)	101,157	104,493	111,647	119,263	124,987	132,386
(A)/(B)		5.4	5.4	5.4	5.4	5.4	5.4
Labor force (number)							
Employed		225,728	266,059	293,751	318,448	342,448	368,913
Self employed		116,721	122,557	128,684	135,519	141,875	148,868
Total	(C)	342,449	388,616	422,435	453,567	484,323	517,881
Annual growth rate	(C1 %)		6.5	1.7	1.4	1.3	1.3
New estimated labor	(C2)	-	46,167	33,819	31,132	30,756	33,558
Labor/household (C)/(B) =	(C3)	3.39	3.72	3.78	3.80	3.87	3.91
Population excluding island municipalities	(S)	449,483	484,840	519,151	555,914	583,906	617,895
Island population share (A-S)/(A)	(%)	18	14	14	14	14	14

Source : JICA Study Team, 1987

Table B.3.3. Employment Increase Target and Job Creation

		1985	1987	1992	1997	2002	2007
Projected labor force							
Employed		225,728	266,059	293,751	318,448	342,448	368,913
Self-employed		116,721	122,557	128,684	135,519	141,875	148,868
Total		342,449	388,616	422,435	453,567	484,323	517,881
Unemployment target ratio	(D %)	7.4	7.4	7.0	6.0	5.0	4.0
Estimated employed labor*	(D1)	317,107	359,858	392,864	426,353	460,107	497,165
Increase of employment	*(D2)*		*42,751*	*33,006*	*33,489*	*33,754*	*37,058*
Underemployment target ratio	(G %)	65	65	50	40	23	12
Estimated underemployment labor	(G1)	222,591	252,600	211,217	181,426	111,394	62,145
Decrease of under-employment	(G2)		30,009	41,083	29,791	70,032	49,249
(G2) x 20% =	(G3)		6,001	8,276	5,958	14,006	9,850
Job requirement (D2 + G3)	(T)		48,752	41,282	39,447	47,760	46,908
Job requirement excluding island municipalities T x (1 - 0.14) =	(H)		41,926	35,502	33,924	41,073	40,340
Annual additional job requirement			-	7,100	6,785	8,213	8,068
Estimated job created by public sector (J) ** (refer to Table N.2.13. in Appendix N.2)			-	4,580	5,420	-	5,760

Note * : Including new entrant
** : Added to job creation in column (J) jobs self-employed and employed labors in private sector will be created to some extent

Source: JICA Study Team

Table B.3.4. Total Number of Families, Total and Average Family Income (Philippines) Urban-Rural and Western Samar 1985

Income Class and Area	Total Number of Families	Income		Total Number of Families	Income	
		Total (in ₱1,000)	Average (in ₱)		Total (in ₱1,000)	Average (in ₱)
				Samar Province		
Philippines	9,847,339	305,775,274	31,052	101,157	1,846,538	18,254
Under ₱6,000	357,849	1,695,850	4,523			
6,000 - 9,999	1,116,780	9,202,175	8,240	33,300	237,638	7,136
10,000 - 14,999	1,778,039	22,207,257	12,490	28,913	355,631	12,438
15,000 - 19,999	1,539,840	26,769,814	17,385	12,046	202,993	16,851
20,000 - 29,999	1,936,341	47,373,441	24,465	14,368	351,961	24,496
30,000 - 39,999	1,085,634	37,402,390	34,452	5,338	186,617	34,961
40,000 - 59,999	1,043,520	50,498,966	48,393	4,177	194,467	46,560
60,000 - 99,999	625,740	47,225,272	75,471	3,016	313,232	103,870
100,000 and Over	345,598	63,396,111	183,439			
U r b a n	3,726,049	171,869,677	46,127			
Under ₱6,000	44,989	195,664	4,349			
6,000 - 9,999	167,556	1,380,440	8,239			
10,000 - 14,999	368,988	4,678,960	12,681			
15,000 - 19,999	443,629	7,786,993	17,553			
20,000 - 29,999	757,310	18,737,649	24,742			
30,000 - 39,999	553,342	19,202,853	34,703			
40,000 - 59,999	646,567	31,447,237	48,637			
60,000 - 99,999	457,327	34,814,518	76,126			
100,000 and Over	286,341	53,625,363	187,278			
R u r a l	6,121,290	133,905,597	21,875			
Under ₱6,000	330,860	1,504,186	4,546			
6,000 - 9,999	949,225	7,821,735	8,240			
10,000 - 14,999	1,409,051	17,528,298	12,440			
15,000 - 19,999	1,096,211	18,982,821	17,317			
20,000 - 29,999	1,179,031	28,635,792	24,288			
30,000 - 39,999	532,292	18,199,536	34,191			
40,000 - 59,999	396,952	19,051,728	47,995			
60,000 - 99,999	168,413	12,410,754	73,692			
100,000 and Over	59,256	9,770,747	164,889			

Table B.3.5. Total Number of Families, Total and Average Family Expenditure by Income Class, 1985

Expenditure by Income Class	Total Number of Families	Expenditure		Total Number of Families	Expenditure	
		Total (in ₱1,000)	Average (in ₱)		Total (in ₱1,000)	Average (in ₱)
				Samar Province		
Philippines	9,847,339	264,551,855	26,865	101,157	1,612,144	15,937
Under ₱6,000	375,849	2,079,228	5,532			
6,000 - 9,999	1,116,780	9,940,445	8,901	33,300	273,639	8,217
10,000 - 14,999	1,778,039	22,240,849	12,509	28,913	364,512	12,407
15,000 - 19,999	1,539,840	25,841,737	16,782	12,046	195,500	16,229
20,000 - 29,999	1,936,341	44,544,140	23,004	14,368	290,945	20,249
30,000 - 39,999	1,085,634	33,584,417	30,935	5,338	131,111	24,563
40,000 - 59,999	1,043,520	43,784,484	41,558	4,177	153,902	36,848
60,000 - 99,999	625,740	39,067,076	62,433	3,016	202,535	67,162
100,000 and Over	345,598	43,469,480	125,781			
U r b a n	3,726,049	145,815,208	39,134			
Under ₱6,000	44,989	288,623	6,415			
6,000 - 9,999	167,556	1,557,600	5,296			
10,000 - 14,999	368,988	4,921,564	13,338			
15,000 - 19,999	443,629	7,907,224	17,824			
20,000 - 29,999	757,310	18,359,192	24,243			
30,000 - 39,999	553,342	17,572,202	31,756			
40,000 - 59,999	646,567	27,996,901	43,301			
60,000 - 99,999	457,327	29,599,596	64,723			
100,000 and Over	286,341	37,612,306	131,355			
R u r a l	6,121,290	118,736,647	19,397			
Under ₱6,000	330,860	1,790,605	5,412			
6,000 - 9,999	949,225	8,382,844	8,831			
10,000 - 14,999	1,409,051	17,319,285	12,291			
15,000 - 19,999	1,096,211	17,934,513	16,360			
20,000 - 29,999	1,179,031	26,184,948	22,209			
30,000 - 39,999	532,292	16,012,214	30,082			
40,000 - 59,999	396,952	15,787,583	39,772			
60,000 - 99,999	168,413	9,467,480	56,216			
100,000 and Over	59,256	5,857,174	98,845			

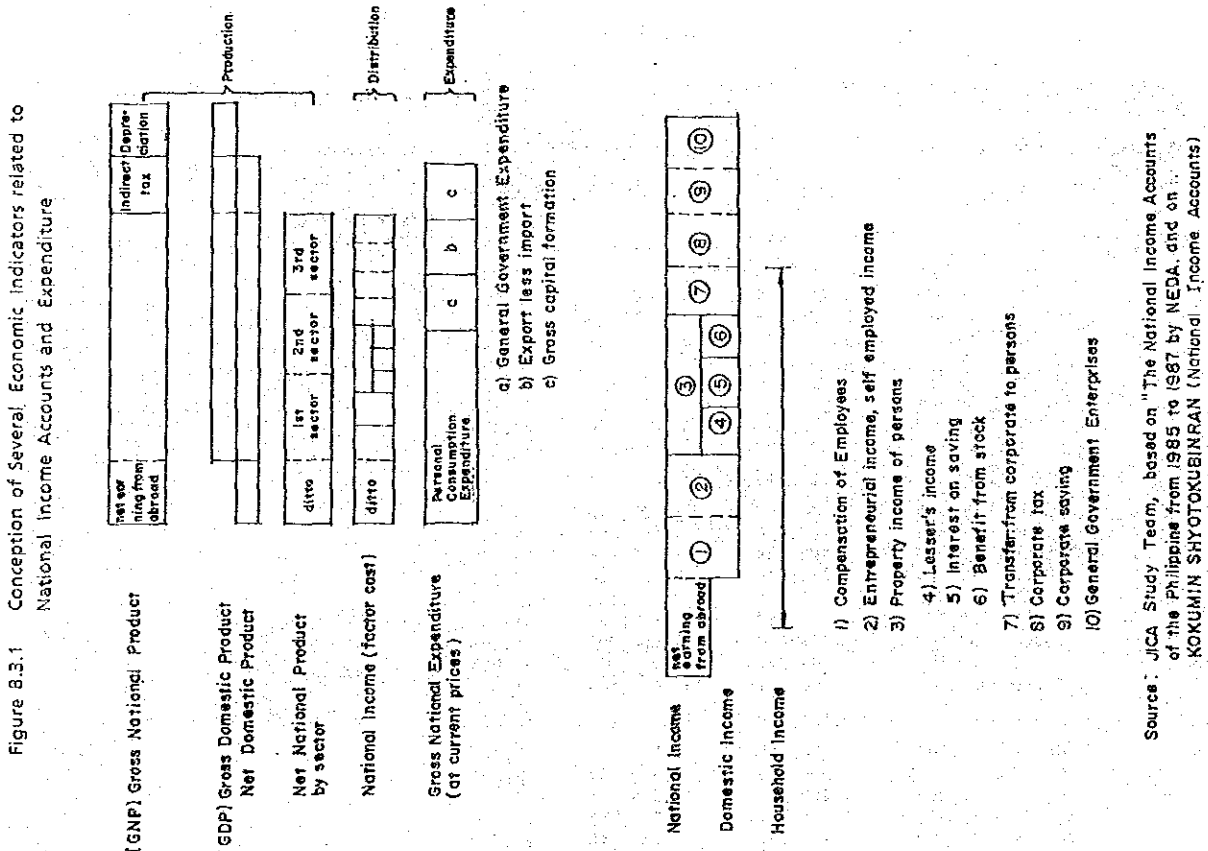
Table B.3.6. Income and Expenditure Increase Target

		1985	1987	1992	1997	2002	2007
Target, Average Household Income		18,254	18,621	23,418	31,052	42,146	57,193
Index		98	100	126	167	226	307
Growth Rate			1 %		5 %		6.5%
Average Income/Labour	NB1	8,180	7,313	8,900	11,629	15,383	20,524
Index		112	100	122	159	210	281
Target, Average Household Expenditure		15,937	16,257	19,397	26,865	35,951	48,455
Index		95	100	119	165	221	298
Growth Rate			1 %		5 %		6 %
Total Household Income (₱ 000)		1,846,520	1,945,764	2,614,549	3,703,355	5,267,702	7,571,552
Index		95	100	133	190	271	389

NB1 : Though, household income will be increased from 1985 to 1987, due to the augmentation of labour force, income per labour will be decreased during the same period.

Source: JICA Study Team.

Figure B.3.1 Conception of Several Economic Indicators related to National Income Accounts and Expenditure



Source : JICA Study Team, based on "The National Income Accounts of the Philippine from 1985 to 1987 by NEDA and on KOKUMIN SHYOTOKUBINRAN (National Income Accounts)

In the former Table B.3.4, the big gap of income level is observed between depressed area like Samar and Metro Manila zone. This phenomena could be acknowledged by one example, in Japan that Tokyo's income level was 2.5 against 1 of income level of the depressed area Kagoshima in 1972. To attain the level of Metro Manila zone during 20 years is an ambitious target but not unrealistic one.

B.4. Non Agricultural (Industrial and Services) Sector

B.4.1. Small Scale and Cottage Industries

Many concerned departments have emphasized on the subject of rural industrialization, particularly agro-processing industry which have been remained until now at infant stage. The data obtained in 1987 shows the actualities as well as the problems of industry in the province (refer to Tables B.4.1 and B.4.2)

B.4.2. Marketing

NFA's limited activity regarding the agricultural produce is shown in the Table B.4.3 (a).

The different market prices existing even within the narrow market is shown in the Table B.4.3 (b).

Characteristics of marketing system in Region VIII is summerized in the Table B.4.4.

B.4.3. Financial and Insurance Services

Production loan to paddy and corn has been very limited (refer to Table B.4.5 (a)). The main portion of loan extended to agriculture has been limited to coconut and abaca (refer to Table B.4.5 (b)). The insurance granted by PCIC for paddy and corn has been also very limited (refer to Table B.4.6 a, b).

B.4.4. Recommendations for Small Scale and Cottage Industries

Relative to the above subject, DTI takes the initiative to promote the rural industrialization, which had been formerly in charge of NACIDA. DTI fixed the policy of investment classified by three categories of plan and all the proposed projects are shown in Table B.4.7 which will be the subject of feasibility study.

The capacity and cost of industrial projects can be fixed only after the completion of market research. On the other hand industrial projects are mainly the subjects of private sector. Therefore, cost estimate of investment in these projects is limited to those in public sector.

The items of A and B listed in Table B.4.8 will be, tentatively recommended to be implemented by public sector to promote the rural industrialization. Further the items of C. listed in the same table are one portion of recommendable items so as to be taken initiative by the DTI to give the incentive of the private sector with private fund. It is the policy of the Philippine Government to transfer certain economic activities such as manufacturing and trade to the private sector. In this regard, the Philippine-Chinese Chamber of Commerce in Tacloban, with about 300 members, may have an important role.

Added to the above, the raw materials available in Samar province is attached hereto as basic information for further studies (refer to Table B.4.9).

Table B.4.1. Establishment by Major Industry and Service in Western Samar and Samar Island

	* 1972		* 1975		** 1978
	W Samar	Samar Island	W Samar	Samar Island	W Samar
Total A (Industry)	256	1,416	417	1,243	481
Logging	3	5	-	-	165 1/
Mining & Quarrying	2	7	2	12	2
Manufacturing	191	618	264	638	308
Electricity, Gas, Water	9	18	8	11	-
Construction	1	4	3	4	8
Transport & Storage	50	784	140	578	N.A
Total B (Service)	1,605	5,884	2,307	6,040	2,716
Financing & Insurance	15	51	16	39	195
Wholesaler & Retail, Hotel	1,492	5,557	2,158	5,723	2,287
Community & Social Service	98	276	133	278	234
A + B Grand Total	1,861	7,300	2,767	7,283	***3,197

Note : 1/ Including establishments of Agriculture, Fishery and Forestry.

Source: * Comprehensive Development Plan by IBRD Vol. I P.30
** Data of Department of Trade and Industry.
*** As reference, 18,822 in Region VIII and 546,265 in the philippine.

Table B.4.2. Summary of Survey on Manufacturing Establishments (Cottage Industry) in Samar Province

Municipalities	Items of industry *	Number of Firms G	S	H	I	Total	Aggregate Asset Size ** Amount	Total	Employment Y81	Y83	growth rate	Remarks
Calbayog	G	24					NB1 P 993,400		86	97		1. Survey was conducted on 90 cottage industries (incl. one small industry) against estimated 308 manufacturing firms. (in 1984)
	W		11				522,650		45	77		
	H			2			2,000		27	32		
	T				1		ab 20,000		6	15		
Total						41		P 1,538,050	(164)	(221)	35 %	
Catbalogan	G	15					296,760		67	76		2. It is discovered that Jiabong, Motiong Pinabacdao and Sta. Margarita have no manufacturing firms.
	W		11				326,500		59	83		
Total						26		353,060	(126)	(159)	26 %	
Calbiga	G	5					180,400		12	12		3. All these cottages firms have financial marketing and technical problems.
	W		1				10,000		9	9	-	
Total	H					6		190,400	(21)	(21)		
Gandara	G	2	NB2				56,000		22	7		
	W		(1)				-		-	-		
	H			1			400		9	9		
Total						3		56,400	(31)	(16)	348 %	
Hinabagan	G	1					9,400		2	1		
	W		1				20,000		4	4		
Total						2		29,400	(6)	(5)	417 %	
San Jorge	G	2					9,100		-	3		
	W		1				45,000		-	7		
Total						3		54,100	(-)	(10)	-	
Wright	G	2					68,300		3	3		
Total						2		68,300	(3)	(3)	-	
Sta Rita	W		1				12,700		2	2		
Total						1		12,700	(2)	(2)	-	
Sta Margarita	H			2			116,000		-	27		
Total						2		116,000	(-)	(27)	-	
Grand Total		51	27	8	4	90		P 2,218,650	353	464	31% up	

* G: Garment
W: Wood and Rattan
H: Household Wares and Gift
T: Ticog

** Total of G: P 1,143,600
Total of W: 936,650
Total of H: 118,400
Total of T: ab 20,000

NB1: One small industry with capital of P 450,000 is including
NB2: Not registered

Source: JICA Study Team based on Survey by Department of Trade and Industry. Samar province in 1987.

Table B.4.3 (a). NFA Procurement and Market Injection of Paddy and Corn for Samar Province

(Unit: ton)

	Year	Production * (A)	Procurement by NFA Target (B)	Procurement by NFA Actual (C)	Share (C)/(A) (%)	Share (C)/(B) (%)	Food Demand (A)	Injection by NFA Target (B)	Injection by NFA Actual (C)	Share (C)/(A) (%)	Share (C)/(B) (%)
Paddy	1980	31,400	1,080	2,005	6.4	185.6	60,173	2,220	2,257 **	3.7	101.7
	1986	63,200	1,305	1,221	1.9	93.6	66,658	3,570	1,473	2.2	41.3
Corn	1980	15,600	210	29	0.2	13.9	14,541	370	295	2.0	79.7
	1986	7,924	405	305	3.8	74.9	16,109	400	243	1.5	60.8

Note : * Production amount is estimated with form of unmilled paddy or corn while NFA procurement target with form of milled rice or corn-grits.

** 32 ton of injection amount with form of rice bran shall be added to the amount in 1980 only.

Source: NFA Office of Region VIII.

Table B.4.3.(b) Market Price of Agricultural Products Prices in Catbalogan and Tacloban

Yearly Average, unit: peso/kg.

	Rice Ordinary (Retail)		Ditto (Wholesale)	
	Catbalogan	Tacloban	Catbalogan	Tacloban
1985	NA	6.51	NA	5.86
1986	NA	5.84	NA	5.42
1987	5.77	6.05	5.60	5.24
Average	5.77	6.13	5.60	5.51

	Rice Special (Retail)		Rice Special (Wholesale)	
	Catbalogan	Tacloban	Catbalogan	Tacloban
1985	NA	6.17	NA	6.90
1986	NA	5.61	NA	6.09
1987	6.79	6.30	5.97	5.37
Average	6.79	6.03	5.97	6.12

	White Corn Grain (Retail)		White Corn Grain (Wholesale)	
	Catbalogan	Tacloban	Catbalogan	Tacloban
1985	NA	4.82	NA	2.98
1986	NA	4.16	NA	2.60
1987	4.74	4.35	2.78	2.92
Average	4.74	4.44	2.78	2.83

	White Corn Milled (Retail)		White Corn Grain (Wholesale)	
	Catbalogan	Tacloban	Catbalogan	Tacloban
1985	NA	5.79	NA	4.96
1986	NA	5.04	NA	4.34
1987	5.07	5.32	NA	4.68
Average	5.07	5.38	-	4.66

Note : As for coconuts, the fixed price in Eastern Visayas have been adopted as 235.54 peso/kg in 1985.
159.83 in 1986, 397.00 in 1987.

Source: B.A.S. Survey records.

Table B.4.4. Characteristics of Marketing in Region VIII

(i) Producers

- As to disposition of produce, it was observed that most crops were not commercialized and home consumption was the primary purpose.

- As to types of buyers, we have (1) wholesalers, (2) wholesaler-retailers, (3) agents, (4) retailers, and (5) consumers with direct or semi-direct marketing.

- As to pricing mechanisms, 37% of the farmers takes canvassing prices, 43% does away with prior canvassing and 20% doesn't market their produce.

(ii) Middlemen

- 62% were retailers; 24% wholesaler-retailers; 11% wholesalers for sample of 91 traders.

- Exchange practices were mostly done on cash and carry basis.

- As to pricing mechanisms, traders apply their knowledge of supply and demand in their transactions.

- Traders related their supply procurement problem as 60% insufficiency of capital and 40% high prices at product sources. Irregular supply, inadequate supply, stiff competition, unpaid debts, low market prices were major constraints.

(iii) Cost and Margins

- At the farm level, the producers' cost and margins were very low due to high costs of production and marketing.

- At the traders/ level, the mark-ups were by commodity and market participant. Storable produce like peanuts and mongo recorded high profits; Others such as cassava, camote and banana with low profits.

- Producers' share in the consumers' peso was well above 50%.

(iv) Market structure and Facilities

- Priority crops like cassava, camote, gabi, peanut, banana and cacao were undertaken by small producers. Mango, the fourth top produce occupied 58% of the market.

- Trading activities were dominated by the whole salers and/or wholesaler-retailers.

- Entry to the trading business was difficult due to the capital requirement.

- The lack of transport facilities was adversely affecting crop marketing. The cold storage facilities/warehouses were not being availed of.

Table B.4.5 (a). Agricultural Loans for Famers in Region VIII
(Total of 1982 to 1986)

(Unit: ₱1,000)

		PNB	DBP	Rural Bank	Land Bank	FSDC	NFA	Miller Trader	Total Amount	Share
Leyte	Paddy	4,997	None	18,902	2,535	515	3,295	3,753	33,797	98.7%
	Corn	-	"	64	16	-	2,487	-	2,567	89.5%
W. Samar	Paddy	52	None	427	-	-	-	N.A	459	1.3%
	Corn	-	"	30	-	-	270	N.A	300	10.5%

Note : No production Loan for Eastern and Northern Samar.

Source: JICA Study Team based on NFA's information.

Table B.4.5 (b). Rural Bank Lending Activities in Western Samar

	Calbayog		Sta. Margarita			Catbalogan	Gandara Basey
	1985	1986	1984	1985	1986		
Agriculture***	6,118.2	8,917.6	730.8	852.2	1,471.4		
			907.0*	597.7	5.0		
Industrial	0.9	0.9	-	-	-	None	later on they will submit the data
Commercial	1,274.0	1,615.8	19	38	32.6		
Others	84.5	950.6	-	-	1,175**		
Total	7,477.5	11,484.9	1,656.8	1,487.9	2,684.0		

Note : * Supervised loan, mainly for poultry.
** Quedan Guarantee Fund Beard (QGFB).
Employers Fring Benefit (EFB).
*** About 98% is for Coconut and Abaca.

Source: JICA Study Team based on Rural Banks' information.

Table B.4.6.a. Insurance for Rice in Samar Province

(₱ 000)

Period	Phase	(NB1)	No. of Farmers	Area (ha)	Coverage Amount (₱1,000)
5. 1981	17-18	B	188	164	220
4. 1982		S	113	109	146
5. 1982	19-20	B	15	22	30
4. 1983		S	131	134	180
5. 1983	21-22	B	946	117	221
4. 1984		S	161	350	534
5. 1984	23-24	B	33	44	90
4. 1985		S	271	509	1,158
5. 1985	25	B	6	6	23
10. 1985		S	196	319	927
5. 1986	26-27	B	5	4	16
4. 1987		S	1,007	2,022	6,063
Total of six years		B	1,193	357	600
		S	1,879	3,443	9,000
Grand Total			3,072	3,800	9,600

Table B.4.6.b. Insurance for Corn in Samar Province

(₱ 000)

Period	Phase	(NB1)	No. of Farmers	Area (ha)	Coverage Amount (₱1,000)
6. 1982	82B	B	-	-	-
12. 1982		S	4	5	7
1. 1983	83AB	B	-	-	-
12. 1983		S	29	38	41
1. 1984	84AB	B	15	15	30
12. 1984		S	79	115	186
1. 1985	85AB	B	56	45	216
12. 1985		S	51	122	244
1. 1986	86AB	B	16	18	54
12. 1986		S	11	27	77
1. 1987	87-A	B	16	18	38
6. 1987		S	9	19	57
Total of five years		B	103	96	338
		S	183	326	612
Grand Total			286	422	950

NB1 : B; Borrowing from the Bank. S; Self-Financed

Source: P.C.I.C Region VIII.

Table B.4.7. Proposed Projects of Small Scale Industries (by DTI) in Western Samar

A. Investment Priorities Plan with Economic Return

I. Agro-processing

1. Food crops
   - A Vegetable
   - B Sweet potatoes
   - C Cassava flour
   - D Fruit (Banana)

2. Cacao

3. Livestock and poultry
   - A Beef cattle
   - B Hogs
   - C Poultry (Broiler, Table Eggs)

II. Manufacturing

1. Processed Fish and Marine Products
   - A Canned fish
   - B Smoked fish
   - C Dried fish

2. Coconut Products
   - A Coconut oil
   - B Charcoal
   - C Coconut lumber
   - D Coconut Vinegar
   - E Coconut wine

3. Wood Products
   - A Furniture

4. Gifts and housewares fashion accessories
   - A Ticog
   - B Shell craft
   - C Buri
   - D Nito

5. Production of feed ingredients and feeds
   - A Fish meal

B. Export Priorities Plan

I. Aqua Marine
   - A Shrimps/prawns
   - B Mussel
   - C Crabs
   - D Fish

II. Handicrafts
   - A Basket (Nito & Nipa)
   - B Ticog
   - C Abaca

III. Coco-based products
   - A Coco shell charcoal
   - B Copra

IV. Forest Products
   - A Guano
   - B Lumber
   - C Rattan

C. Technology Priorities Plan

I. Gift and housewares
   - A Ticog
   - B Nito
   - C Shell craft

Note : Excluding the coastal fishing and Mining.

Source: Briefing Kit, DTI presentation meeting with congressmen.

Table B.4.8. Recommendable Cottage Industries and Services

A. Recommendable Industry for Public Sector

Item	Capacity	Location
Coconut oil extraction charcoal shell product	ab. 2,3 Million pieces/year/ each	St. Margarita Calbayog Wright

Note: There exis an Implementation Program in 1980.

B. Some Training or Services Program to be Promsted by Public Sector

Item	Unit	Location	
Sales display centers	3	Catbayog	Catbalogan/Gandara
Seminar-workshop on furniture	3	-ditto-	" /St.Margarita
Seminar-workshop on abrasive and finishing technique	3	-ditto-	" /San Jose de Buan
Training program on wood furniture	3	-ditto-	" /Hinabangan
Training program on bamboo novelties	3	-ditto-	" /Calbiga
Training program on rattan furniture	3	-ditto-	" /Motiong
Training program on product development and designing	3	-ditto-	" /Gandara
Training program on basketry and bag making	3	-ditto-	" /Pagsanghan
Training program on food processing	3	-ditto-	" /St. Niño
Common service facilities	1	-ditto-	
Center of procurement, storage and selling materials	1	-ditto-	

C. Recommendable Cottage Industries for Private Sector

Products	Material	Location
Nipa Fruits Processing	Nipa	Basey, Pagsanghan
Handicrafts	Tikog	Calbayog
	Nito	Sta Rita
Abaca Handicraft	Abaca	Gandara, Sta Marganita
Furniture & Handicraft	Bamboo	Calbiga, Matuguinao
Furniture	Lumber	San Jorge
Banana Processing	Banana	San Jose de Buan
Ipili Ipili Chacoal	Ipili Ipili	Calbayog
Rattern Craft	Rattern	Hinabagan, Motiong
Fish Drying, Feed Mill	Acqua Marine	Catbalogan
Garment	Fiber	Not Specified

Source: JICA Study Team based on DTI informations, Regional Development Plan by NEDA and Socio-Economic Profile of Samar.

Table B.4.9. Recommendable Projects of Small Scale Industries in Samar Province
Raw Materials available in Samar Province as base for them

Municipality	(A) Major Raw Materials Available for Cottage Industry																				TOTAL	
	Coconut						Abaca	Piña	Anahat Vines	Idyok Palms	Ipil-ipil	Rattan	Nito	Wood	Bamboo	Buri leaves and Midribs	Nipa leaves and Midribs	Ticog	Tiklw (Silliran)	Anahaw Leaves and trunk	A	R
	Midribs	Meat	Shell	Oil	Leaves	Water																
1. Basey	R	R	R	R	R	R	A	-	A	A	A	R	A	R	A	R	R	R	R	A	7	12
2. Calbayog	R	R	R	R	R	R	R	R	R	R	R	R	A	R	R	R	R	R	R	A	2	18
3. Calbiga	R	R	R	R	R	R	R	A	A	A	A	R	A	R	R	A	R	R	R	A	7	13
4. Catbalogan	R	R	R	A	R	R	A	A	A	A	R	A	A	R	R	A	-	A	A	A	11	8
5. Gandara	R	R	R	R	R	R	R	A	A	A	A	-	-	R	R	A	R	R	R	A	6	12
6. San Jorge	Lack of data																				-	-
7. Hinabangan	R	R	R	R	R	R	A	A	A	A	-	R	A	R	R	A	R	R	R	A	7	12
8. Jiabong	A	A	A	A	A	A	R	A	A	A	A	A	A	R	R	-	A	A	A	A	16	3
9. Marabut	R	R	R	R	R	A	-	A	A	A	-	R	A	R	A	A	R	R	R	A	8	10
10. Matuguinao	A	A	A	A	A	A	A	A	A	A	-	A	A	R	A	-	-	A	A	A	16	1
11. Motiong	R	R	R	R	R	R	R	A	A	A	A	R	A	R	R	A	R	A	A	A	9	11
12. Pinabacdao	A	A	A	A	A	A	A	A	A	A	-	A	A	A	R	A	R	R	R	-	14	4
13. San Jose de Buan	A	A	A	A	R	A	A	A	A	A	-	R	R	R	A	-	-	A	A	A	13	4
14. San Sebastian	A	A	A	A	A	A	A	-	-	A	-	-	-	A	R	-	R	A	A	A	12	2
15. Sta. Margarita	R	R	R	R	R	R	R	A	A	A	A	A	A	A	R	A	R	R	R	A	9	11
16. Sta. Rita	R	R	R	R	R	R	R	A	A	A	-	A	A	A	R	A	R	R	R	A	8	11
17. Talalora	R	R	R	R	R	R	-	-	-	-	-	-	-	A	R	-	-	-	-	A	2	7
18. Tarangnan	R	R	R	R	R	R	A	-	-	-	R	-	-	A	R	-	-	A	-	A	4	8
19. Villareal	R	R	R	R	R	R	A	-	-	-	A	-	-	A	R	-	A	R	R	A	5	9
20. Wright	R	R	R	R	R	R	R	A	A	A	A	R	A	R	R	A	R	R	R	A	7	13
21. Pagsanghan	Lack of data																				-	-
TOTAL A:	5	5	5	6	4	6	9	13	14	15	8	6	13	7	4	10	2	7	6	18	163	
TOTAL R:	14	14	14	13	15	13	8	1	1	1	3	8	1	12	15	2	12	11	11	-		169

A: Average R: Rich

Source: JICA Study Team based on the data of NACIDA.

B.5. Inquiry Survey of Inhabitants Needs

B.5.1. Methodology of Inquiry Survey

1) Method

- Target respondents were Barangay Captain who represent the opinions of inhabitants of his Barangay.
- Five barangays per municipality were selected as survey barangays on the basis of their comparatively larger population.
- Questionnaires were prepared taking into account the experiences from the previous test survey, so as to collect the necessary information as precisely and as objectively as possible. Points considered are:
  - ° questions must be definite and clear to understand (avoid absolute questions)
  - ° questions must be easy to answer
  - ° municipalities/barangays shall have equal chances to be covered by the survey (not to avoid municipalities or barangays where access is difficult)

Needless to say, the attention has been taken so that the result of survey should be correct statistically and precise objectively (refer to Table B.5.1).

- Survey guide and definition of terms in the questionnaires were prepared.
- Some background information were also collected through a parallel inquiry.
- Surveyed barangay number occupied about 12% of total barangay and it has population corresponding to 17% of total population in the Province. These figures are sufficient for interpreting the result as general opinion of the Province excluding island area. (refer to Table B.5.2)

2) Way of Implementation

- Enumerators were hired and given the guidelines for the conduct of the survey.

- By the request of the Study Team, the mayor of each municipality sent corresponding communications to the respondents to provide assistance and cooperation in the conduct of the study.

- All the answers obtained were rechecked, reconfirmed or sometimes adjusted by the study team responsible for the survey so as to avoid any misunderstanding.

3) Limited Conditions

- Even with the above mentioned considerations, different interpretations of each question might be possible because of the respondents' individual differences.

- Because of the difference in the existing living condition in each barangay, it could hardly be expected on some items as statistically precise in a strict sense.

B.5.2. Tabulation and Analysis

1) Tabulation Method on Preference for Project (column D of questionnaire)

- Among the twelve items, inhabitants were asked to rank three items as to their priority.

- Weights were assigned on the priority ranking

  Priority No.1 - 5 points
  Priority No.2 - 3 points
  Priority No.3 - 1 point

- Priority weights were tabulated per barangay. Points were added for barangays within the municipality to come-up with total points for each municipality.

- Points for all municipalities per project item were likewise added to come-up with ranking of project priorities (refer to Table B.5.3).

2) Tabulation Method on Preferable Items in a Project (column D of questionnaire)

- Among the several items in each a project inhabitants were asked to rank three items preferable.

- Weights and points calculation were made by same method as explained above in 1) (refer to Table B.5.4)

3) Tabulation Method on, Time of Realization, Necessity and Expectation (column A, B, C of questionnaire)

- Weights were assigned as;

A column	1 .. 5 points		B column	1 .. 5 points	
	2 .. 4	"		2 .. 3	"
	3 .. 3	"		3 .. 1 point	
	4 .. 1 point				
	5 .. -3 points				
C column	1 .. 5 points				
	2 .. 3	"			
	3 .. 1 point				

- Obtained points of five barangays were added and made to be the average for each municipality (refer to Table B.5.5).

Table B.5.1. Questionnair of Inquiry Survey

A. Method of Answer

I. Please answer S: Satisfied, N: Neutral
UN: Unsatisfied on the present condition of each item from No. 1 to 12.

II. Please select one suitable answer out of the following column A.B.C. for each question.

III. Please refer to column D

a) Please rank the question from 1 to 3 in each item as to their importance.

b) Please rank the items from 1 to 3 as to their importance among 12 items.

B. Column of Answer

A. Expected Time of Realization					B. Magnitude of Necessity			C. Expectation			D. Priority of Project	
1. Immediately	2. Until 1990	3. Until 2000	4. After 2000	5. Not possible eternaly	1. Necessary	2. Undecided	3. Unnecessary	1. Highly expected	2. Undecided	3. Unexpectable	a) Question within the item	b) Among 12 items
1	2	3	4	5	1	2	3	1	2	3		
1	2	3	4	5	1	2	3	1	2	3		
1	2	3	4	5	1	2	3	1	2	3		

Table B.5.2. Surveyed Barangays in Total Barangays of Samar Province

Municipality	Population of Municipality in 1980 (A)	Barangay Numbers	Surveyed Barangay	Population of Surveyed 5 Barangays (B)	(B)/(A)
1) Basey	36,760	51	5*	4,975	13.5%
2) Calbayog	106,719	155	5	10,610	9.9
3) Calbiga	14,201	39	5	2,854	20.1
4) Catbalogan	58,757	57	5	16,708	28.4
5) Gandara	24,764	56	5	3,388	13.7
6) San Jorge	9,123	26	5	2,068	22.7
7) Hinabangan	10,786	16	5	2,271	21.7
8) Jiabong	11,055	34	5	2,834	25.6
9) Marabut	13,288	14	5	3,030	22.8
10) Matuginao	5,020	20	5	1,695	33.8
11) Motiong	10,035	27	5	3,362	33.5
12) Pinabacdao	9,389	23	5	3,349	34.3
13) San Jose de Buan	5,455	12	5	2,333	42.8
14) San Sebastian	4,606	11	5	1,919	41.7
15) Sta. Margarita	16,922	32	5	7,114	42.0
16) Sta. Rita	21,640	31	5	4,399	20.3
17) Tarangnan	15,558	41	5	2,235	14.4
18) Villareal	20,505	37	5	2,498	12.2
19) Wright	21,556	46	5	4,115	19.1
20) Pagsanghan	6,512	12	5	2,557	39.3
Total and Average	422,629 [84%]	740	100 [12%]	84,314 [17%]	20.0%
Total of the Province	501,439[100%]	864	864[100%]	501,439[100%]	-

Note : * In Marabut, only 4 baranguays weresurveyed, but by applying their average figure of answers and population, tabulation was made on the basis of 5 baranguays.

Source: JICA Study Team on the basis of effectuated Inquiry Survey and 1980 census.

Table B.5.3. Computation Table of Inhabitants Opinion (No. 1) on Vote for Priority Project (Column D of Questionaire)

Municipality	(1) Living Condition	(2) Income	(3) Potable Water	(4) Electricity	(5) Road Linkage	(6a) Road Transportation	(6b) Other Transportation	(7a) Education Facilities	(7b) Education Secondary	
1) Basey	-	6	3	-	3	6	-	3	-	
2) Calbayog	-	9	14	-	16	-	-	-	-	
3) Calbiga	-	-	11	-	3	8	-	8	-	
4) Catbalogan	8	3	15	-	3	-	-	1	4	
5) Gandara	-	5	11	3	15	-	-	2	-	
6) San Jorge	1	5	3	5	9	-	-	5	-	
7) Hinabangan	-	5	23	2	9	-	-	4	3	
8) Jiabong	-	-	18	-	11	-	-	2	1	
9) Marabut	-	-	12	4	25	1	1	-	-	
10) Matuginao	-	-	5	-	-	12	9	23	23	
11) Motiong	-	-	13	5	15	-	-	1	-	
12) Pinabacdao	-	1	11	-	-	2	13	-	-	
13) San Jose de Buan	-	-	6	13	23	-	-	-	-	
14) San Sebastian	-	-	23	-	13	-	-	-	-	
15) Sta. Margarita	-	-	5	-	9	-	-	19	-	
16) Sta. Rita	-	-	5	6	14	10	10	1	1	
17) Tavangnan	-	10	16	-	14	4	4	-	-	
18) Villareal	-	-	7	-	13	4	-	14	-	
19) Wright	-	5	10	-	9	1	1	10	10	
20) Pagsanghan	-	5	7	-	21	-	-	-	-	
Total	9	54	218	38	222	18	38	93	42	27
										162

- Continued

Municipality	(7c) Education College or Vocational	(8a) Health Care	(8b) Health Care (Population Growth)	(9) Communication	(10a) Farm Land	(10b) Agriculture	(11a) Increase of Employment	(11b) Increase of Employment	(12) Shopping Items	
1)	-	2	-	-	1	21	-	-	-	
2)	-	6	-	-	-	-	-	-	-	
3)	-	-	-	-	15	-	-	-	-	
4)	1	8	-	-	-	-	3	1	-	
5)	-	-	-	-	-	9	-	-	-	
6)	-	-	-	-	-	17	-	-	-	
7)	-	-	-	-	-	-	2	-	-	
8)	-	5	1	-	-	3	6	1	-	
9)	-	3	2	-	-	-	-	-	-	
10)	15	4	-	-	-	1	-	-	-	
11)	-	5	5	-	-	1	-	-	-	
12)	-	4	-	-	-	14	-	-	-	
13)	-	-	-	-	-	-	3	-	-	
14)	1	-	-	-	-	6	2	-	-	
15)	-	6	-	-	-	6	-	-	-	
16)	1	-	-	-	9	7	-	-	-	
17)	-	1	-	-	-	-	3	-	-	
18)	-	1	-	-	-	6	-	-	-	
19)	10	2	1	-	3	8	-	-	-	
20)	-	9	-	-	-	3	-	-	-	
Total	27	57	9	-	13	117	19	2	-	
						130				

Note : Interpretation is made as follows:
Priority 1 - 5 points, 2 - 3 points, 3 - 1 point
Make addition of five barangays for each municipality

Source: JICA Study Team on the basis of effectuated inquiry survey.

- Continued

Municipality	(10 A) Farm Land			(10 B) Agriculture Facilities					(11 A) Increase of Employment Opportunities			(11 B) Increase of Employment Opportunities						(12) Shopping Item					
NBI	1	2	3	1	2	3	4	5	1	2	3	1	2	3	4	5	6	1	2	3	4	5	6
1)	23	11	11	25	-	12	5	3	25	10	11	23	15	-	-	5	7	1	4	-	17	23	-
2)	15	11	19	20	12	8	4	1	25	11	9	-	6	3	-	12	4	7	10	11	6	11	-
3)	15	13	17	19	-	13	12	1	15	15	15	17	-	-	-	13	15	-	6	2	19	14	-
4)	21	9	15	11	6	10	4	1	23	9	13	-	15	-	15	8	7	25	13	4	3	-	-
5)	21	11	13	25	13	7	-	-	7	25	13	15	-	1	4	-	25	-	13	-	7	25	-
6)	19	15	11	25	13	7	-	-	7	25	13	8	6	1	6	5	19	-	15	3	2	25	-
7)	18	8	10	3	3	20	7	3	21	9	15	15	-	5	9	3	13	21	11	3	-	10	-
8)	17	5	23	5	1	23	15	7	21	7	17	25	3	-	4	-	13	16	9	1	4	15	-
9)	11	21	13	5	16	4	4	14	19	7	19	25	3	1	-	11	5	20	11	9	-	5	-
10)	25	13	7	20	11	2	12	-	23	11	11	25	12	5	-	3	-	5	3	9	14	14	-
11)	19	19	7	-	25	3	13	4	25	7	13	23	9	5	-	7	1	-	5	15	13	12	-
12)	21	15	9	20	9	8	2	6	15	9	3	25	3	6	-	3	8	11	10	6	9	9	-
13)	19	5	21	10	-	21	11	3	25	7	13	23	3	8	4	4	3	13	8	3	1	11	-
14)	15	5	25	23	6	8	8	-	23	9	13	13	11	5	6	4	6	16	5	1	-	14	-
15)	25	15	5	19	13	13	-	-	7	23	15	8	2	11	11	6	16	1	8	2	9	25	-
16)	25	11	9	15	12	1	12	2	25	7	13	25	9	6	-	5	-	2	-	1	9	15	-
17)	17	15	13	-	10	14	7	5	25	13	7	10	15	-	9	8	3	5	7	13	20	-	-
18)	25	15	5	25	3	12	5	-	25	11	9	23	13	-	-	2	7	-	3	7	13	21	1
19)	7	19	19	-	19	3	7	-	21	5	19	25	10	8	-	2	-	5	10	4	6	13	-
20)	17	18	15	25	15	5	-	-	25	15	5	25	-	-	-	13	7	1	10	9	9	16	-
	375	254	267	295	187	194	128	50	402	235	246	353	135	65	68	114	154	149	161	103	161	278	1

NBI Number is corresponding question number in each item, eg: 6B other transportation.
1. reverine transportation 2. ship transportation
3. catbalogan airport 4. another airport

Source: JICA Study Team on the basis of effectuated Inquiry Survey.

Table B.5.4. Computation Table of Inhabitants Opinions (No. 2) on Preference of Items in the Specific Project (Column D of Questionaire)

Municipality	(6B) Other Means of Transportation				(7 A) Education Facilities			(7 B) Education (up to High School)			(7 C) Education (Voc. College)			(8 B) Health Care (Population Growth)		
NBI	1	2	3	4	1	2	3	1	2	3	1	2	3	1	2	3
1) Basey	17	23	5	-	25	15	5	21	17	7	25	13	7	20	6	10
2) Calbayog	9	23	13	-	25	15	5	19	17	9	23	17	5	5	19	21
3) Calbiga	17	23	5	-	23	17	5	25	15	5	23	17	5	8	10	18
4) Catbalogan	17	17	11	-	25	15	5	25	15	5	21	15	9	9	13	23
5) Gandara	25	11	9	-	21	11	13	15	19	11	19	17	9	7	13	25
6) San Jorge	20	8	8	-	23	15	7	21	13	11	15	19	11	13	11	21
7) Hinabagan	25	13	7	-	25	7	13	21	15	9	13	25	7	4	10	14
8) Jiabong	25	11	9	-	23	9	13	19	19	5	13	25	7	5	21	19
9) Marabut	21	15	8	1	15	19	11	21	15	9	11	21	13	7	21	17
10) Matuginao	25	13	-	7	19	19	7	15	23	7	21	19	5	15	21	9
11) Motiong	20	12	2	2	25	15	5	23	15	7	17	17	11	13	21	9
12) Pinabacdao	19	19	7	-	25	13	7	25	15	5	20	12	4	21	11	13
13) San Jose de Buan	20	12	4	-	25	13	7	25	9	11	15	25	5	5	21	19
14) San Sebastian	25	13	7	-	21	15	9	21	17	7	15	25	5	5	21	19
15) Sta. Margarita	25	13	7	-	25	11	9	17	11	17	17	17	11	9	13	23
16) Sta. Rita	25	15	2	3	19	19	7	15	23	9	21	15	9	9	21	15
17) Tarangnan	15	9	3	-	25	13	7	21	17	7	23	17	5	13	17	15
18) Villareal	15	25	5	-	25	15	5	25	15	5	20	15	5	5	13	17
19) Wright	15	9	3	-	21	13	11	7	25	13	19	19	7	6	16	14
20) Pagsanghan	25	15	5	-	25	15	5	25	15	5	25	15	5	13	15	17
Total	405	299	120	13	460	284	106	404	330	164	376	365	145	192	322	338

Table B.5.5. Computation Table of Inhabitants Opinion (No. 3)
(Column: (A) Time of Realization (B) Necessity (C) Expectation)

Municipality	(1) Living Condition			(2) Income			(3) Potable Water			(4) Electricity			(5) Road Linkage		
	(A)	(B)	(C)	(A)	(B)	(C)	(A)	(B)	(C)	(A)	(B)	(C)	(A)	(B)	(C)
1) Basoy	16.2	13.4	7	20.6	15.2	9	13	12	13	11	11	11	26	25	20.2
2) Calbayog	24	15	15	24.2	15	15	24.6	15	15	16	10	10	36.2	20.2	20.2
3) Calbiga	15	15	15	15	15	15	15	15	15	12	12	12	25	25	25
4) Catbalogan	19.8	15	15	19.2	15	15	16.8	15	15	10	10	10	35.6	24.2	25.2
5) Gandara	25.8	15	16.4	26.8	15	15	25.6	15	14.8	17.4	15	10.8	38	25.4	24.4
6) San Jorge	20.8	15.4	16.2	25	15.2	14.8	24.8	15	16.2	12	15	9.8	38.4	25.4	24
7) Hinabangan	24.2	15.2	15	23.2	15	15	17.4	15	15	19	15	15	33.2	21.2	72.6
8) Jiabong	22.8	15	15	16.2	15	15	18.4	15	15	10.4	3.8	8.2	16.4	12.2	12.2
9) Marabut	24	15	15	15.6	15.2	15.2	17.6	15.2	15.2	22.6	16	15.8	32.8	26.8	27.2
10) Matuginao	24	15	15	13.6	10.4	10.4	24.8	15	15	11	12.2	12.4	33	22	22
11) Motiong	24.2	15.2	15.2	22.2	15	15	15	15	15	15.8	15	15	30.8	25.6	25.6
12) Pinabacdao	15	15	15	15	15	15	15	13.4	15.2	10	10	10	25	25	25
13) San Jose de Buan	24	15	15	24	15	15	22.2	15.6	15.6	20.4	15	15	25.6	25	25
14) San Sebastian	24.6	15.4	15	28.5	15	15	16	10.2	13.6	22.2	15.6	15.6	35	22.8	24.6
15) Sta. Margarita	25.2	15	15.8	24.8	15.2	15.8	24.8	15	15.4	15.2	15.2	15	14.2	56.6	25.4
16) Sta. Rita	25.2	15	15	24	15	15	17.4	15	15	14.2	10.8	10.8	38	25	25
17) Taranguan	24	15	15	24.6	17	17	24	15	15	13.6	10	10	32	20.4	21.4
18) Villareal	9	10.2	10.2	11.8	11.8	15.4	9	15	15.6	10	10	10	27.8	16	16
19) Wright	25.4	15.4	15.4	22.6	15.2	15.2	15	15	15	7	12.6	12.6	20	25.4	25.4
20) Pagsanghan	24	15	15	24	15	15	24	15	15	16	30	10	40	25	25
Total	437.2	295.2	291.2	420.9	295.2	292.8	380.4	291.4	299.6	379.4	264.2	239.0	595.0	474.2	511.4

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Municipality	(6a) Road Transportation			(6b) Other Means of Transportation			(7a) Educational (Physical Facilities)			(7b) Educational Institution (up to high school)			(7c) Educational Institution (College)		
	(A)	(B)	(C)	(A)	(B)	(C)	(A)	(B)	(C)	(A)	(B)	(C)	(A)	(B)	(C)
1)	9.2	13.6	8.6	7	9.2	7.6	13.2	13.4	12	15	15	15	19.8	15	15
2)	25	15	15	24.6	15.2	15.2	24.6	15	15	24	15	15	24.6	15	15
3)	15	15	15	20.6	18.4	18.4	15	15	15	15	15	15	15	15	15
4)	20.8	15	15	7	12.4	21.4	17	15	15	15	15	15	16.8	15	15
5)	22	15	17.6	19.6	13.6	12.6	25.8	15	15.8	24.8	15	15.8	24.4	15	19.4
6)	16.4	17	11.2	21.8	12	12.2	24.8	15	16.4	25	15.2	14.8	24.8	15	19.4
7)	16.4	11	12.8	27.2	25.6	20.4	21	15	15	20.6	15	15	20	15	15.6
8)	14.6	10.8	2	0.8	0.2	1	20.8	15	15	16.8	15	15	23.8	15	15
9)	18.8	15.6	15.8	18.6	15.2	15.2	16.2	15.4	15.4	18.6	15.2	15.2	18	15.2	15.2
10)	(-9.8)	(-5.8)	(-5.8)	12	7.2	7.2	21.4	15.4	15.4	18.8	11.8	11.8	11	7	7
11)	15	15	15	28	22	22	19	15	15	15.6	15	15	23.8	15	15
12)	15	15	15	11.4	10.6	14.2	15	15	15	15	15	15	15	15	15
13)	22.2	13.4	15	31.4	20	20.4	25.2	15	15	17.4	15	15	23.4	15	15
14)	22.8	17.4	16.2	22.2	19.6	21.4	25.8	15	15	18	15	15	25.6	15.2	15.2
15)	25.6	24.6	15	15.6	25.8	15.8	14.6	24.6	15	23.4	15	16	24.8	15	15.2
16)	23	15	15	33.6	20	20	15.8	15	15	14.4	15	15	21	15	15
17)	20.4	15	15	16.6	12.8	12.6	24.2	15	15	24	15	15	24	17	15
18)	15	15	15	14.4	17.8	12.2	14	14	14	15	15	15	15	15	15
19)	16.8	15	15	7.2	11.6	11.6	15.6	15	15	16.4	15.2	15.2	21.2	15	15
20)	24	15.6	15	19	12	12	24	15	15	24	15	15	24	15	15
	348.2	283.2	258.4	358.6	301.2	293.4	393	307.8	299	376.8	297.4	298.8	416	294.4	302

Table B.5.5. (cont'd)

Municipality	(8a) Health Care			(8b) Population Growth			(9) Communication			(10a) Farm Land			(10b) Agriculture Facilities		
	(A)	(B)	(C)	(A)	(B)	(C)	(A)	(B)	(C)	(A)	(B)	(C)	(A)	(B)	(C)
1)	15	15	15	16.8	13.4	15.2	15	13.4	13.4	15	15	5.4	23.6	23.4	20.6
2)	24.4	15	15	24.4	13.6	15.4	24	15	15	24	15	15	40	25	15
3)	15	15	15	19.8	7	8.4	15	15	15	15	15	15	25	25	25
4)	15	15	15	18.6	15.4	15.4	16.8	15	15	20	15	15	22.8	21.8	25.4
5)	23.4	15	14	25	15.4	17.4	6.4	15.2	6.2	19.8	15	16.8	41.8	25	26.8
6)	19.6	15	11.4	24	16.2	17.8	0.8	14.2	3.2	16.4	14.2	26.2	42.2	25.2	27.8
7)	24	15	15	17.2	12	15.8	10.6	2.4	5.8	13.8	15.8	14.8	35	24.4	23.6
8)	15.6	15.6	15	12.2	11.8	12	12.2	10.6	7.4	8	5.4	5.4	32.6	23.6	23.8
9)	16.8	15.2	15.2	18.2	18	15.4	19.6	14.8	14.8	18.6	15.6	15.6	28.6	19.6	19.6
10)	14	15	15	3.2	2.2	2.2	(-15)	(-9)	(-9)	3.2	7	7	(-4.2)	(-1.8)	(-1.8)
11)	2.8	15	15	16.6	15	15	20.2	15.4	15.4	21.2	15	15	39	25	25
12)	14	14.4	15.2	15	15	15	15	15	15	15	15	15	23	23	23
13)	19.8	15	15	14.8	13.8	15.8	12.4	7	4.2	23.6	15	15	40	25	25
14)	23.4	15	15	18	14	15.8	21	14.4	14.6	22.8	15	15	37.2	23	23
15)	17	15	14.4	18.2	11	14.2	11.2	13	11.8	16.2	13.4	12.8	38	24	26.2
16)	20.4	15	15	22.2	15	15	16.6	15	15	22.4	15	15	37.8	25	25
17)	24.4	15	15	25	15	15.2	24.6	15	15	23.2	15	15	22.4	19.2	22.8
18)	15	15	15	15	13.4	13.4	16.4	13.4	15.2	14.4	13.4	13.4	27.4	25	25
19)	20	15	15	15.8	13.4	15.2	17.2	14.4	14.4	12.6	15.6	15.6	25.4	25	25
20)	24	15	15	24	15.2	15.2	24	15	15	24	15	15	24	15	15
	373.6	300.2	295.2	364	265.8	284.8	284	244.2	222.4	349.2	280.4	283	601.6	440.4	450.8

- Continued

Municipality	(11a) Employment Opportunities			(11b) Employment Opportunities			(12) Shopping Items		
	(A)	(B)	(C)	(A)	(B)	(C)	(A)	(B)	(C)
1)	20.6	15	11.8	39.8	30	30.4	36.6	30	30
2)	24	15	15	40.2	26.8	26.8	48.8	30	30
3)	19	15	15	32.4	30	30	30	30	30
4)	15.6	15	15	32.8	28.4	28.4	42.8	30	30.4
5)	19.8	15	16	49.8	29	31.8	23.4	23	12.2
6)	20	15	10	38.2	29.2	30.6	3.4	24	(-0.4)
7)	20.6	15	15	37.4	28.2	28.6	26.6	17.4	14.4
8)	13.6	13.4	13.4	30.2	26.8	26.8	25.8	13.2	11.4
9)	18.8	15.2	15.4	40.4	30.8	31.8	40.2	27.8	27.8
10)	4	7.6	7.6	29.8	18.8	18.8	(-15.4)	(-16.4)	(-16.4)
11)	23.8	15	15	32.4	31.4	31.4	40.8	30	30
12)	15	15	15	31.8	26.8	10.4	33.6	30	30
13)	18.8	15	15	37.2	27.2	27.2	42.8	25.8	22.4
14)	19.6	15	15	47.6	30.8	30.8	15.2	15.2	14
15)	25.6	15.4	14.6	47.4	31	27.6	16	19.8	12.4
16)	23	15	15	44.2	30.2	30.2	38.4	30	30
17)	24	15	15	35.4	23.8	23.8	44.2	28.8	29.6
18)	17.4	15	15	31.6	30	30	30	30	30
19)	24.8	15.2	17	40.4	30.2	30.2	28.8	24.6	23.2
20)	24	15	15	35	27.4	27.4	48	30	30
	392	281.8	285.8	754	566.8	553	600	473.2	421

Source: JICA Study Team on the basis of effectuated Inquiry survey.

APPENDIX C. METEOROLOGY AND HYDROLOGY

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C.1. Climate

C.1.1. General Condition

PAGASA uses three climate classification system: Coronas, Hernandez, and Koppen. However, only the first one is presently utilized in Samar island. The climate in the island is categorized into two type (II, IV) according that classification.

In Western Samar, Type IV covers approximately an area of Jibatan river basin, Calbayog city, downstream of Gandara river basin and municipality of Catbalogan, while Type II extends to an area of upstream of Gandara, Tenane and Silaga river basins, and municipality of Basey. In terms of the area, the both types have their shares in almost equal (refer to Figure C.1.1).

In Samar island, seven rainfall stations are presently in operation. But in Western Samar, the Catbalogan observatory is only one operated for long term, and located nearly in the middle of the Study Area. General climate data and records of the area are available (refer to Figure C.1.2 and Table C.1.1).

Collected meteorological data related to the Study Area are as follows:

Item	Station	Duration
Rainfall	Catbalogan	36 years (1951 - 1986)
Temperature	-do-	13 years (1974 - 1986)
Humidity	-do-	-do- (-do-)
Wind	-do-	-do- (-do-)
Cloudiness	-do-	-do- (-do-)
Evaporation	Catarman	11 years (1975 - 1985)

C.1.2. Meteorological Conditions

1) Rainfall

The isohyetal map of annual rainfall in Samar island presented with a range between 3,000 mm in seashore area and 6,000 mm in the central mountainous area (refer to Figure C.1.3).

Annual rainfall in Catbalogan is recorded at 2,636.3 mm on an average for 36 years from 1951 through 1986. The rainfall is effected by the monsoons, and is calculated the minimum monthly mean rainfall of 109.9 mm in April and 315.8 mm in November at maximum, respectively. The period from April to May has brought a comparatively small rain in the year. However, rainfall exceeding 300 mm in this period was sometimes observed. Monthly rainfall is irregular in the quantity (refer to Table C.1.2).

The probability analysis of daily and consecutive rainfall has been made by using those 35 years complete data for 1951 to 1986, and summarized as rainfall in 1/50-years frequency at 418.9 mm/day, 513.7 mm/2-day and 527.3 mm/3-day, respectively. Difference between 2 and 3-days consecutive rainfall is very small, and 2-day consecutive rainfall would be applicable for the hydrological analysis for the project (refer to Table C.1.4).

The analyses were conducted by using Iwai's equation which was treated as hydrological data by logarithmic normal distribution as follows:

$$\log (x + b) = \log (Xo + b) \frac{1}{a} \xi$$

where,

Xo; median of data

$$b = \frac{1}{m} \sum_{i=1}^{m} bs \qquad bs = \frac{X_e X_e - X^2_g}{2Xg - (Xe - Xs)}$$

m; integer close to $\frac{1}{n}$ n; number of data

$$\frac{1}{a} = \frac{\sqrt{2n}}{2 - 1} Sx$$ Sx = standard deviation

ξ ; probability variation transformed into logarithm

2) Temperature and humidity

The annual mean temperature is 27.6°C on an average with 31.9°C in maximum and 23.3°C in minimum. The monthly mean temperature is the highest in May and the lowest in January in a year, but the annual range of temperature is as small as 3°C only.

The annual mean relative humidity is 80.2%, while 75.7% in April is at minimum and 83.8% in December is at maximum. The annual range of mean relative humidity is small, similarly to the case of the mean temperature. The correlation between the mean monthly temperature and relative humidity is in contrast (refer to Figure C.1.5).

3) Wind direction and velocity

The mean wind velocity is 0.80 m/s (2.9 km/hr). The wind direction in the island varies seasonally due to the monsoon. Southwest wind is in the season from June to September, while northeast wind is in November through April (refer to Table C.1.5).

4) Cloudiness and evaporation

The cloudiness is 6.3 in Okta on the annual mean and has a small variation by month, which is 4.9 at minimum in April and 6.9 at maximum in August.

No evaporation data is available in Catbalogan. According to the data observed in Catarman, the annual mean evaporation by Open Pan Evaporation is 1,460 mm, and the maximum is 5 mm/day in April and the minimum is 3 mm/day in November/December in the monthly means.

C.1.3. Tropical Cyclones

The tropical cyclones to pass on or near the island in a range of 200 kilometers therefrom have given various influences to the island. The number of tropical cyclones which affect to the island, was 147 for 38 years from 1948 to 1985 in the record, and frequency of tropical cyclones calculates at 3.9 times per year on an average. Frequency for every ten years is in a range from 34 to 45 times. Tropical cyclones have no big difference in number recently (refer to Figure C.1.6 and C.1.7).

Type I	(north of Samar)	2.1 times/year
Type II	(over Samar)	1.1 times/year
Type III	(south of Samar)	0.7 times/year

The World Metrological Organization (WMO) classifies the tropical cyclone by the wind speed near the center into four categories, while the PAGASA uses three categories.

Terminology of Tropical Cyclone

WMO	Wind Speed unit; m/s (knots)	PAGASA
Tropical Depression	up to 17.1(33)	Tropical Depression
Tropical Storm	17.2(34) to 24.4(47)	} Tropical Storm
Severe Tropical Storm	24.5(48) to 32.6(63)	
Typhoon/Hurricane	over 32.7(64)	Typhoon

C.2. Rivers and Streams

C.2.1. River Basins

The area of Samar island (11,487 km^2) excluding islets surrounding Samar is divided into 39 river basins. Among them, 23 river basins (5,132 km^2) are located in the area of Western Samar, and 60 percent of their drainage areas is shared by seven main basins; Basey (249 km^2), Calbiga (258 km^2), Catubig (150 km^2), Gandara (1,154 km^2), Jibatan (359 km^2), Silaga (204 km^2) and Ulot (725 km^2) (refer to Figure C.2.1).

Table C.1.1. Summary of Climatological Conditions of W. Samar

Data	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Annual
Monthly Rainfall 1/													
Mean (mm)	234.4	147.0	130.1	109.9	168.2	203.5	246.3	218.3	262.8	306.1	315.8	304.0	2636.3
Max. (mm)	643.9	339.2	389.8	361.8	591.4	401.2	549.6	618.3	549.3	900.2	632.7	705.8	
Min. (mm)	8.7	5.6	2.8	8.6	1.0	82.3	69.0	25.1	93.4	62.2	140.7	64.4	
Daily Rainfall 1/													
Max. (mm)	142.2	122.4	303.2	190.8	384.3	165.9	146.4	223.5	227.6	261.9	299.2	387.9	
Number of Rainy Days 2/	17	16	14	14	15	17	18	17	18	21	22	22	211
Temperature 3/													
Mean (°C)	25.8	26.3	27.3	28.3	28.9	28.5	28.1	28.6	28.1	27.7	27.1	26.4	27.6
Max. (°C)	29.9	30.8	32.1	33.2	33.6	32.9	32.2	32.6	32.3	32.0	31.3	30.4	31.9
Min. (°C)	21.7	21.7	22.5	23.4	24.2	24.1	23.9	24.7	23.8	23.4	23.0	22.4	23.2
Relative Humidity 3/ (%)	82.6	80.8	77.8	75.7	76.8	79.5	79.1	78.0	81.2	82.8	83.7	83.8	80.2
Cloudiness 3/ (Okta)	6.8	6.2	5.1	4.9	5.5	6.5	6.6	6.9	6.7	6.6	6.5	6.7	6.3
Prevailing Wind 3/ Direction	NE	NE	NE	NE	VAR	SW	SW	SW	SW	VAR	NE	NE	NE
Velocity (m/s)	0.75	0.75	0.91	0.91	0.83	0.75	0.75	1.07	0.79	0.75	0.71	0.67	0.80
Open Pan Evaporation 4/ (mm/day)	3.4	3.9	4.7	5.0	4.7	4.1	4.3	4.5	3.9	3.5	3.0	3.0	1460
Number of Tropical 5/ Cyclones	5	3	5	5	11	12	17	6	12	20	29	22	

Period of Record and Source

1/ 1951-1986 (at Catbalogan, PAGASA)
2/ 1951-1980 (- do - , National Institute of Climatology PAGASA Published Sept., 1985)
3/ 1974-1986 (at Catbalogan, PAGASA)
4/ 1975-1985 (at Catarman, PAGASA)
5/ 1948-1985 (PAGASA)

Table C.1.2. Monthly and Annual Rainfall at Catbalogan

(Unit: mm)

Year	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Annual
1951	189.0	118.1	98.8	64.7	591.4	134.6	299.4	295.0	317.6	348.2	505.8	344.8	3307.4
52	255.7	60.5	89.0	75.2	124.9	177.2	285.5	407.9	218.1	900.2	240.7	613.6	3448.5
53	281.5	165.2	103.3	127.3	156.5	379.5	269.9	277.8	275.8	257.8	234.7	314.1	2843.4
54	149.8	139.1	209.7	81.0	141.9	168.1	176.6	174.9	180.2	149.5	279.2	349.1	2199.1
55	614.6	138.2	148.0	199.9	177.0	196.1	95.5	190.1	247.7	229.9	351.1	391.1	2979.2
56	175.2	328.2	156.6	313.5	229.5	115.5	288.5	310.9	339.5	182.2	351.4	469.4	3260.4
57	289.5	142.3	111.4	77.9	206.1	199.3	229.1	266.2	292.2	426.7	206.9	64.4	2512.0
58	196.1	135.4	89.9	129.7	97.3	82.3	199.4	248.6	233.6	667.3	411.1	252.7	2743.4
59	103.5	69.3	309.3	66.9	110.8	182.1	151.4	316.0	184.0	62.2	390.1	624.2	2569.8
1960	(60.7)	(32.1)	184.5	136.8	(171.6)	241.8	176.6	277.0	(155.4)	594.4	369.6	210.0	(2606.5)
61	52.1	139.0	117.8	69.0	150.2	215.4	82.2	283.4	188.2	216.8	209.0	166.2	1889.3
62	146.3	167.6	176.2	122.0	303.2	109.5	371.8	309.6	381.6	103.7	316.1	177.1	2684.7
63	135.1	48.6	54.5	63.1	190.6	189.5	337.1	618.3	111.4	280.3	263.4	314.1	2606.0
64	116.5	169.6	21.6	165.6	228.0	91.2	241.3	189.9	270.5	305.1	242.1	296.3	2337.7
65	270.1	128.3	342.5	169.5	330.1	208.2	304.8	107.0	194.1	178.8	182.8	492.4	2908.6
66	93.4	86.4	69.3	33.0	281.8	139.0	414.4	116.0	104.9	381.2	388.1	528.3	2635.8
67	493.4	240.2	68.9	48.4	56.7	102.2	172.7	206.8	498.9	198.8	467.8	222.8	2777.6
68	349.3	102.1	53.2	35.8	109.1	91.0	115.1	296.7	195.7	218.1	523.3	173.8	2263.2
69	52.4	10.1	2.8	79.9	65.6	298.5	263.9	214.8	233.7	166.3	277.3	340.8	2006.1
1970	260.7	239.4	104.2	89.8	121.5	247.3	294.0	162.5	146.6	594.4	468.3	168.1	2896.8
71	183.1	180.7	389.8	198.5	368.1	345.6	352.5	110.3	160.3	424.5	222.6	135.1	3071.1
72	643.9	107.1	119.9	41.4	64.7	241.1	236.2	249.8	518.8	112.9	208.1	259.4	2803.3
73	8.7	41.0	62.6	43.8	64.2	83.2	183.8	156.3	225.4	218.0	353.5	319.1	1759.6
74	124.3	191.5	44.7	113.4	135.1	323.6	226.1	101.2	143.6	509.3	229.0	342.7	2484.5
75	367.7	193.0	36.4	214.9	107.8	341.7	260.7	83.5	179.3	251.2	165.5	575.1	2776.8
76	384.0	177.4	148.4	68.8	182.6	401.2	158.8	166.8	93.4	167.5	255.0	482.2	2686.1
77	157.9	339.2	92.9	35.4	85.4	181.8	376.7	118.5	307.8	195.1	140.7	66.4	2097.8
78	95.7	212.5	108.3	189.7	150.4	88.4	69.0	205.9	549.3	238.9	188.2	327.1	2423.4
79	104.9	127.8	49.0	103.9	221.2	323.9	312.3	120.7	219.8	242.8	301.7	229.6	2357.6
1980	293.5	128.5	345.7	71.3	62.9	322.9	198.5	416.2	218.6	386.5	541.7	158.4	3144.7
81	319.4	54.6	22.2	43.7	116.0	177.3	160.3	88.3	221.0	261.8	484.4	254.6	2203.6
82	233.2	204.7	248.6	102.0	281.1	130.9	467.8	118.6	400.2	169.7	211.0	144.8	2712.6
83	57.9	5.6	69.6	8.6	1.0	127.8	549.6	215.9	360.6	329.7	632.7	705.8	3064.8
84	233.9	257.6	213.0	60.4	84.6	189.8	143.1	191.4	318.8	352.2	343.7	232.6	2621.1
85	383.8	172.5	78.6	149.3	184.9	214.9	194.2	25.1	527.2	236.0	268.7	107.7	2542.9
86	386.9	123.3	142.4	361.8	106.1	262.6	209.1	219.8	138.7	463.0	146.7	90.2	2650.6
Mean	234.4	147.0	130.1	109.9	168.2	203.5	246.3	218.3	262.8	306.1	315.8	304.0	2636.3

Note: 1 - The figures in ( ) show the total amount of rainfall in omitting the days without records.
2 - The monthly mean rainfall are bared on complete records only.

Table C.1.3. Extreme-Value at Catbalogan

Year	Annual				Irrigation Period of Second Rice (16 Mar. - 30 Sep.)				Maximum Rainfall			
	Rainfall (mm)	Effective Rainfall (mm) 1/	No. of Drought days 2/ Total	Consecutive	Rainfall (mm)	Effective Rainfall (mm) 1/	No. of Drought days 2/ Total	Consecutive	Daily (mm)	Consecutive Rainfall 2 days (mm)	Consecutive Rainfall 3 days (mm)	More than 3 days (mm)
1951	3307.4	1912.1	252	22	1728.3	951.9	145	16	384.3	514.1	534.4	544.8
52	3448.5	2286.4	234	15	1303.5	925.9	137	15	234.4	394.9	437.8	525.6
53	2843.4	2049.6	243	13	1512.9	1108.0	136	10	142.2	191.5	207.2	307.1
54	2199.1	1575.4	255	12	1010.4	717.7	150	12	63.2	91.1	102.2	267.3
55	2979.2	2044.0	247	26	1137.9	803.6	140	15	135.1	161.6	205.3	403.2
56	3260.4	2188.6	246	18	1635.9	1042.2	142	18	227.6	256.0	260.3	412.0
57	2512.0	1806.5	259	18	1285.1	918.1	148	18	108.5	187.7	225.5	235.4
58	2743.4	1859.4	253	20	1049.0	784.0	148	16	229.6	282.7	288.5	345.6
59	2569.8	1560.9	260	15	1189.5	871.0	143	15	387.9	492.8	494.1	494.1
1960	2606.5	1756.7	268	45	1262.0	907.2	152	16	261.9	362.0	419.7	426.1
61	1889.3	1359.0	260	26	1068.8	786.4	143	13	74.4	81.8	96.5	131.5
62	2684.7	1954.6	249	16	1689.9	1247.8	130	16	108.2	153.2	170.9	194.3
63	2606.0	1786.4	262	23	1546.6	1055.0	145	23	223.5	284.2	287.2	287.2
64	2337.7	1640.2	271	21	1200.3	816.9	142	18	146.4	146.8	146.8	161.9
65	2908.6	2061.3	256	12	1478.0	1059.4	135	12	141.2	227.6	244.4	488.6
66	2635.8	1656.6	268	22	1103.3	738.3	154	22	332.8	339.8	340.6	354.8
67	2777.6	1803.7	269	38	1093.8	746.5	161	30	269.0	314.0	315.0	398.1
68	2263.2	1511.7	278	30	850.5	573.1	161	28	155.4	270.1	278.5	482.9
69	2006.1	1467.9	267	71	1157.8	848.4	142	32	73.5	104.5	127.9	178.3
1970	2896.8	2029.8	240	14	1151.7	828.8	145	14	233.8	274.4	280.5	331.3
71	3071.1	2151.7	243	24	1635.8	1204.6	143	24	189.6	235.2	244.0	409.2
72	2803.3	2034.2	251	35	1449.9	1030.8	146	35	119.8	155.7	204.8	346.3
73	1759.6	1166.3	282	31	813.9	563.5	151	22	173.7	226.2	242.4	242.4
74	2484.5	1724.4	267	27	1062.8	742.4	153	21	123.9	215.9	222.9	223.2
75	2776.8	1961.9	254	25	1199.3	864.8	141	17	125.0	142.6	215.3	385.4
76	2686.1	1908.8	252	19	1111.5	747.4	157	18	165.9	222.5	238.8	265.0
77	2097.8	1431.0	269	23	1145.8	754.9	154	23	113.5	218.7	223.0	223.5
78	2423.4	1731.4	262	27	1281.3	898.6	153	27	142.8	219.4	219.9	367.4
79	2357.6	1752.0	258	19	1333.7	984.1	145	19	101.8	113.0	136.6	144.9
1980	3144.7	2100.9	251	37	1629.5	1007.0	143	18	303.2	312.3	319.4	336.1
81	2203.6	1567.0	271	30	816.7	586.6	153	24	106.7	175.4	219.6	366.2
82	2712.6	1965.9	268	23	1726.9	1248.1	147	23	133.6	185.0	215.8	278.6
83	3064.8	1979.6	274	58	1318.1	891.4	160	58	217.9	323.2	425.1	441.7
84	2621.1	1912.9	260	18	1014.0	740.4	150	18	96.2	124.8	192.1	368.7
85	2542.9	1816.3	250	19	1339.2	990.9	136	17	116.6	127.9	142.3	396.8
86	2650.6	1808.1	264	19	1353.1	890.7	149	19	190.8	217.9	300.3	349.4

Note: 1/ The amount of 80% of daily rainfall more than 5mm and less than 80mm is effective for paddy cropping.
2/ Daily rainfall of less than 5mm is considered as drought.

Table C.1.4. Hydrological Probability at Catbalogan

Return Period	Annual			Irrigation Period of Second Rice (16 Mar. - 30 Sep.)			Maximum Rainfall		
	Rainfall (mm)	Effective Rainfall (mm) 1/	Consecutive Drought Days 2/	Rainfall (mm)	Effective Rainfall (mm) 1/	Consecutive Drought Days 2/	Daily (mm)	Consecutive Rainfall 2 days (mm)	Consecutive Rainfall 3 days (mm)
2	2606.2	1797.7	22.5	1257.5	873.1	19.2	154.7	209.8	233.3
5	2286.0	1587.5	31.5	1051.8	735.2	25.8	230.2	304.0	325.9
7	2207.0	1535.4	34.6	999.2	700.9	28.0	256.9	335.4	356.5
10	2134.6	1487.6	37.9	950.3	669.3	30.3	285.3	368.1	388.2
15	2062.8	1440.1	41.6	901.1	637.9	32.9	317.9	404.8	423.7
20	2017.2	1409.9	44.2	869.5	617.9	34.7	341.4	430.7	448.6
30	1958.6	1371.0	47.9	828.4	592.1	37.3	375.2	467.4	483.7
50	1892.7	1327.2	52.6	781.6	563.1	40.6	418.9	513.7	527.9
80	1838.1	1290.9	57.1	742.3	538.9	43.6	460.6	556.9	568.9
100	1813.9	1274.8	59.2	724.7	528.1	45.1	480.8	577.5	588.5

Note: 1/ The amount of 80% of daily rainfall more than 5mm and less than 80mm is effective for paddy cropping.

2/ Daily rainfall of less than 5mm is considered as drought.

Table C.1.5. Damages of Major Typhoon is Western Samar

Year	Name of Typhoons	Date	Meteorological Data Rainfall (mm)	Meteorological Data Max. Wind (kph)	Type of Track	Casualties Dead	Damages (1,000 ₱) Crop	Damages (1,000 ₱) Others	Damages (1,000 ₱) Total
1976	Huaning	June 22 - July 2	238.8	41	I	-	-	819	819
1977	Elang	July 16 - 18	223.0	22	I	-	-	581	581
1978	Weling	Sept.25 - 27	219.9	74	I	2	-	229	229
1979	Bebeng	Apr. 14 - 16	59.6	93	II	2	3,290	31,100	34,390
1979	Yayang	Nov. 4 - 5	67.9	48	I	43	3,500	18,434	21,934
1980	Aring	Nov. 1 - 4	161.3	43	I	-	52	32	84
1980	Bening	Mar. 22 - 24	319.4	74	II	3	8	1,550	1,558
1983	Warling	Nov. 18 - 20	425.1	80	I	-	-	1,344	1,344
1983	Bebeng	Jul. 13 - 15	243.6	76	I	-	2,235	780	3,015
1984	Undang	Nov. 3 - 5	77.8	94	II	78	29,135	19,166	48,301
1987	Harning*	Aug. 11 - 12	217.3	109	I	9	9,724	8,499	18,223

Source: Office of Civil Defense Meteorological Data - Catabalogan, PAGASA * As of Sept. 1, 1987

Note : Type of Track (I - North, II- Over, III - South of Samar, see Figure C.1.7)

FIGURE C.1.6. FREQUENCY OF TROPICAL CYCLONES IN THE SAMAR (1948 – 1986)

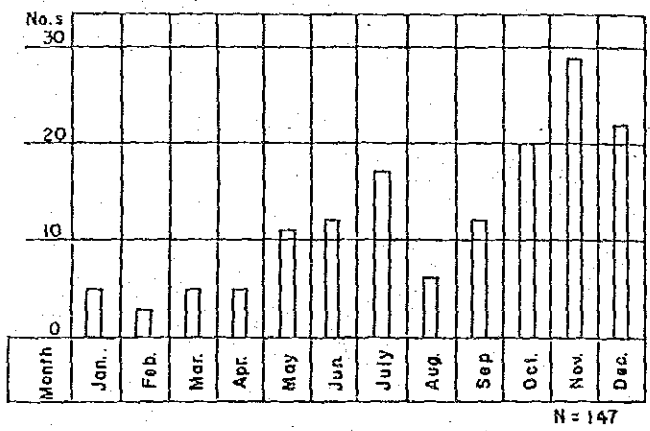
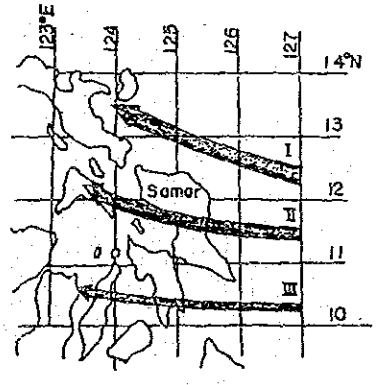


FIGURE C.1.7. TRACK TYPES OF TROPICAL CYCLONES (SAMAR)

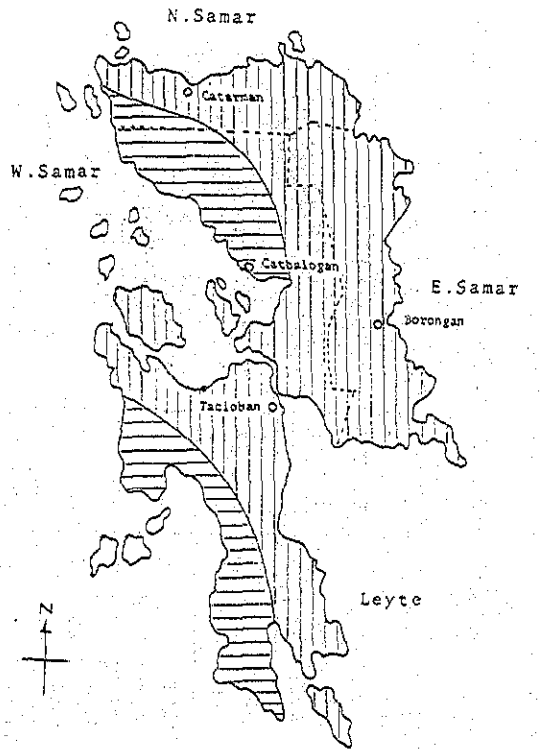
Period	Track Type I	II	III	Total
1948 ~ 1955	16	9	4	29
1956 ~ 1965	28	11	6	45
1966 ~ 1975	13	14	7	34
1976 ~ 1985	20	9	10	39
Total	77 (2.03)	43 (1.13)	27 (0.71)	147 (3.87)

Note: ( ) Annual Mean



Number of tropical cyclones passed through the area from 123°E to 127°E and 10°N to 14°N

FIGURE C.1.1. CLIMATE MAP OF REGION VIII



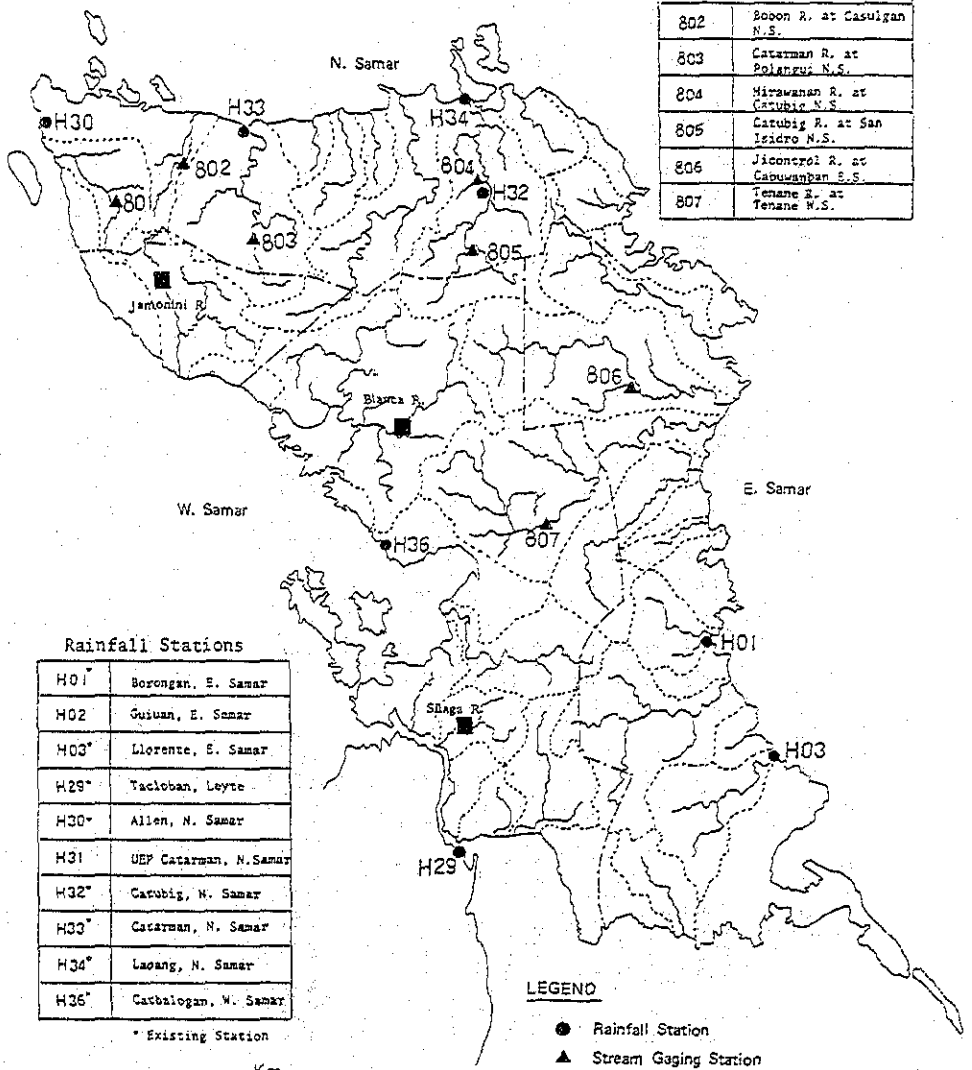
Legend: CORONAS CLASSIFICATION

	1st Type:	Two pronounced seasons; dry from November to April; wet during the rest of the year.
	2nd Type:	No dry season with a very pronounced, maximum rainfall from November to January.
	3rd Type:	Seasons not very pronounced, relatively dry from November to April and wet during the rest of the year.
	4th Type:	Rainfall more or less evenly distributed throughout the year.

FIGURE C.1.2. HYDROLOGIC MAP

Stream Gaging Stations

801	Nawo R. at San Ramon N.S.
802	Bobon R. at Casulgan N.S.
803	Catarman R. at Polangui N.S.
804	Mirawanan R. at Catubig N.S.
805	Catubig R. at San Isidro N.S.
806	Jiconcrol R. at Cabuwanpan S.S.
807	Tenane R. at Tenane W.S.



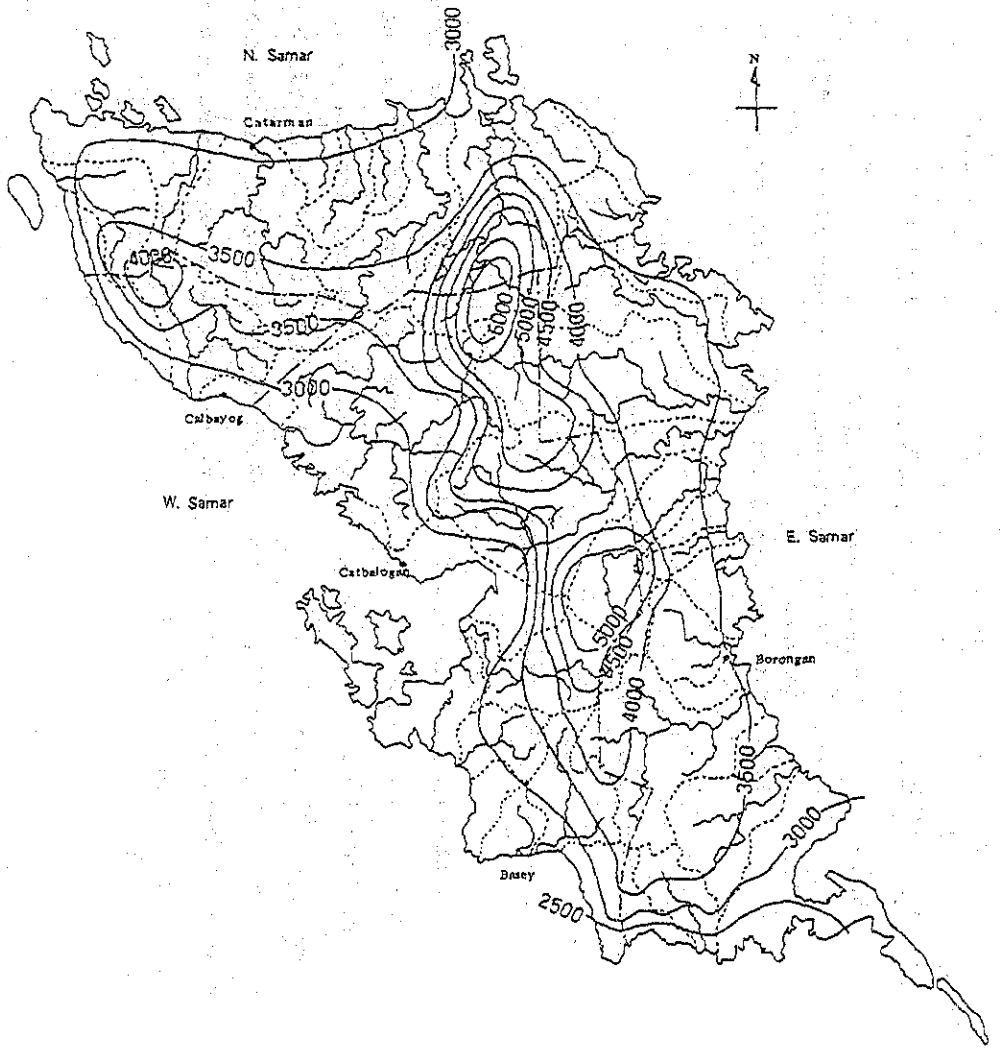
Rainfall Stations

H01*	Borongan, E. Samar
H02	Guiuan, E. Samar
H03*	Llorente, E. Samar
H29*	Tacloban, Leyte
H30*	Allen, N. Samar
H31	UEP Catarman, N.Samar
H32*	Catubig, N. Samar
H33*	Catarman, N. Samar
H34*	Lapang, N. Samar
H36*	Catbalogan, W. Samar

* Existing Station

0 10 20 30 Km.

FIGURE C.1.3. ISOHYETAL MAP OF ANNUAL RAINFALL (mm)



Source: Comprehensive Development Plan for Samar Island May,1982

FIGURE C.1.4. ANNUAL RAINFALL (CATBALOGAN)

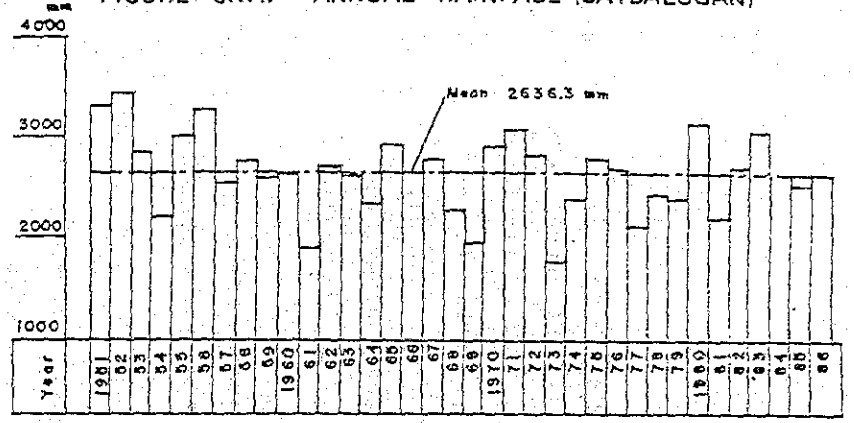
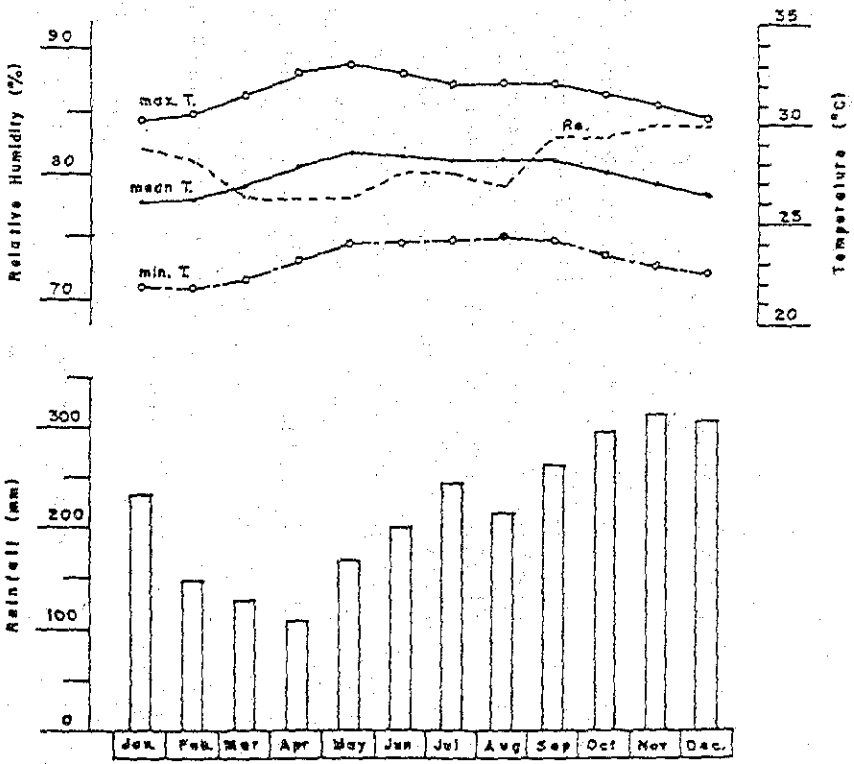


FIGURE C.1.5. GENERAL CLIMATIC CONDITIONS (CATBALOGAN)



C.2.2. Flood Discharge

The flood discharges in the Study Area can not be exactly estimated due to the limited observation data, only the annual peak discharges on the Tenane River from 1959 to 1986. For estimating flood discharges, NIA has prepared a nomograph applicable to the Leyte and Samar basins (refer to Table C.3.5 and Figure C.2.3). However, when the nomograph was applied to the Tenane River, the flood discharges given by the graph showed about 7 to 23% smaller than the probable flood discharges calculated using the above available record (refer to Table C.3.7). It is learned that the values given by the nomograph need some modification for each return period as follows:

Return Period	Q (cum/s) (1)	Q (cum/s) (2)
w = 1/2 years	Q = 10.0 x A	Q = Q x 1.07
w = 1/5 "	Q = 15.1 x A	Q = Q x 1.08
w = 1/10 "	Q = 17.6 x A	Q = Q x 1.12
w = 1/25 "	Q = 22.1 x A	Q = Q x 1.17
w = 1/50 "	Q = 24.5 x A	Q = Q x 1.21
w = 1/100 "	Q = 28.9 x A	Q = Q x 1.23

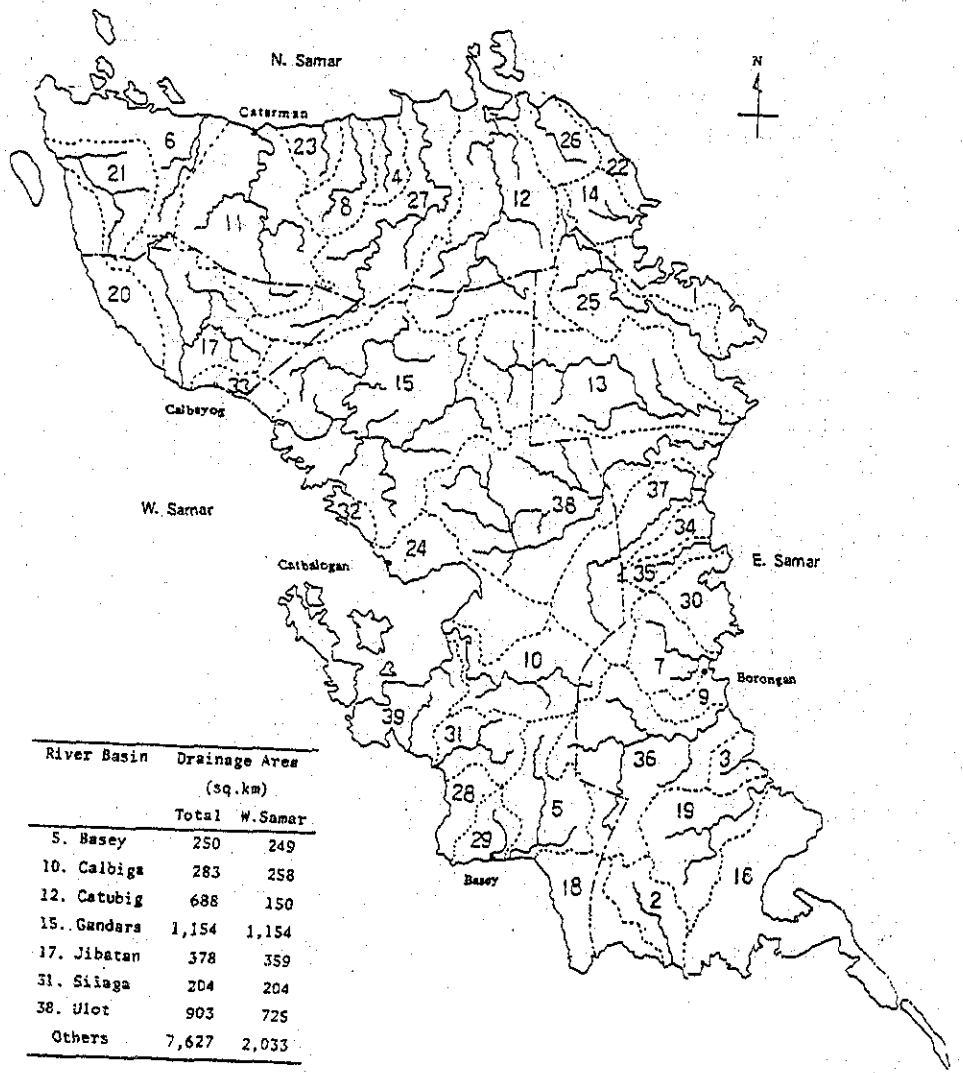
Note: A ... Drainage area (sq.km)
(1) ... Estimated equations and values given by the nomograph
(2) ... Modified equations and flood discharges

C.3. Water Resources

C.3.1. Tenane River Flow Analysis

In the area of Western Samar, the daily runoff data from 1959 to 1986 are available only for the Tenane River which is a tributary of the Ulot River in the upper reaches. A drainage area at the gauging station is 392 km^2. The discharges recorded from 1973 had been converted by using the new rating curve available in the Water Resources Division of NWRC, since those data were expressed in water depth (refer to Table C.3.1).

FIGURE C.2.1. RIVER BASINS MAP

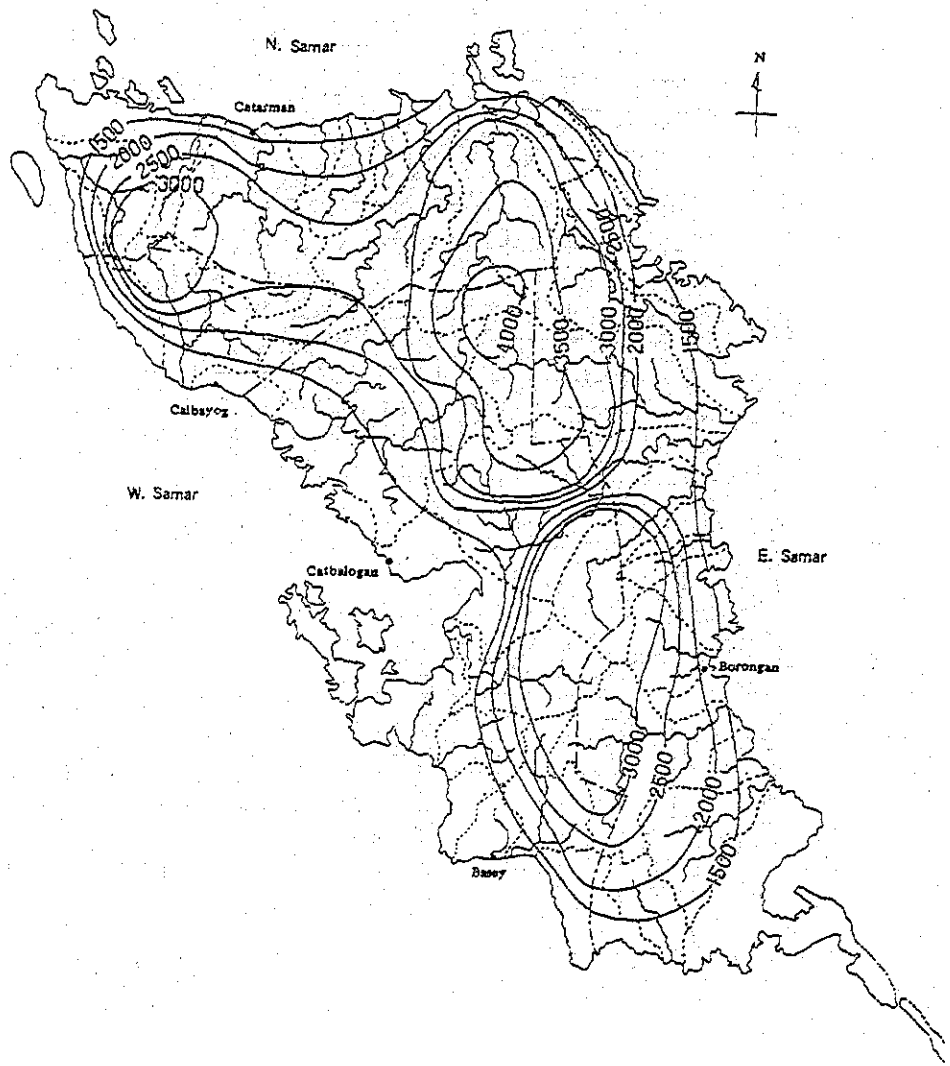


River Basin	Drainage Area (sq.km)	
	Total	W.Samar
5. Basey	250	249
10. Calbiga	283	258
12. Catubig	688	150
15. Gandara	1,154	1,154
17. Jibatan	378	359
31. Silaga	204	204
38. Ulot	903	725
Others	7,627	2,033
Total	11,487	5,132

Note; Excluding small islands

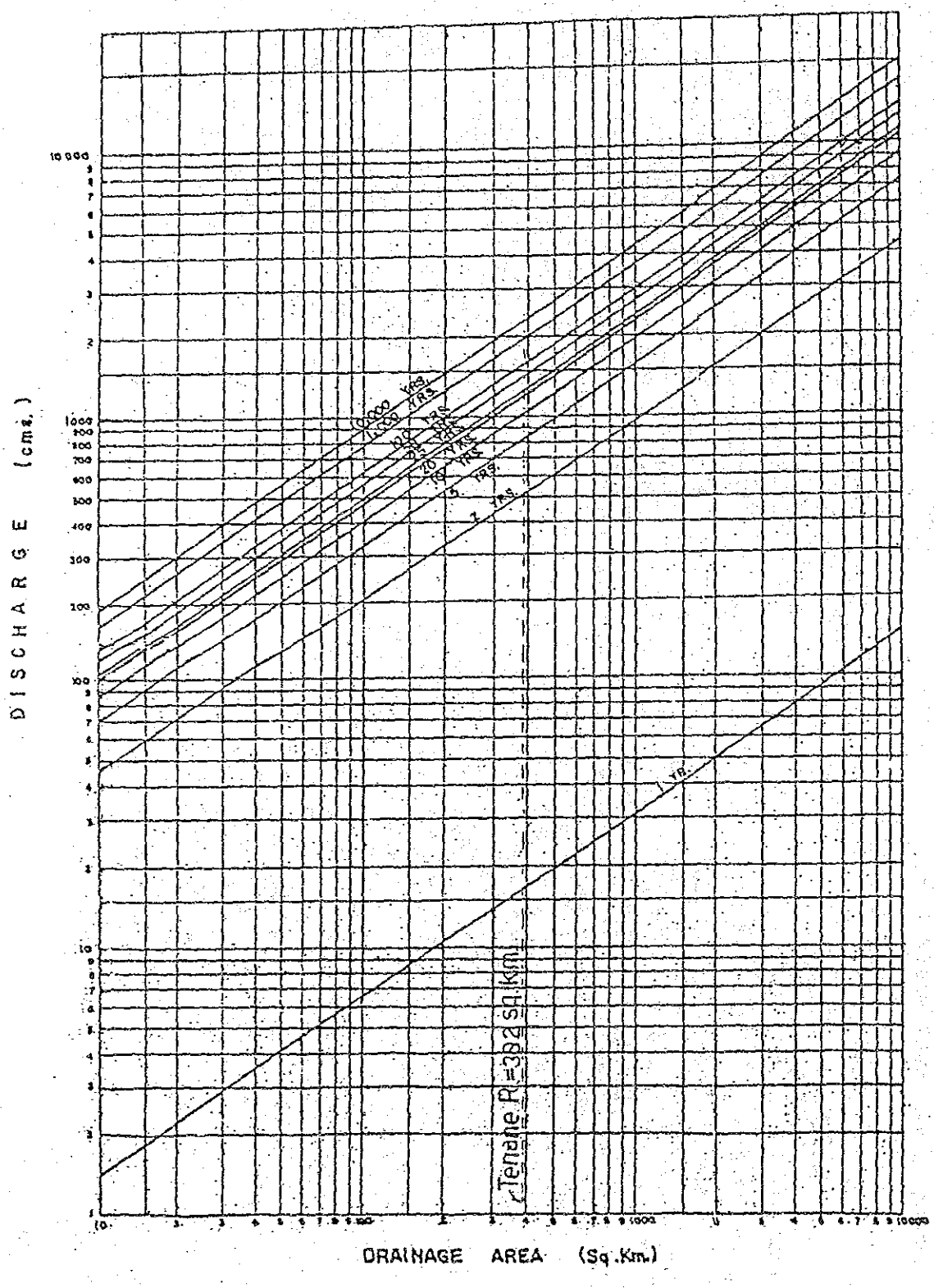
Source: NWRC

FIGURE C.2.2. ISOHYETAL MAP OF SPECIFIC RUNOFF (mm/Year)



Source: Comprehensive Development Plan for Samar Island May, 1982

FIGURE C.2.3. DISCHARGE–FREQUENCY–DRAINAGE–AREA RELATIONSHIP



LEYTE & SAMAR

Source; NIA

A runoff coefficient is calculated to be 60% in Tenane River discharge (1,608 mm/year in Table C.3.3) against Catbalogan synoptic station rainfall (2,636.3 mm/year). The annual rainfall of Western Samar is estimated to be 3,630 mm based on Figure C.1.3, and the annual mean runoff is 2,180 mm with the above mentioned runoff coefficient.

In evaluation mean monthly specific discharges per 100 km^2, a big difference ranging between 2.68 m^3/sec in May and 10.47 m^3/sec in December had been observed. A skewness of monthly discharges are big in April, July and August. These months shown a big skewness means that runoff discharges are varied widely, while those discharges in the months from November through February are comparatively stable (refer to Figure C.3.1).

The Flow Duration Curve has been developed by using those 14 years complete data (N=5,114 in a total number of data) out of 27 years of the total observation period . The curve shows that 90% of the runoff discharge is 5.1 m^3/sec or 1.3 m^3/sec/100 km^2 and 75% of runoff discharge is 7.4 m^3/sec or 1.9 m^3/sec/100 km^2 (refer to Figure C.3.2).

The probability analysis on daily water discharges has been made and designed for the water discharges in 10 years return period (w = 1/10). The low water discharge equivalent to discharge available for 275 days a year is 5.1 m^3/sec or 1.3 m^3/sec/100 km^2, and the drought water discharge equivalent to discharge available at least for 355 days a year is 3.1 m^3/sec or 0.79 m^3/sec/100 km^2 (refer to Table C.3.4). As a result of probability analysis, the flood discharges are q = 1.42 m^3/sec/km^2 for w = 1/2, q = 2.93 m^3/sec/km^2 for w = 1/10 and q = 4.38 m^3/sec/km^2 for w = 1/50 (refer to Table C.3.6).

C.3.2. Groundwater

The NWRC estimates that the total groundwater storage is 29,270 MCM in Samar island, and the "safe yield" level is 2,876 MCM/year. The safe yield value corresponds to 250 mm per year (2,876 MCM/11,487 sq.km = 250 mm/year). At the seashore and hilly land occupying about 80% of the total area, since the groundwater is difficult for use, those areas should be excluded from the potential area. Therefore, an actual available groundwater of 50 mm/year is assumed at 20% of the above yield. For use of groundwater, hydro-geological survey and maintenance of the wells are needed.

C.4. Water Resources Development

C.4.1. Water Resources and Utilization Scheme

Western Samar is fortunate to have much more water than necessity because of much rainfall. The total available water based on the water balance study is estimated at about one billion cubic meter (about 1,000 MCM) per year (refer to Figure C.4.1). On the other hand, the water demand in the year 2007 is estimated at about 570 MCM/year. The amount of annual water resources is about 1.8 times of the demand.

Available Water Resources:
- Surface Water = 150 mm x 5,132 km^2 = 770 MCM
- Groundwater = 50 mm x 5,132 km^2 = 260 MCM
- Total = 1,030 MCM/year

Water Demand:
- Irrigation 2,040 mm x 25,000 ha = 510 MCM
  (Note; The total duty of water as 2,040 mm is quoted from F/S report of Communal Irrigation Projects, 1982)
- Water Supply 150 lit./c/d x 660,000 x 365 d = 36 MCM
- Others = 24 MCM (about 5%)
- Total = 570 MCM/year

Table C.3.1. Collected Data of Daily Discharge at Tenane River

Year	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.
1959												
1960	**	**	**	**	**	**	**	**	**	**	**	**
1961	**	**	**	**	**	**	**	**	**	**	**	**
1962	**	**	**	**	**	**	**	**	**	**	**	**
1963	**	**	**	**	**	**	**	**	**	**	**	**
1964	**	**	**	**	**	**	**	**	**	**	**	**
1965	**	**	**	**	**	**	**	**	**	**	**	**
1966	**	**	**	-	-	-	-	-	-	-	-	-
1967	-	-	-	**	**	**	**	**	**	**	**	**
1968	**	**	**	**	**	**	**	**	**	**	**	**
1969	**	**	**	**	**	**	**	**	**	**	**	**
1970	**	**	**	**	**	**	**	**	**	**	**	**
1971	**	**	**	-	-	**	**	**	**	**	**	**
1972	**	**	**	**	**	**	**	**	**	**	**	**
1973	*	*	*	*	*	*	*	*	*	*	*	*
1974	*	*	*	*	-	*	*	*	*	*	*	*
1975	*	*	*	*	*	*	*	*	*	*	*	*
1976	*	*	*	*	*	*	-	-	-	*	*	-
1977	-	-	-	-	-	-	-	-	-	-	-	-
1978	*	*	*	*	*	*	*	*	*	*	*	*
1979	*	*	*	-	-	-	*	*	*	*	-	-
1980	-	-	-	-	-	-	-	-	-	-	-	-
1981	-	-	-	-	-	-	-	-	-	-	-	-
1982	-	-	-	-	-	-	-	-	-	-	-	-
1983	-	-	-	-	-	-	-	-	-	-	-	-
1984	-	-	-	-	-	-	-	-	-	-	-	*
1985	*	*	*	*	*	*	*	*	*	*	*	*
1986	*	*	*	*								

Legend: ** : Discharge * : Water level and discharge - : No observation
Note: The discharge data from 1973 to 1986 were calculated by using the rating curve observed at Tenane, by NWRC, 1987.

Table C.3.2. Mean Monthly and Annual Discharge Data for the Tenane River (1959 - 1986)

(Unit: cum/s.)

Year	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Annual
1959	-	-	-	-	-	-	11.71	12.75	10.06	9.48	24.32	100.19	-
1960	25.65	14.44	11.79.	15.45	12.13	25.48	16.37	15.13	10.01	61.61	48.52	43.17	25.04
61	17.09	19.25	10.39	8.67	13.21	9.02	9.81	29.30	11.24	17.21	21.80	18.92	15.49
62	25.63	18.23	19.07	7.74	12.01	14.51	20.28	21.90	39.49	26.02	40.41	25.66	22.58
63	37.96	11.53	8.96	7.86	6.50	13.55	15.65	58.02	22.24	29.68	33.42	27.40	22.86
64	13.91	20.26	11.45	10.19	13.89	8.09	18.38	10.64	18.60	19.75	69.10	41.44	21.26
65	41.22	25.46	32.04	15.24	28.53	33.14	65.61	18.61	13.77	17.16	12.85	106.39	34.41
66	19.49	10.79	8.45	6.33	-	-	-	-	-	-	-	-	-
67	-	-	-	-	7.59	5.57	9.82	15.09	9.53	14.87	33.80	24.14	-
68	30.01	20.19	12.59	6.75	5.44	5.83	10.39	11.04	6.16	11.97	38.25	27.12	15.46
69	8.57	5.33	4.49	4.19	3.99	7.11	12.83	10.07	16.58	16.81	15.85	33.21	11.64
1970	28.61	17.46	7.92	5.34	3.97	5.40	19.30	10.72	10.62	30.66	41.37	35.94	18.14
71	20.92	38.74	27.71	-	-	36.09	31.31	7.92	8.13	34.02	18.03	15.76	-
72	67.48	11.86	8.98	6.55	3.98	11.23	6.32	4.45	17.98	4.87	25.85	31.75	16.82
73	10.39	7.76	6.89	6.49	6.05	6.14	6.03	7.26	18.06	24.26	39.10	38.19	14.74
74	18.22	13.10	10.38	7.85	-	30.89	10.99	11.74	7.00	33.75	48.44	41.30	-
75	66.47	18.88	10.50	15.55	9.76	12.13	12.79	10.69	14.98	11.83	9.68	91.72	23.90
76	60.86	32.33	19.74	9.20	19.47	45.90	-	-	-	12.73	23.96	46.00	-
77	-	-	-	-	-	-	-	-	-	-	-	-	-
78	12.87	20.91	13.69	11.78	10.68	10.76	10.94	10.81	42.35	21.52	20.93	36.35	18.58
79	15.90	11.17	7.78	-	-	-	11.59	9.83	13.23	15.19	-	-	-
1980	-	-	-	-	-	-	-	-	-	-	-	-	-
81	-	-	-	-	-	-	-	-	-	-	-	-	-
82	-	-	-	-	-	-	-	-	-	-	-	-	-
83	-	-	-	-	-	-	-	-	-	-	-	-	-
84	-	-	-	-	-	-	-	-	-	-	-	24.55	-
85	52.86	45.87	9.80	8.41	11.11	14.45	17.56	8.13	10.75	16.18	18.83	11.84	18.66
86	79.93	10.88	14.08	93.19	-	-	-	-	-	-	-	-	-
Mean	32.70	18.72	12.84	13.71	10.52	16.41	16.72	14.95	15.83	21.48	30.76	41.05	19.97
M.S.D.	8.34	4.78	3.27	3.50	2.68	4.18	4.27	3.81	4.04	5.48	7.85	10.47	5.09
Un.Var	21.62	10.28	6.93	20.13	6.47	12.34	13.19	11.88	9.85	12.46	14.96	26.89	5.69
Skewness	0.86	1.23	1.56	3.70	1.39	1.12	2.88	2.73	1.74	1.68	0.79	1.51	1.00
Kurtosis	2.45	3.98	4.74	15.16	4.82	2.97	11.21	10.33	5.20	6.38	3.29	4.11	4.04
No. of Yrs.	20	20	20	18	16	18	19	19	19	20	19	20	14

Note: M.S.D.; Mean Specific Discharge (cum/s. 100 sq.km) Un.Var.; Unviased Variance

Table C.3.3. Summary of Daily Discharge (Tenane R.)

C.A.= 392.0 SQ.KM (CUM/S)

YEAR	MAX-Q	95DAYQ	185DAYQ	275DAYQ	355DAYQ	MIN-Q	MEAN-Q	TOTAL-Q
1960	607.80	24.56	15.30	9.88	7.60	7.20	25.04	9163.44
1961	397.28	16.50	11.39	8.58	6.80	6.20	15.49	5654.50
1962	231.10	24.56	16.10	11.39	6.80	6.60	22.58	8242.57
1963	786.33	21.93	12.71	7.80	5.66	5.52	22.86	8343.67
1964	1032.66	17.30	12.05	9.36	7.40	7.00	21.26	7779.77
1965	701.46	25.64	17.30	13.37	8.32	7.00	34.41	12558.46
1968	207.54	14.50	7.80	5.52	3.84	3.42	15.46	5659.78
1969	176.70	11.06	6.80	4.54	3.28	2.84	11.64	4250.18
1970	166.05	20.05	10.14	6.00	3.28	3.00	18.14	6621.43
1972	237.30	14.50	7.00	4.54	2.92	2.84	16.82	6154.68
1973	559.65	11.20	7.50	6.30	5.20	5.20	14.74	5381.27
1975	492.68	16.00	11.60	9.20	7.95	7.65	23.90	8724.68
1978	607.80	17.50	11.20	8.55	7.35	6.60	18.58	6782.16
1985	460.96	16.30	11.20	8.10	6.60	6.00	18.66	6809.66
MEAN	476.09	17.97	11.29	8.08	5.93	5.50	19.97	7294.71
Specific Discharge	121.45	4.58	2.88	2.06	1.51	1.40	5.09	(1.608mm) 1860.89

Table C.3.4. Probability of Exceedence (Tenane R.)

/S)

R. P.	MAX-Q	95DAYQ	185DAYQ	275DAYQ	355DAYQ	MIN-Q	MEAN-Q	TOTAL-Q
1/2	406	17.6	10.8	8.7	5.9	5.5	19.1	6984
1/5	675	13.9	8.4	5.8	4.1	4.0	15.3	5589
1/10	882	12.2	7.3	5.1	3.1		13.7	5004
1/20	1102	10.9	6.6	4.5	2.4		12.6	4583
1/30	1238	10.2	6.2	4.3	2.0		12.0	4384
1/50	1417	9.5	5.8	4.0	1.5		10.9	4167
1/100	1675	8.6	5.4	3.7	0.9		10.7	3920

Table C.3.5. Annual Discharge Characteristics in Tenane River

Year	Peak Q (cu.m/s)	Gage Height (m)	Date	Time
1959	1,305.90	9.40	Dec. 19	12 NN
1960	607.80	6.00	Oct. 6	6 AM
1961	434.62	5.02	Sep. 14	5 PM
1962	580.80	5.85	Nov. 6	5 PM
1963	1,045.08	8.14	Aug. 13	8 AM
1964	1,154.79	8.67	Nov. 19	6 AM
1965	985.05	7.85	Jul. 12	6 AM
1966	(60.96)	1.87	Jan. 4	6 AM
1967	201.34	3.36	Dec. 17	6 PM
1968	323.50	4.30	Dec. 23	6 AM
1969	193.90	3.30	Dec. 22	6 AM
1970	255.90	3.80	Oct. 14	6 AM
1971	398.80	4.80	Oct. 4	6 AM
1972	353.20	4.50	Jan. 8	AM
1973	600.60	5.96	Nov. 20	PM
1974	707.72	6.49	Jan. 9	AM
1975	709.76	6.50	Jan. 6	AM
1976	974.85	7.80	Jan. 24	PM
1977	-	-	-	-
1978	607.80	6.00	Sep. 27	PM
1979	148.75	2.85	Jan. 28	PM
1980	-	-	-	-
1981	-	-	-	-
1982	-	-	-	-
1983	-	-	-	-
1984	-	-	-	-
1985	466.24	5.20	Jan. 21	7 AM
1986	1,223.10	9.00	Apr. 6	5 PM

Table C.3.6. Peak Flow Discharge (Tenane R.)

Return Period	Q (cum./s.)	q (cum./s./sq.km
2 year	557	1.42
5	905	2.31
10	1148	2.93
25	1469	3.75
50	1716	4.38
100	1971	4.87

Period of Record ; 1959-1986 , N=21

Table C.3.7. Comparison of Existing Data and Study Result for Probable Peak Discharge on Tenane River

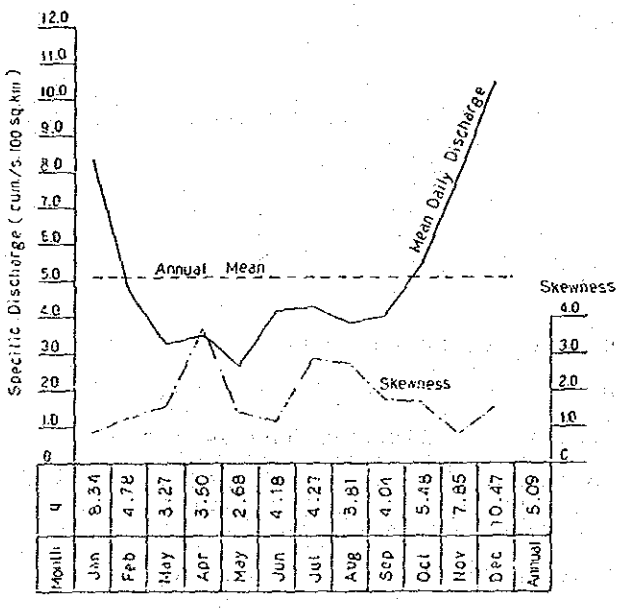
(Unit: cum./s.)

Return Period	Study Result (1)	Existing Data (2)	Existing Data (3)	(1)/(3)
yrs.				
2	557	505	521	1.07
5	905	891	840	1.08
10	1148	1128	1027	1.12
25	1469	1392	1259	1.17
50	1716	1561	1413	1.21
100	1971	1709	1598	1.23
Data	1959-1986 N = 21	1959-1974 N = 16		

Note: (2) Framework Plan for Samar Basins (NWRC Dec., 1979)

(3) "Discharge-Frequency-Drainage-Area Relationship"(NIA) (refer to Figure C.2.3)

FIGURE C.3.1. MEAN DAILY DISCHARGE OF TENANE RIVER

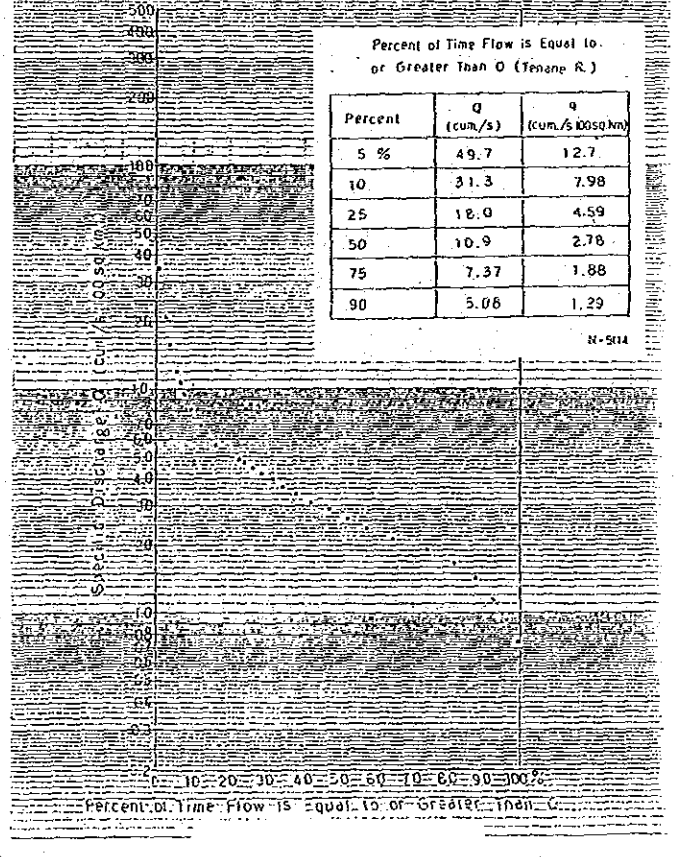


Note:

Catchment Area =392 sq.km.

Period of Record ; 1959-1986

FIGURE C.3.2. FLOW DURATION CURVE OF TENANE RIVER (1960 – 1985)



Three factors to be considered in developing water resources are as follows:

Spring Water	:	Positive approach for spring development should be considered because of steady flow and good water quality.
Groundwater	:	Hydro-geological study/survey should be carried out to develop groundwater in the future.
Surface Water	:	Flood design for diversion work should be included for stability and safety of the structure.

C.4.2. Hydrological Probability Analysis and Design Year

The probability analysis on rainfall, effective rainfall and consecutive drought days had been made by applying rainfall data available at Catbalogan for the period of 35 years.

In the analysis and computation, effective rainfalls are assumed to be 80% more than 5 mm in daily rainfall but 64 mm (80 mm x 0.8) in the maximum water depth a day, and drought days mean dry days including rainy days with less than 5 mm in depth is effective in the analysis (refer to Table C.1.3). The seasonal effective ratio of rainfall is shown in Table C.4.1.

Based on the above-stated conditions, probability analysis on rainfalls had been made for the years and irrigation period from March 16 to September 30, and summarized in Table C.4.2 together with runoff discharges of the Tenane River for 14 years period.

By using above results, design and water years for water utilization scheme were determined. Thereof, water year is selected from 14 years where complete data are available. Although the year of 1963 has much rainfall of 618.3 mm in August, the year is decided to be the medium year having the return period of w = 1/2 in the project, considering the hydrological studies on probability such as effective rainfall and consecutive drought days.

Design year	;	Drought year, 1968, equivalent to probability (w) = 1/10
Medium year	;	1963, (w) = 1/2
Wet year	;	1965, (w) = 1/1
Abnormal drought year	;	1969, (w) = 1/20 to 1/40

The flow duration curves of those above listed years would be shown in Figure C.4.2.

C.4.3. Specific Discharge for Each Zone

The specific runoff discharges in the Study Area were estimated on the basis of certain assumed conditions, because of lack of available data. As learned from isohyetal map of annual rainfall and specific runoff in Samar island, the runoff discharges differ greatly between the seashore area and hilly/mountainous area. Taking such hydrological factors and topographic conditions into account, the area is divided into three zones, as listed below and shown in Figure C.4.3. Average runoff discharges were also calculated from the existing data (refer to Figure C.2.2).

Zone A;	(Seashore area)	1,500 mm/year
Zone B;	(Hilly land area)	2,250 mm/year
Zone C;	(Mountainous area)	3,375 mm/year

Nevertheless, there is a large difference between the above mean annual runoff discharges for Zone B and actually recorded at Tenane gauging station for a period of 14 years, so that the runoff discharge estimated for Zone B (2,250 mm/year) should be replaced with the recorded runoff discharge on Tenane River (1,608 mm/year).

The ratio of the above-listed runoff discharges for the Zone A and C are 70% and 150%, respectively in comparison to that of Zone B which involving the area of Tenane River basin. The runoff discharge of Zones A and C could be estimated on the basis of the above ratio obtained from the discharge of Zone B, respectively.

The water year was determined in the year 1968 for w = 1/10 and 1963 for w = 1/2 in the probability of non-exceedence, respectively.

Table C.4.1. Seasonal Effective Ratio of Rainfall

Item	16 Mar.-30 Sep.	1 Oct.-15 Mar.	Annual
Rainfall(1)	1,268.7	1,367.6	2,636.3
Effective Rainfall(2)	884.8	931.4	1,816.2
Ratio (2)/(1)	0.70	0.68	0.69

Not.; (1) Rainfall Data Source: Catbalogan,PAGASA
This table has been made by using 35 years complete data out of 36 years from 1951 to 1986.

Table C.4.2. Probability Analysis of Hydrological Data

Year	Annual			Irrigation Period of Second Rice (16 Mar. - 30 Sep.)			Discharge of Tenane River		
	Rainfall	Effective Rainfall	Drought Days 1/	Rainfall	Effective Rainfall	Drought Days 1/	Annual Amount	Daily Discharge 275DQ	Daily Discharge 355DQ
1951	1.1	1.5	1.9	1.0	1.5	1.4			
52	1.0	1.1	1.2	1.8	1.6	1.0			
53	1.4	1.2	1.1	1.2	1.1	1.3			
54	7.3	5.4	1.0	6.5	5.9	1.1			
55	1.2	1.2	2.8	3.2	2.9	1.3			
56	1.1	1.1	1.4	1.1	1.2	1.7			
57	2.5	1.9	1.4	1.8	1.7	1.7			
58	1.6	1.7	1.6	5.1	3.4	1.4			
59	2.2	5.9	1.2	2.5	2.0	1.3			
1960							1.2	1.3	1.3
61	51.4	34.3	2.8	3.5	3.3	1.1	4.7	1.6	1.5
62	1.7	1.4	1.2	1.1	1.0	1.4	1.4	1.1	1.5
63	2.0	2.1	2.1	1.2	1.2	3.5	1.4	1.9	2.2
64	4.1	3.7	1.8	2.4	2.7	1.7	1.5	1.4	1.3
65	1.3	1.2	1.0	1.3	1.2	1.1	1.0	1.1	1.2
66	1.9	3.4	1.9	3.8	4.9	2.9			
67	1.5	2.0	10.1	3.9	4.5	9.5			
68	5.5	8.3	4.2	24.0	41.6	7.0	4.7	6.5	5.9
69	21.5	11.8	328.0	2.9	2.3	13.0	40.7	19.7	8.9
1970	1.3	1.3	1.1	3.0	2.5	1.2	2.4	4.4	8.9
71	1.2	1.1	2.3	1.1	1.0	3.8			
72	1.5	1.3	7.3	1.3	1.2	20.9	3.1	19.7	12.0
73	171.2	585.6	4.7	34.9	49.5	2.9	6.2	3.7	2.7
74	2.6	1.6	5.1	4.7	4.7	2.5			
75	1.5	1.4	2.5	2.4	2.1	1.6	1.3	1.4	1.2
76	1.7	1.5	1.5	3.6	4.5	1.7			
77	12.2	16.3	2.1	3.1	4.2	3.3			
78	3.1	2.5	3.1	1.9	1.8	6.0	2.2	1.6	1.3
79	3.8	2.3	1.5	1.6	1.4	1.9			
1980	1.1	1.2	9.1	1.1	1.3	1.7			
81	7.1	5.7	4.2	33.9	32.9	3.8			
82	1.7	1.4	2.1	1.0	1.0	3.3			
83	1.2	1.3	88.1	1.7	1.8	665.1			
84	1.9	1.5	1.4	6.3	4.8	1.7			
85	2.3	1.9	1.5	1.6	1.3	1.6	2.2	1.8	1.6
86	1.8	1.9	1.5	1.6	1.9	1.9			

Note: 1/ Consecutive Drought Days

Ex. The figure of 21.5 of annual rainfall in 1969 means the probability of 1/21.5 or return period of 21.5 year.

Table C.4.3. Specific Discharge by Zone in W. Samar

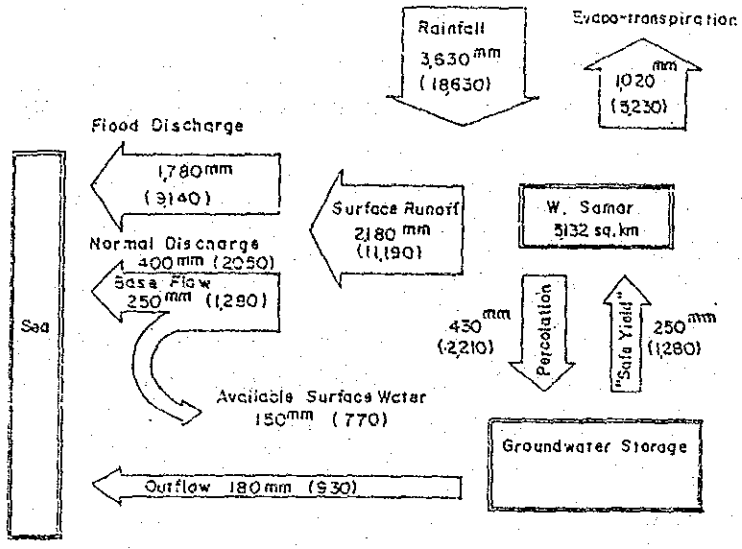
(Unit: cum./s, 100 sq.km)

Month	Probability Ratio of 1/10 1/			Probability Ratio of 1/2 2/		
	Zone A	Zone B	Zone C	Zone A	Zone B	Zone C
Jan.	5.36	7.66	11.49	6.78	9.68	14.52
Feb.	3.61	5.15	7.73	2.06	2.94	4.41
Mar.	2.25	3.21	4.82	1.60	2.29	3.44
Apr.	1.20	1.72	2.58	1.41	2.01	3.02
May	0.97	1.39	2.09	1.16	1.66	2.49
Jun.	1.04	1.49	2.24	2.42	3.46	5.19
Jul.	1.86	2.65	3.98	2.79	3.99	5.99
Aug.	1.97	2.82	4.23	10.36	14.80	22.20
Sep.	1.10	1.57	2.36	3.97	5.67	8.51
Oct.	2.14	3.05	4.58	5.30	7.57	11.36
Nov.	6.83	9.76	14.64	5.97	8.53	12.80
Dec.	4.84	6.92	10.38	4.89	6.99	10.49
Mean	2.76	3.94	5.91	4.08	5.83	8.75
Annual Amount (MCM)	87	124	186	129	184	276

Note: 1/ Based on Discharge in 1968
2/ Based on Discharge in 1963

FIGURE C.4.1. WATER BALANCE IN WESTERN SAMAR

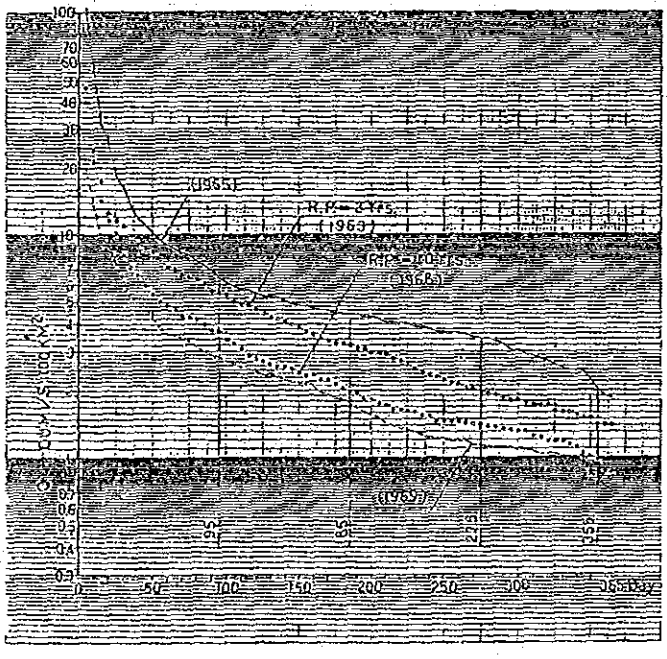
(unit; MCM/year)



Legend;

(1) Annual Rainfall: based on Figure C.1.3
(2) Surface Runoff: (1) x 60%
(3) Evapo-transpiration: 1460mm(Open Pan Evaporation) x 70%
(4) Percolation: (1)-(2)-(3)
(5) Normal Discharge: assumed at 90% of Discharge in Figure C.3.2
(6) Flood Discharge: (2)-(5)
(7) Base Discharge(River Maintenance Flow);
adapting Drought Water Discharge of Tenane River for N=1/10
(8) Available Surface Water: (5)-(7)
(9) Available Ground Water: 250mm(NWRC) x 20% (assumed)
(10) Total Available Water: (8)+(9)=200mm (= 1,950MCM/year)

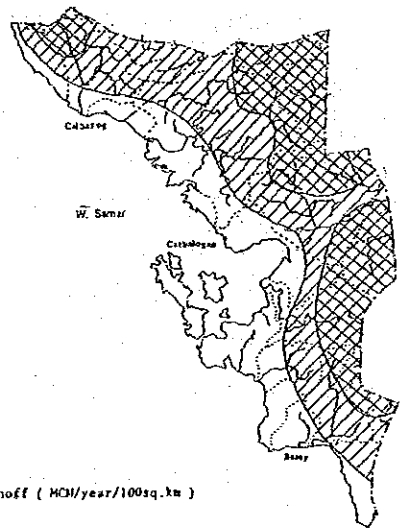
FIGURE C.4.2. FLOW DURATION CURVE OF TENANE R.



River Regime of Tenane R.

Year	Discharge (cum./s/100sq.km)					Annual Amount (MCM)	Remarks
	High 95D	Ordinal 185D	Low 275D	Drought 355D	Mean		
1965	6.54	4.41	3.41	2.12	8.78	277	Wet Year
1963	5.59	3.24	1.99	1.44	5.83	184	R.P.=2Yrs.
1968	4.31	1.99	1.41	0.98	3.94	125	R.P.=10Yrs.
1969	2.82	1.74	1.16	0.84	2.97	81	Abnormal Drought Year

FIGURE C.4.3. RUNOFF ZONE MAP IN W. SAMAR



Legend;

Annual Runoff (MCM/year/100sq.km)

Zone	(N=1/2)	(N=1/10)
A	129	87
B	184	124
C	276	186

Based on the recorded discharge data on Tenane River, the mean specific runoff discharges were estimated as shown in Table C.4.3.

C.5. JICA Gauging Stations

The three water level gauges and rainfall gauges were made by the Study Team taking into consideration distributive locations (refer to Figure C.1.2 and Table C.5.1).

C.5.1. Regional Rainfall Distribution

Rainfall data collected from these JICA stations are useful for analysis of regional rainfall distribution. Especially, rainfall on three typhoons; namely Diding, Etang and Herming in 1987 that occurred during field investigation indicate the property of reported isohyetal map as shown in Table C.5.2. The more accurate rainfall analysis could be made when further observation data are collected in the future.

C.5.2. Rating Curve

The rating curves of three water gauging stations were made during the field survey, but due to limited flood occurrence during that time, these curves are not sufficient in attaining accuracy. It is recommended that continuous observation should be done at different water level/flood level in the future for more accurate result. In addition to this, the three gauging stations should be connected by level survey from the nearest bench mark to the concrete pedestal of the water level instruments (refer to Figure C.5.2). Silaga water level gauging station can only be utilized for flood discharge observation because of the tidal effect.

C.5.3. Runoff Coefficient

Based on the observed runoff discharge and recorded rainfall data at three stations on typhoon "Herming", the runoff coefficient have been calculated at the range between 53 and 63%, so that the mean runoff coefficient is estimated at 61% (refer to Table C.5.4).

Table C.5.1. Water Level Gauging Station in W. Samar

Station Number	River	Basin	Location	Agency	Coodinates Latitude	Coodinates Longitude	Catchment (sq.km)	Remarks
1	Jamonini	Jibatan	Bo. Sigo, about 20km, NW from Calbayog City	SIDRP	12°13'55"	124°13'04"	84(1)	Newly-established (Automatic Gauge)
2	Blanca	Gandara	Bo. Blanca Aurora about 11km. SEE from town proper Gandara	SIDRP	11°57'59"	124°53'46"	300(2)	- do -
3	Silaga	Silaga	Bo. Tulay, about 9km NEE from town Santa Rita	SIDRP	11°28'03"	125°01'03"	142(2)	- do -
4	Tenane	Ulot	About 14km. from town proper Wright, along the Wright Taft, provincial road	BPW	11°48'25"	125°08'00"	392	Existing (Staff Gauge)

(1) 1:50,000 Topographic Map
(2) 1:200,000

Table C.5.2. Regional Rainfall Distribution

Station Name		Sigo	Blanca Aurora	Tulay	Catbalogan(3)
Annual Rainfall(1)		4,000 mm	5,200 mm	3,000 mm	2,636.3 mm
Ratio	(1)/(3)	1.52	1.21	1.14	1.00
Recorded Rainfall(2)		509.5 mm	380.5 mm	217.5 mm	287.3 mm
Ratio	(2)/(3)	1.77	1.32	0.76	1.00

Note: (1) based on the Isohyetal Map (Figure C.1.3)
(2) by Field Observation on Three Typhoon ("Diding","Etang", "Herming",1987)
(3) PAGASA

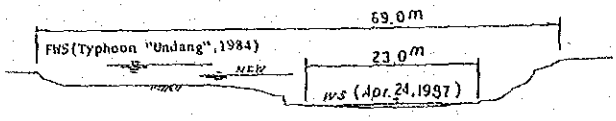
Table C.5.3. Observed Data at Water Level Gauging Stations

River Name	Date and Time	Water Level (m)	Flow Area (sq.m)	Velocity (m/sec)	Discharge (cu.m/sec)
Jamonini	Apr.24 11:00	0.75	7.67	0.077	0.59
	Aug.15 11:25	1.26	22.40	0.375	8.40
	Aug.21 10:00	1.01	13.00	0.271	3.52
	Aug.12 18:00	8.35	400	2	800 (1)
Blanca	Apr.23 11:00	-0.98	29.73	0.112	3.33
	Aug.14 13:35	3.77	200.07	0.257	51.42
	Aug.19 12:00	1.37	86.85	0.169	14.68
	Aug.12 17:00	10.1	600	2	1200 (1)
Silaga	Apr.25 12:00	1.63	17.74	0.111	1.97
	Aug.20 10:45	2.42	27.81	0.096	2.67
	Aug.20 12:10	2.22	25.11	0.144	3.62
	Aug.20 13:10	2.05	22.89	0.130	2.98
	Aug.13 4:00	6.83	110	2	220 (1)

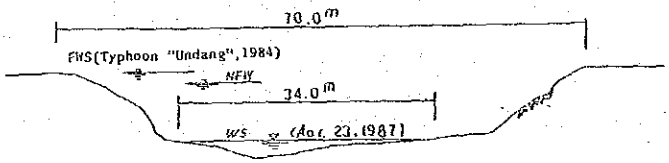
Source; JICA Study Team in 1987
(1)--Estimated Value on Typhoon "Herming"

FIGURE C.5.1. CROSS SECTION

NO. 1 JAMONINI R. (JIBATAN R. BASIN)



NO. 2 BLANCA R. (GANDAR R. BASIN)



NO. 3 SILAGA R. (SILAGA R. BASIN)

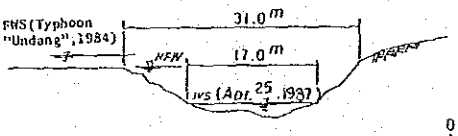


FIGURE C.5.2. RATING CURVE

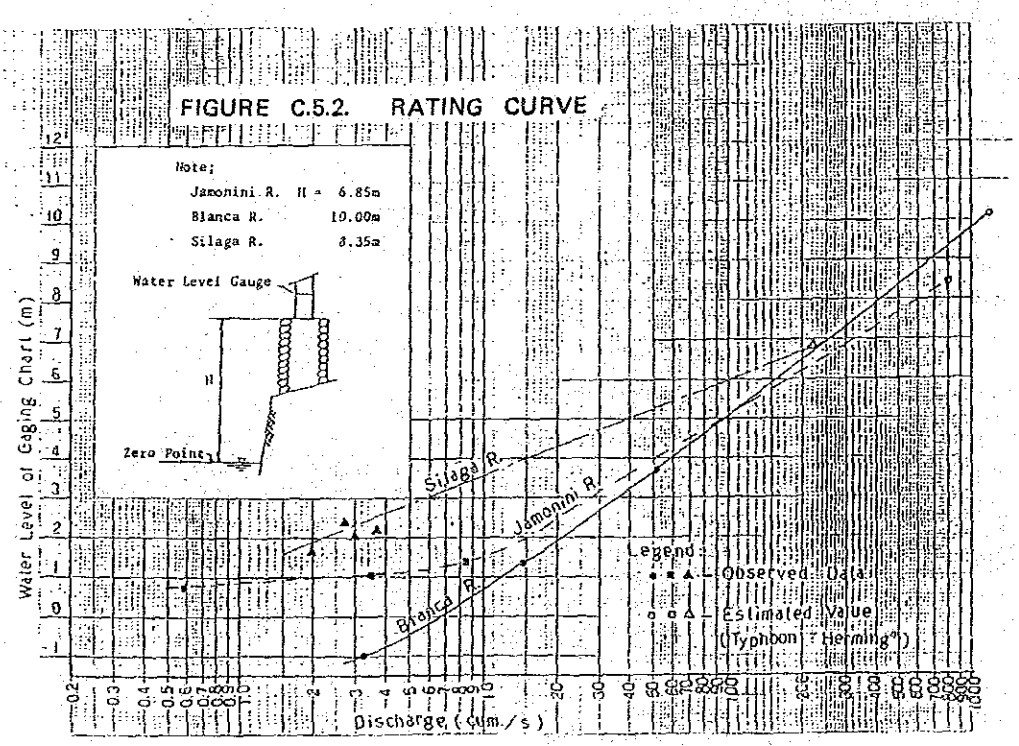


FIGURE C.5.3. HYDROGRAPH OF TYPHOON "HERMING"

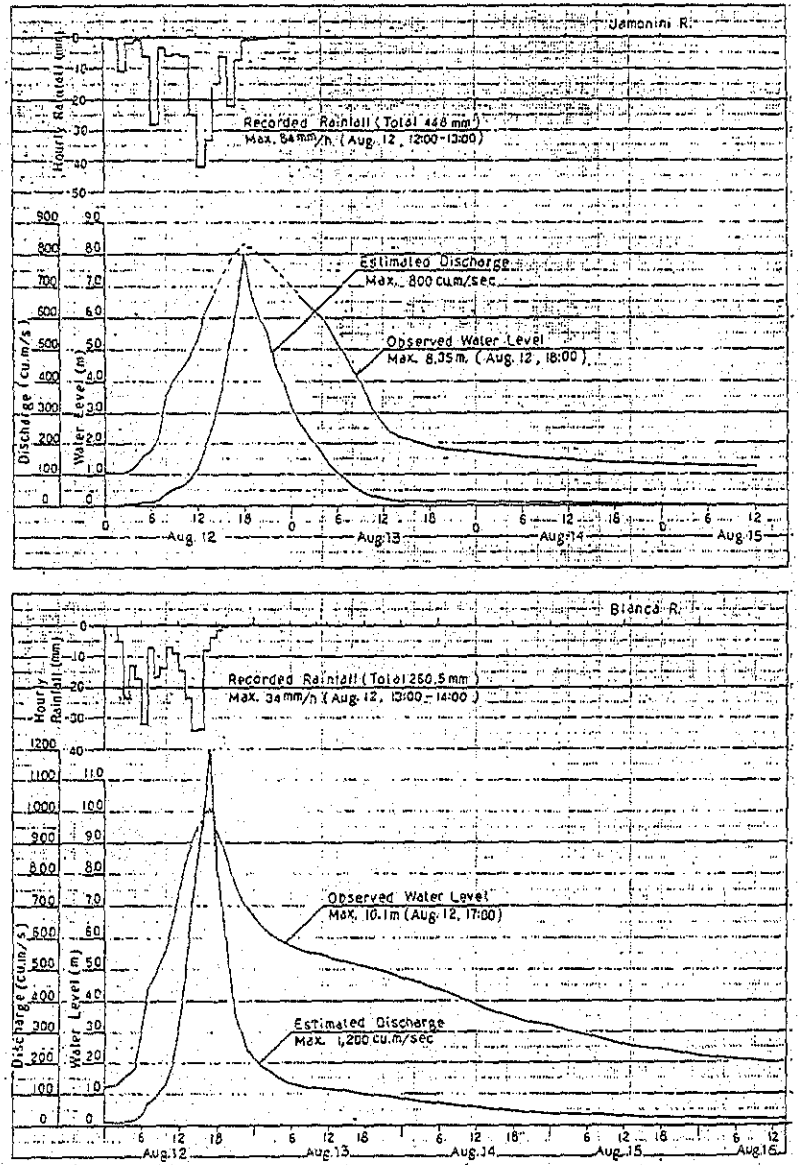


FIGURE C.5.3. HYDROGRAPH ON TYPHOON "HERMING" (cont'd)

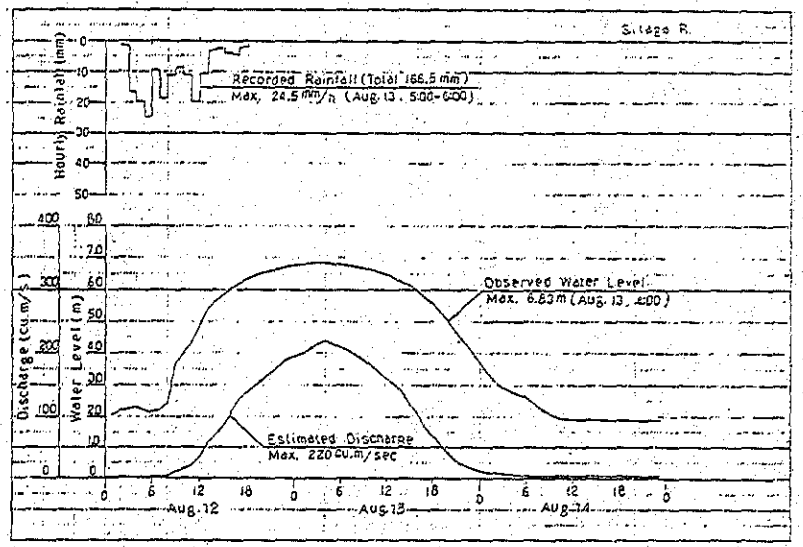


FIGURE C.5.4. RUNOFF PERCENTAGE OF FLOOD DISCHARGE

River Basin	Catchment Area (1) (sq.km)	Rainfall (2) (mm)	Rainfall Volume (3) (MCM)	Total Runoff (4) (MCM)	Base Flow (5) (MCM)	Direct Runoff (6) (MCM)	Runoff Percentage (7) (%)
Jamonini	84	448.0	37.6	27.1	2.0	25.1	67
Blanca	300	260.5	78.2	48.2	6.6	41.6	53
Silaga	142	166.5	23.6	17.4	2.6	14.8	63
Mean							61

Note: JICA Study Team
Runoff data recorded on typhoon "Herming"
(2);Recorded Data
(3) = (1) x (2)
(4),(5); Calculated by Figure C.5.3
(6) = (4) -(5)
(7) = (6)/(3) x 100

APPENDIX D. SOIL, LAND USE AND CONSERVATION

APPENDIX D. SOIL, LAND USE AND CONSERVATION

APPENDIX D. SOIL, LAND USE AND CONSERVATION

D.1. Soil

D.1.1. Available Data

A soil map of the Samar province scaled 1:200,000 was published by A.A. Simon et al in 1953. The renewed soil map was published by BOS in 1976. Moreover, the following maps have been published by BOS.

- Geomorphological Map of Samar Island (Scale = 1:250,000)
- Slope Map of Samar Province (Scale = 1:250,000)
- Land Capability Classification Map of Samar Province (Scale = 1:200,000)
- Land Use Map of Samar Province (Scale = 1:250,000)
- Land Use Opportunity Map of Samar Province (Scale = 1:250,000)

Some parts of Jibatan and Gandara river basins were included in the Samar Island Reconnaissance Land Resources Survey of Priority Strips conducted by BOS - UNDP/FAO in 1977. From this survey, the land system map and land use map scaled 1:50,000 have been prepared.

Furthermore, a survey team dispatched by BOS had conducted the Land Resources Evaluation Project in Eastern Samar. The team will start the similar project in the Samar province near future. In this project, a multi-disciplinary survey is carried out and the following thematic maps will be prepared.

- Geomorphology Map
- Geology Map
- Slope Map
- Land Use and Vegetation Map
- Erosion Map
- Flooding Map
- Fertility Status Map
- Infiltration and Permeability Map

- Agro-Ecological Zone Map
- Crop Zonification Map
- Land Use Opportunity Map
- Geographic Flow of Commodities Map
- Socio-Institutional and Supporting Service Map

The LANDSAT false-color image scaled 1:250,000 was also available for land use survey, especially for the interior area. The BFD, on the other hand, has the land classification, slope and vegetative cover maps for the undulating hills and forested areas. And the FSDP (Farming System Development Project) has published useful information about hillside farming system in combination with soil conservation measures.

D.1.2. Geomorphology

The study area is characterized by rolling hills and rugged mountains and intricated valleys. The plains and valleys form narrow strips and are bounded by ranges of undulating hills. The geomorphological units are divided into three groups, i.e., depositional, solutional and denudational landforms. The depositional landforms consist of tidal flats, coastal alluvial plains and valleys and are located in the downstream areas of Jibatan, Gandara and Basey rivers as well as the littoral extending between Wright and Sta. Rita. These landforms comprise only 11.4% of the land area, while 25.8% is the solutional landforms, i.e., Karst formation derived from coralline limestone. The remaining 62.8% is denudational landforms, mainly steeply sloping mountains in interior portions (refer to Figure D.1.1).

D.1.3. Slope Classification

The slope classification map is presented in Figure D.1.2. This map was drawn after subdivision of 0 - 8% slope class of the existing slope map prepared by BOS into two classes of 0 - 3% and 3 - 8% by JICA Study Team. There are six general slope classes as below;

- Slope Class A (0 - 3%) includes all level to nearly level lands which are most suitable for irrigation. Depending on soil physical conditions, 3% slope is to be used for paddy rice production.

- Slope Class B (3 - 8%) consists of nearly level to gently undulating lands which are suitable for irrigation but require slight terrain modification in terms of contouring or terracing. Depending on soil and climatic conditions, 8% slope is about the maximum slope for diversified crop production that requires more complex soil conservation practices.

- Slope Class C (8 - 18%) consists of moderately undulating to rolling lands. Due to terrain restriction, irrigated agriculture will not be feasible. Depending on effective soil depth tree crops representing coconut will be suitable. Agro-forestry including grazing will be also suitable. Intensive soil conservation measures are necessary to keep the topsoils in place when cultivated.

- Slope Class D (18-30%) includes rolling to hilly lands where cultivated crops cannot be produced continuously over an extended period of time.

- Slope Classes E (30 - 50%) and F (over 50%) include those that are steeply sloping to hilly and mountainous terrain. These slope categories are not suitable to any type of cultivated crops and should be left as forest cover.

D.1.4. Geology

Geological Stratigraphy

Quaternary Period	Holocene	Alluvial layer	
	Pleistocene	Kali cornic group	
Tertiary	Pliocene	Late period	
		Early period	Catbalogan layer group
	Miocene	Late period	
		Middle period	
		Early period	Dam layers group
		Late period	
	Oilgocene	Later period	
		Early period	Penetrating diorites
			Jersick volcanic rock
	Eocene		
	Paleocene		
Cretaceous			Ultra-mafic rock
			Cankyubas volcanic rock

Source: Based on the Geological map published by Bureau of Mines and Geo-Sciences (BMG), 1963.