



SAMAR
INTEGRATED RURAL DEVELOPMENT PROJECT

THE MASTER PLAN
FOR
THE INTEGRATED AGRICULTURAL/ RURAL
DEVELOPMENT PROJECT
IN WESTERN SAMAR

APPENDIX II

DECEMBER 1988

JAPAN INTERNATIONAL COOPERATION AGENCY

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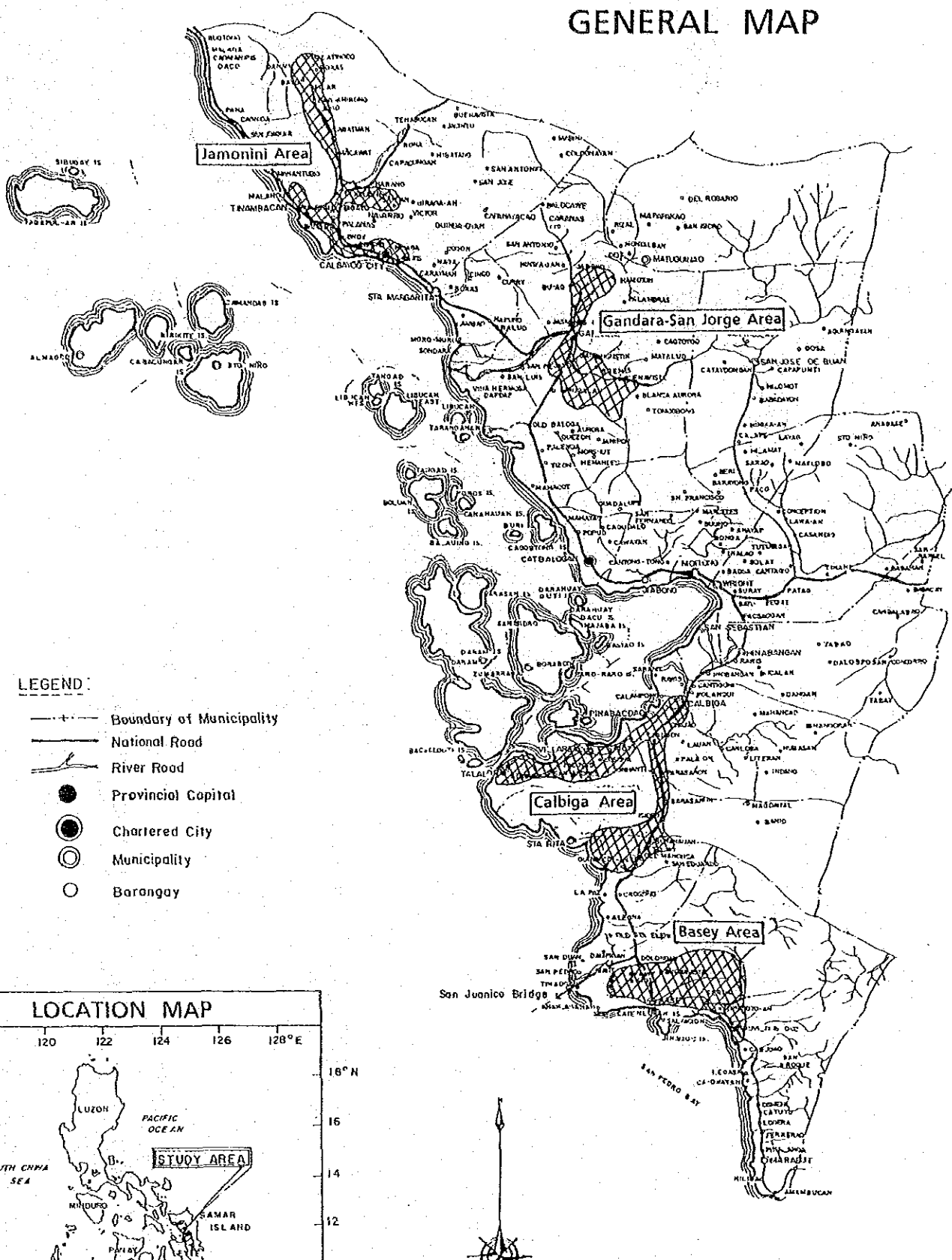
APPENDIX II

(PLANS FOR DEVELOPMENT OF PRIORITY PROJECT)

DECEMBER 1988

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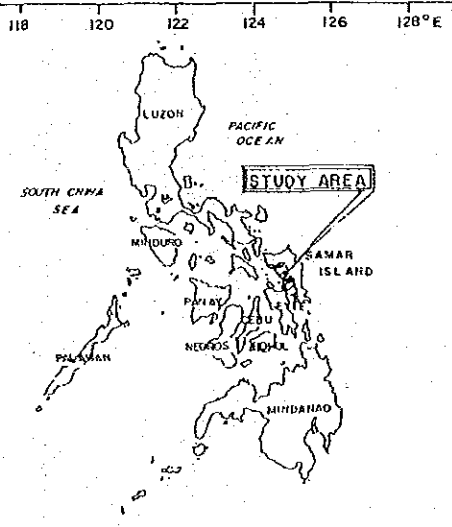
GENERAL MAP



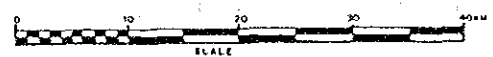
LEGEND:

- +— Boundary of Municipality
- National Road
- River Road
- Provincial Capital
- Chartered City
- Municipality
- Barangay

LOCATION MAP

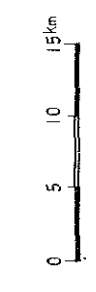
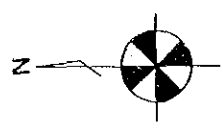
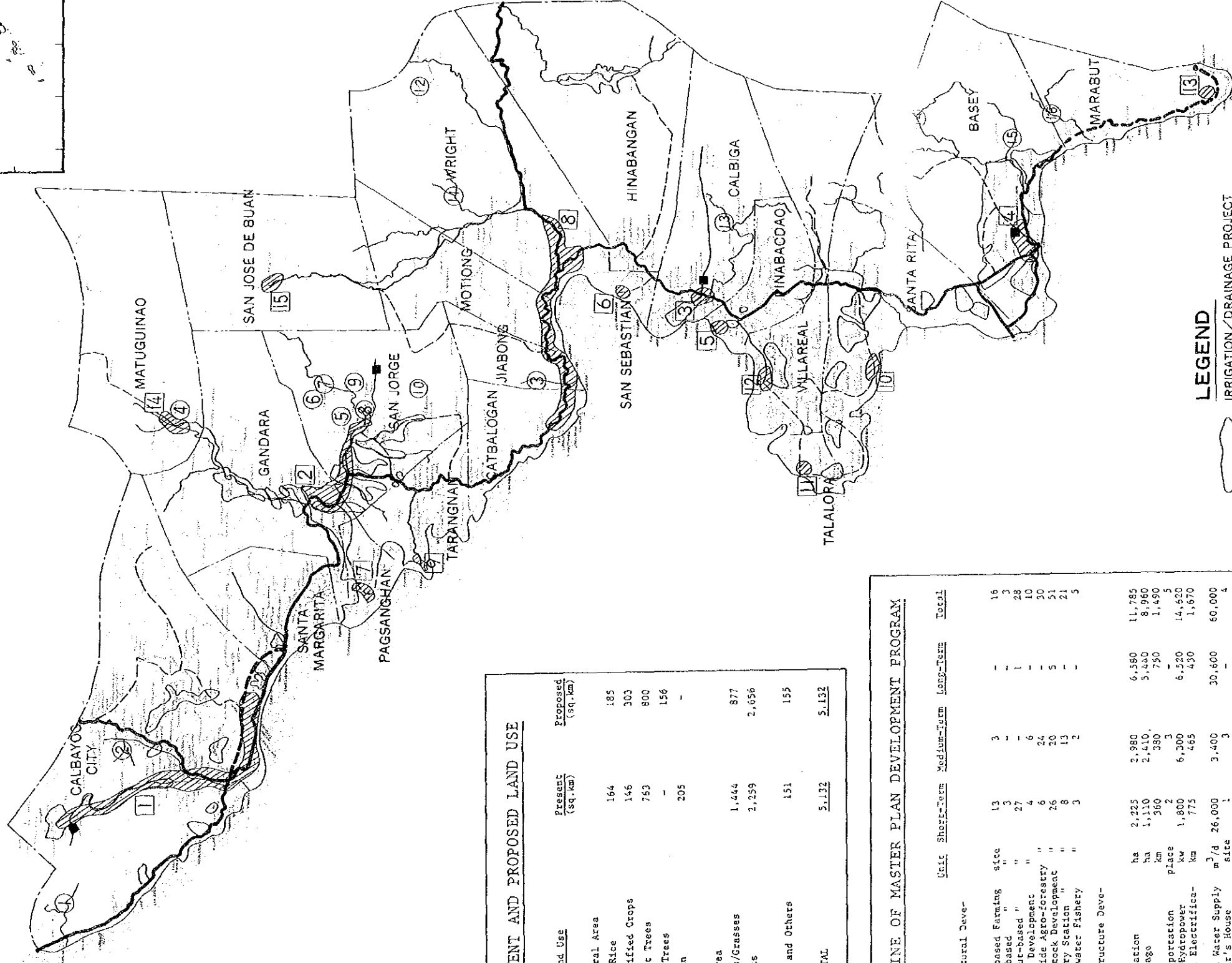
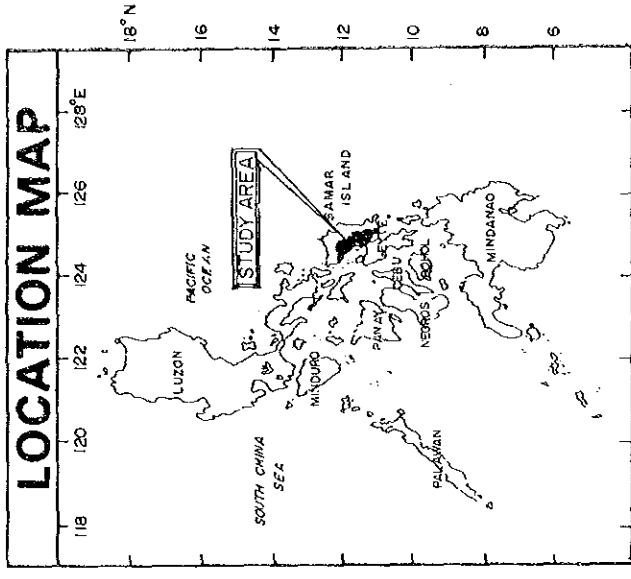


San Juanico Bridge



GENERAL PLAN

THE INTEGRATED AGRICULTURAL/ RURAL DEVELOPMENT PROJECT IN WESTERN SAMAR



- 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

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
Kasingin	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	size	13	3	-	16
2) Corn-based "	"	3	-	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	30	5	51
7) Nursery Station	"	6	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	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

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GENERAL PLAN

PRELIMINARY LAYOUT OF AGRICULTURAL DEVELOPMENT
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ABBREVIATION

CONVERSION FACTORS, MEASUREMENT AND GLOSSARY

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
DEM	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
NCISO	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
OECE	Overseas Economic Cooperation Fund
PAGASA	Philippine Atmospheric Geophysical and Astronomical Service Administration
FCA	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
HNEP	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
OECP	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

<u>Unit</u>		<u>Comparison</u>	<u>English Equivalent</u>
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 eastern direction reaching the island during the period from February to April.
Tropical cyclone	:	PAGASA classifies the tropical cyclone by the wind speed as follows; <ul style="list-style-type: none"> - 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 cylindrica)	:	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	:	Deforestation 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

SUMMARY

SUMMARY

(Introduction)

1. This APPENDIX-II compiles the layout of plans for the priority projects under the Integrated Agricultural/Rural Development Project in Western Samar in the Philippines. In the course of the Master Plan Study for the Project, the layout of plans for the priority projects in the Master Plan has been planned for immediate implementation prior to the implementation of the Project.

(Purpose of Master Plan)

2. The purpose of the Integrated Agricultural/Rural Development Project in Western Samar aims at increasing agricultural production, creating job opportunity, and improving living conditions and uplifting living standard of inhabitants in the rural area. The final target is to fill up the gap between rural average and urban average by the target year 2007.

(Development Strategy of Master Plan)

3. Master Plan for the Integrated Agricultural/Rural Development Project in Western Samar is envisioned with three stages of development: short-term, medium-term, and long-term. The short-term development calls for the urgent implementation within five years in order to get immediate results with a relatively little amount of investment while the medium-term requires about 10 years on an average for the development, and the long-term development which will be aimed to be undertaken depending on the results of the medium-term development.
4. In considering the depressed conditions of Samar province at the present, the following three fundamental overall strategies are settled for the selected time targets.

Short-Term Development (5 years range)
Target : Satisfaction of Basic Human Needs (BHN)
Strategy: Level up to the national rural average

Medium-Term Development (10 years range)
Target : Escape from the poverty
Strategy: Level up to the national average

Long-Term Development (20 years range)
Target : Prosperity of Samar province
Strategy: Level up to the highest average in the
Philippines(Greater Manila zone)

(Background of ADPP)

5. In considering the need for the project to be implemented immediately under the short-term development proposed in the master plan, it is recommended by the Study Team that Agricultural Development and Promotion Project (ADPP) shall be established in four selected areas in the Samar province as the priority projects in this master plan. Out of the four promising project sites for ADPP, an area in a part of Gandara municipality and the bulk of San Jorge municipality is considered the project given the highest priority for establishment of ADPP, while the three others are selected as sites for subprojects of ADPP.

(Objective of ADPP)

6. ADPP playing a role of the show window for the development of the Province has the purposes to increase of agricultural productivity and level up the living standards of the local people. This kind of demonstration show window is very useful for successful rural development in helping the inhabitants have better understanding and practical knowledge of the Project.

(Socio-Economic Conditions of the ADPP Area)

7. The ADPP area of approximately 9,000 ha includes the bulk of San Jorge and a part of Gandara, and involves 27 Barangays with

the population of 12,359, more than 80 percent of which is engaged agriculture. The number of households is 2,129 and the average family is 5.8 persons which are higher than provincial average of 5.4. The annual population growth rates of 1.98 percent in Gandara, 1.36 percent in San Jorge and 1.60 percent in the provincial average show immigration into the former and emigration from the later. The labor force is about 8,500 out of which 2,500 belong to unemployment or underemployment.

8. The average farm size is 2.3 ha, consisting of 1.0 ha paddy field, 0.5 ha of corn field and 0.8 ha of coconut field. The number of farm households is 1,705 out of which about 600 belong to owner-cultivators and the remainders are the part-owners and tenants inclusive of 900 landless farmers. The large coverage of grass land and the tenancy land is a major problems in the Area. The grass land occupies 50 percent of total area and the tenancy farm land occupies 40 percent of total farm land. The tenancy agreement usually state on sharing at the rate of 75 to 25.
9. The rice disposal for selling is comparatively small in amount to suggest the inadequacy in rice production. The corn and coconut producers tend to sell their products as much as possible for cash income for rice purchasing. Animal production has been practised earning cash, food and power, and almost all the farmers raise at least one kind of animals. Co-use of carabao as draft animals is significant but the farmers dislike to invest in livestock which is not their own unless they can get a full benefit of their labor capital and management.
10. The annual income of the local farmers can be grouped into three as follows: about 10 percent of the total household can earn only less than 10,000 pesos, about 80 percent between 10,000 and 30,000 pesos and the rest 10 percent over 30,000 pesos.

Out of their income, in general, they spend 68 percent for foods, 10 percent for housing, 2 percent for recreation/ personal care and the remnants for the miscellaneous. About 85 percent of the total families is below the target poverty line of the annual income by 24,792 pesos. A typical farm household in the Area can earn 17,180 pesos per annum, which spends 16,321 pesos in a year.

(Project Components of ADPP)

11. ADPP consists of such a variety of development components as agricultural development as a principal component of the development, agricultural facilities development, development of post harvest and marketing services assistance, development of farmers' organization, and agricultural development and promotion center (ADPC) as a functional center of ADPP.

(Present Agriculture in the ADPP Area)

12. The ADPP area presents a typical landscape in the Samar province, where four soil series are identified. More than half of the lowland is left as grass land. According to the information on the accomplishment of land reform program, the land transfer has been operated in the areas within the jurisdiction of Calbayog DAR office which covers the ADPP area. The other kinds of farm land than the rice and corn lands and a large area of open grass land seem to be possessed by the absentee landlords to some extent.
13. The shifting farming has been traditionally practiced in most of hilly land, and disturbs the establishment of cultivation of perennial crops like coconut. The rice-based farming is practiced in the lowland under the rainfed conditions except for the very limited functional irrigation service areas. In the elevated lowland, the corn-based farming is exclusively employed. Most of coconut plantation is scattered in the hilly area, where the extensive coconut mono-culture prevails. The

abaca plantation area in ADPP is counted only at a 41 ha. The poor irrigation and drainage conditions with low intensity of roads, have hampered the agriculture from development in resulting in inefficient land use and low level of crop yields. The number of carabao is considerably deficient in the ADPP area. It has caused the delay in the cropping of paddy and corn to decrease the crop yield due to the late planting and also reduce the cropping intensity. Presently, few mechanical post-harvest facilities are used in the ADPP area.

(Agricultural Development)

14. Based on the result of the field survey, it is considered that the agricultural development should be promoted as far and early as possible through (i) supply of the basic food for self-sufficiency, (ii) stabilization of farm management, (iii) improvement of production technology with introduction of new crops and livestock/poultry, (iv) elimination of bottlenecks in the agricultural development with the assistance and coordination by SIRDP Office, and (v) maximum vitalization of the existing organizations and institutions.
15. It is proposed that ten on-farm demonstration farms should be established in the strategic areas to improve the farming system based on various crops. Furthermore, the programs of livestock and poultry dispersal as well as freshwater fishculture are included respectively together with the plan of increasing the number of carabaos and other domestic animals and supplying protein in the internal areas. The improvement plan of on-farm post-harvest is included in the above demonstration activities.
16. To maximize the vitalization of the existing agricultural organizations and institutions in the proposed integrated agricultural development, the basically needed facilities have to be fully developed, including those facilities for training,

the soil test and seed analysis laboratories, as well as those of Gandara Seed Farm, the Gandara Breeding Station, the animal diagnostic and treatment center, the municipal nursery, etc.

(Irrigation Development)

17. The present irrigation systems were developed as Communal Irrigation System (CIS) by NIA in considering the geographic constrain of the ADPP area. There are four CISs with the total potential paddy field of 270 ha, which are not functional now due to damages by typhoon. Other areas of about 700 ha are still placed on rainfed field.

On the other hand, eight pumping irrigation systems (PISs) which are not operated now due to damages by flood, are founded in the ADPP area. Those PISs are located at along the Gandara River with enough irrigation water even in drought months.

18. In the irrigation development, the higher priority will be given to rehabilitation works of the existing irrigation systems with small amount of investment and quick benefit. New irrigation projects will be also proposed for those sites which have water resources available for irrigation of their beneficial areas. The proposed six projects cover a 455 ha paddy field. The projects consist of four gravity irrigation projects with a total area of 205 ha, one pump irrigation project with 130 ha, and one lift irrigation project with 120 ha under about 15 portable pumping equipments. On-farm facilities such as farm ditches, farm drains and farm road are also included in the proposed irrigation development.

(Drainage Development)

19. The drainage system in the ADPP area consists of the Gandara River and its tributaries; Blanca, Buena Vista, Sinibaran and Sapinit Rivers, and the Baga-Oring and Ngoso creeks. Those basins are low lying at an elevation lower than five meters

above the mean sea level (MSL). When the water level becomes four to five meters above MSL on the Gandara River during heavy rain brought by typhoon, the present drainage systems do not inefficiently function. There are many submerged areas under long inundation due to absence of drainage facilities. Since the ADPP area is polluted by endemic of schistosomiasis, the suitable countermeasures for reduction of polluted area and number of its victims should be taken.

20. Only the effective way to solve the present poor drainage problem in the Area is considered to exist in implementation of such a large scale flood control program as the Gandara River improvement. Further studies and analyses based on a variety of data collected through survey and observation will be required for realization of the Project.

The current socio-economic conditions of the Area, however, suggest that the implementation of the large scale project will not be feasible nor realistic. But even small amount of investment could ensure to bring about remarkable effects on the schistosomiasis control by implementing on-farm level drainage improvement.

From the above viewpoint, the drainage improvement plans for 10 sub-areas in ADPP is proposed to cover about 310 ha in total and three of them, covering 195 ha, will be overlapped with the planned irrigation development areas. For the future studies on the flood control of the Gandara River, five water level gauging stations and three rainfall gauging stations are proposed in or around the ADPP area. The observation, O & M works and data processing of the collected data should be continuously practised by SIRDP.

(Rural Road Development)

21. There exist many isolated Barangays in the ADPP area, where accessibility is poor on the road networks. The road ratios per square kilometer land area and per one thousand population are 0.28 km/km^2 and $2.10 \text{ km/1,000 population}$, respectively.

22. The rural road development aims to improve the accessibility to Barangays so as to secure efficient transportation of agricultural input/output. And furthermore, the well provided road networks will accelerate the development of agricultural facilities, educational facilities and health service facilities.

The major development components of the rural road are as follows:

Construction of farm-to-market roads:	26.5 km
Improvement of the existing roads	: 11.9 km
Construction of trunk farm road	: 6 km

(Rural Water Supply Development)

23. The present water service rate by Level I Service in municipalities of San Jorge and Gandara are assessed at 10 and 18 percent, respectively. Most existing water supply facilities do not functional due to poor maintenance and unsuitable water source.

The infection rate of schistosomiasis is very high in the area. The improvement of the existing water supply facilities should be taken into consideration as one of the high priority projects to be implemented immediately in ADPP. As for water source of the rural water supply in the ADPP, Binubucalan spring at Barangay Tomogbong in San Jorge is suitable.

24. The water supply proposed for ADPP will cover 17 Barangays with population 11,259 among total 27 Barangays. The proposed plan is expected to raise the service rate to about 77 percent for the Area. And the related major facilities are itemized as follows:

Transportation Pipeline	:	Ductile/Steel Pipe ø300 - ø150 mm Length 20 km
Distribution Pipeline	:	Steel Pipe ø150 - ø50 mm Length 13 km
Public and Community Faucet:	:	300 places
Daily Maximum Demand	:	1,043 m ³
Service Level	:	Level II Service Service Rate: 77%

(Rural Electrification Development)

25. The ADPP area is franchised by SAMELCO I but energized only in Barangays located along Maharlika Highway. At present, 10 Barangays out of 27 or 1,439 households out of 2,516 have been covered by the distribution line of SAMELCO I.

26. The proposed distribution line is planned to extend the existing distribution line to the interior Barangays to improve living conditions of the inhabitants and also to meet the requirement of development scheme. The total length of the proposed electric line is estimated at 30.3 km for the distribution line and 10.5 km for the secondary line to serve 15 Barangays with about 830 households. After completion of the Project, therefore, 25 Barangays out of 27 or 2,265 households out of 2,516 will be totally covered by the electric power services.

(Rural Health Development)

27. Maternal, child and infant mortality rate is a big national concern and problem. The national statistics show a high rate of maternal death per live birth and infant mortality in the rural area like Samar. Particularly in the ADPP area, schistosomiasis is widely infected with high rate. One of serious problems in the rural area is the absence of effective measures to store medicines necessary for promoting the health service program.

28. The protection of vaccines against damaged and decreased potency requires that they be maintained at low temperatures from the moment of manufacture to the point of injection into the child or adult. For improvement of facilities on storage of medicine in the ADPP area where no stable electric supply is expected, it is proposed to install four units of solar powered cold chain. The storage facilities should be used for animal artificial insemination program under the project as well.

(Development of Farmhouse)

29. The agricultural development under the Project includes the livestock development for dispersal of carabao, goat and duck. This development scheme is expected to provide sideworks for farmers' wives in order to earn some additional income. To carry out this scheme effectively, the farmers shall accommodate the facilities for animal feeding and comfortable living. This program under ADPP aims at providing model farmhouse for diffusing them in the rural area.

(Post Harvest Facilities)

30. Presently, few post-harvest machines are used in the ADPP area, although some manual wooden threshers and winnows are used in the limited area for paddy and corn cultivations. The sun drying of the harvests on the paved roads is commonly practised, however, the drying on backyard is seen in many Barangays as well as on the unpaved road. The capacity of the existing rice mills are insufficient because the capacity can not be increased under the present unstable supply of paddy.
31. As supplemental purpose, on-farm post-harvest facilities such as threshers, paved drying yard and mechanical dryers are provided for the use of farmers' organizations as proposed for the demonstration farms of the rice-and corn-based farming. To improve the coconut post-harvest technology, the improved copra dryers and charcoal kilns will be introduced in the

coconut-based farming demonstration farms. For the increased paddy production under the Project, it is planned that a small scaled rice mill should be introduced for the trial use by farmers' organization members.

(Marketing Assistance)

32. There is much difference between the farm gate and the market price of crops and livestock products, which suggests that so many traders intervene into the marketing system. Milled rice and corn are sold in Catbalogan or Calbayog City but copra flows through more complicated route than that of others'. The marketing price of meat has diurnal fluctuation due to lack of refrigerators in the market. Almost of all farmers are now under the subsistence living conditions, therefore, they are reluctant to sell their products directly to consumers, because the farmers must run a marketing risk by themselves.

33. The marketing service assistance includes: (i) marketing research assistance, (ii) provision of 2.0-ton capacity tracks to production-related farmers organizations and (iii) provision of meat cold storage facilities on the rental basis to retailers.

These assistance aim to eliminate the intervening margins and to increase both the farm gate price and the market price. Besides, the propagation of marketing knowledge to the farmers can be much anticipated.

(Farmer's Organization)

34. To ensure success of any integrated rural development projects, a careful attention must be paid to formulation of suitably designed strategy and well-planned tactics for community organizing, so that active and sustained involvement of the community would be secured in the development process throughout the stages of planning, implementation, monitoring, and evaluation.

35. To support successful implementation of ADPP, the beneficiary farmers should organize themselves into cooperations/ associations for carrying out the operation and maintenance of the facilities for irrigation and drainage, rural water supply, rural electrification, and farm road. And cooperative management of such demonstration farms as rice-based farming, corn-based farming and abaca growing should be also operated by the respective farmers' organizations themselves. Also they operate agricultural-related programs such as freshwater fishculture and livestock raising and dispersal.
36. It will be most desirable to provide them with a common office at ADPC in view of securing a tight coordination among various line agency officers and technicians. The success of ADPP depends largely on efficient activities of the line agency staff, particularly those assigned to intensive technical guidance towards various demonstration farms plus the NGO's staff as many transmitters of knowledge and skill will work among the organized farmers through SIRDP's wise coordination. Successful community organizing is one of the most important tasks imposed on ADPP. Accordingly, farmers' organization on preferably co-operation basis is vehemently encouraged by SIRDP as many cores for implementing various agricultural development programs are planned criss-cross over the ADPP area.

(Agricultural Development and Promotion Center, ADPC)

37. ADPC is a central building serving as a center of ADPP for management, operation and training of staff and farmers. ADPP has various development components which are scattered in the ADPP area of about 9,000 ha in total. Each development component will be achieved independently, however, the performance of ADPP as an integrated development of the rural area shall be properly managed and superintended by ADPC for success.

38. Major facilities of ADPC consist of the administration office, compound laboratory, lecture building, rural health unit, warehouse, garage and workshop, dormitory, guest house for visiting lecturers, canteen, etc. One of significant roles of ADPC is training and extension services. Investment to human resources development is fundamental to the long-term development of the Project for success. Such investment centers on provision of learning opportunities with under-privileged groups and individuals so as to enable them to understand and to control their changing physical, economic and social environment, if possible.

(Development Cost)

39. The total development cost of ADPP is estimated at 562.85 million pesos, based on June, 1987 price.

(Implementing Program)

40. The total implementation period of ADPP after the commencement of the detail design will be 20 months. The Samar Integrated Rural Development Project (SIRDP) should implement the project in close cooperation with other sectoral line agencies concerned and under the assistance of consultants and capable contractors.

(Project Evaluation)

41. As the financial viability of the Project, the farm budget analysis is conducted under the condition of without and with project situation. The 12 farm household models which represent the typical four farming systems and three tenurial situations are adapted in the analysis allowing for their household consumption, land resources, production disposal and household expenditure.
42. The net production value and economic internal rate of return are adopted in economic evaluation together with the

sensitivity analysis. The economic benefits from infrastructure development and agriculture development are quantified. Since all components are essential to attain the overall project benefits, it is not logical to analyze the discrete components as self-contained economic entities, and therefore, the estimation of benefits by project components are obtained by following the theoretical procedures.

43. The financial viability of the project is evaluated by family cash balance, because the project will not improve the living standards of the rural poor unless the farm household are able to generate surplus cash for non-food expenditures. The disposable income accruing from the project will be maximized in the owner-cultivator on a coconut farm at 22,300 pesos. Except the tenant on a rainfed rice farm, considerable disposable income will be generated and the recommendable dietary allowance will be taken, and consequently, the annual net household income of 12 households will show the mushroom growth with 143 to 231 percent of the present income.
44. The overall economic rate of return is computed at 5.5 percent. About 50 percent of the project benefits are attributable to agriculture development. The project EIRR is most sensitive to delays in the accrual of benefits from slower expansion activities. The EIRR of 5.5 percent in basic case derives to 3.4 percent by two years delay and one percent by five years delay.

CHAPTER 1. INTRODUCTION

APPENDIX II
PLANS FOR DEVELOPMENT OF PRIORITY PROJECT

CHAPTER 1. INTRODUCTION

1.1. Background

The purpose of the Integrated Agricultural/Rural Development Project in Western Samar aims at increasing agricultural production, creating job opportunity, and improving living conditions and uplifting living standard of inhabitants in the rural area. The final target is to fill up the gap between rural average and urban average by the target year 2007.

The Master Plan is envisioned with three stages of development: short-term, medium-term, and long-term. The short-term development calls for the urgent implementation within five years in order to get immediate results with a relatively little amount of investment while the medium-term requires about 10 years on an average for the development, and the long-term development which will be aimed to be undertaken depending on the results of the medium-term development. In considering the depressed condition of the Samar province at the present, the following three fundamental overall strategies are settled by the Study Team for the selected time targets.

Short-Term Development (5 years range)

Target : Satisfaction of Basic Human Needs (BHN)
Strategy : Level up to the national rural average

Medium-Term Development (10 years range)

Target : Escape from the poverty
Strategy : Level up to the national average

Long-Term Development (20 years range)

Target : Prosperity of Samar province
Strategy : Level up to the highest average in the
Philippines (Greater Manila zone)

In most situation and as far as agricultural production in the Samar province is concerned, the major cause of low production are the existence of low level technology and inefficient farm practices. Farm mechanization is very seldom existing in the province. All these reasons stressed that the Samar province is really suffering from the non-viability of the high level technology to enhance the increases in agricultural production of the province. There are also other aggravating problems which contribute to the slow development in the Samar province such as the over-logging activities in some areas leading to soil erosion and flooding as well as the absence of some related development projects.

It is therefore, essential that the development approach should focus in catering to all these needs through advance technology development and extension services by introducing ADPP in the Samar province, as the project immediately to be implemented.

1.2. Priority Project

In considering the need for the project to be implemented immediately under the short-term development, it is recommended by the Study Team that the Agricultural Development and Promotion Project (ADPP) shall be established in four selected areas in the Samar province as the priority projects in the Master Plan. Out of the four promising project sites for ADPP, an area in a part of Gandara municipality and the bulk of San Jorge municipality is considered the project given the highest priority for establishment of ADPP while the three others are selected as sites for subprojects of ADPP.

The primary objective of ADPP is to increase agricultural productivity, and the upliftment of the standard of living condition of the inhabitants in the province.

To develop a rural area, it is quite useful to provide the farmers a pilot as demonstration show window for the agricultural development. In generally, introduction of newly developed technology or new natures and varieties of the crops into the farming is quite hesitated by the farmers concerned due to much risks for them. The agricultural/rural development will generally include the new development technology, new varieties of crops, introduction of new agro-industries, etc. It is necessary to develop the area as a show window like ADPP.

Specific objectives of ADPP may be defined as follows:

- i) To develop appropriate and productive technology for agricultural development.
- ii) To carry out applied and adaptive researches, field trials and farm demonstrations in coordination with concerned line agencies, local offices, farmer's organizations and NGO's.
- iii) To provide agricultural/rural infrastructure facilities such as irrigation and drainage facilities, rural and farm roads, water supply systems, rural electrification and so on in rural areas for supporting every activity on the increase of the agricultural productivity and the uplift of living standard of the inhabitants.
- iv) To conduct farmers training and seminars on crop production and other agricultural development.
- v) To conduct planning, project implementation, monitoring and evaluation of the different project components included in the Master Plan.
- vi) To establish an Agricultural Development and Promotion Center (ADPC) which shall be located along the Maharlika Highway inside the area of ADPP as a center of all activities of ADPP.

1.3. Present Condition of the ADPP Area

1.3.1. Population and Labor Force

The project area includes the bulk of San Jorge municipality and a part of Gandara municipality, totally about 9,000 ha and involves 27 Barangays. The 1987 population of the ADPP area is estimated at 12,359 of which 10,220 are engaged in farming activities. The number of households is estimated at 2,129 and the average family size at 5.8 persons per household which is higher than the provincial average of 5.4 persons. The annual average population growth rate between 1985-1987 and 1987-2007 is estimated at 1.98 and 1.36%, respectively, in Gandara municipality, 0.94 and 0.47%, respectively, in San Jorge municipality. The provincial average annual population growth rate is estimated at 1.6% between 1985-1987; the above growth rates suggest immigration into Gandara municipality and emigration from San Jorge municipality. The labor force (age groups 15 to 64 years) is about 8,500 persons out of which 2,500 belong to unemployment or under-employment.

1.3.2. Farm Size and Land Tenure

The average farm size is estimated at 2.3 ha per farm household, but not all areas are actually cultivated.

According to the farm economy survey, the size of farm area operated inclusive of area rented in and operated free of charge is estimated as shown in Table 1.3.1.

Due to its geographical conditions, the bulk of farmers do not have plain land; viz. 2.3 ha average land holding area are divided into 1.0 ha of paddy field (0-3% slope), 0.5 ha of corn field (3-6% slope) and 0.8 ha of coconut field (6-18% slope), respectively.

There are no reliable data on land tenure. It is estimated that about 35% of farmers are owner cultivators, and the remaining 65% are part owner and tenant, of which 80% are landless. The owners who have land more than 10.0 ha are usually living in the poblacions.

The grass lands are scattered in lands of 18% slopes and over or in abandoned areas, account for 50% of the total area. About 40% of agricultural land are cultivated, under the tenancy agreements in sharing at the rate of 75 to 25.

1.3.3. Disposal of Crops

A great portion of the corn and copra productions were marketed. The crop disposal pattern by tenure status are shown in Table 1.3.2.

The farm gate prices of the above crops vary by season and area. Normally corn and copra are sold to the trader (middlemen) at the prices of 3.0 to 5.0 pesos/kg for palay, 2.3 to 3.0 pesos/kg for corn grain, and 3.0 to 5.0 pesos/kg for copra, respectively.

1.3.4. Selling and Purchasing Pattern of Crops

A number of farmers in the area buy rice for three to five months a year even though they are paddy raisers. This can be attributed to some factors like tenure status, farm size, rice production techniques, etc. If a farm is tenanted, the remainder after payment to land owner is usually deficient to meet household demands for food. Most amount of paddy and corn are sold after their harvest season, however, coconut (copra) can be harvested at anytime and sold when the farmers need the money.

The peak months of rice purchasing in the area are June and July in seven Barangays of Gandara, and July in 20 Barangays of San Jorge. (Refer to Figure 1.3.1)

1.3.5. Livestock Disposal

Male carabaos are bred mainly for draft power, while female carabaos are for breeding and sold for cash. Milking carabaos are raised in some Barangays and the processed product into cheese is sold rather than consumed at home. Pigs and chickens are bred both for cash and for food.

Almost all farmers in the ADPP area raise at least one kind of animals. Average number of livestock per farm household is 0.6 heads of carabaos, 1.4 heads of pigs and 8.9 heads of chickens. And 0.2 heads of carabaos, 2.6 heads of pigs and 7.8 heads of chicken are sold annually at the price of 5,000 to 7,000 pesos per head of carabao, 700 to 1,000 pesos per head of pig and 20 to 30 pesos per head of chicken, respectively. Besides, ducks and goats are sometimes marketed at the price of 25 to 50 pesos per head of duck and 100 to 200 pesos per head of goat, respectively, although they are not yet popular.

Share breeding of carabaos affects badly the farmers' investment and the management of shared animal. As seen in the crop management of share cropping, most share tenants attain low production because tenants are hesitant to invest adequately.

1.3.6. Farm Income and Expenditure

Based on the farm economic survey and other related data, it is analyzed that about 10% of the households can earn only less than 10,000 pesos annually, about 80% between 10,000 pesos and 30,000 pesos annually and the rest 10 percent over 30,000 pesos annually. Out of their income, in general, they spend 68% for foods, 10% for housing, 2% for recreation/personal care and the remaining for the miscellaneous. About 20% of families have savings, however 85% of families are below the targeted poverty line at 24,792 pesos per annum. (NEDA, 1986).

The total income composed of farm income, off farm income and non-farm income is ranged between 7,800 pesos and 50,000 pesos and 17,180 pesos per annum on an average. Out of this amount, 16,321 pesos which correspond to about 95% of the above average is spent as family expenditure, mainly on food, house repairs and education purposes. Average farm debt are 700 pesos per household. On the other hand, lending money to the others is recorded at 230 pesos.

1.3.7. Farmer's Activity

The poor farming activities in the area is affected by lack of the inadequate infrastructure and the unpredictable weather. Usually the busy months, from May to July coincide the harvest seasons of dry season crops which are overlapped by the planting time of wet season crops. On the contrary, subsequent months, from August to December are dull season for them:

The potable water in the area is mostly fetched from wells or streams, which incurs much loss time for the families. The water fetching takes time from two hours at the maximum to a few minutes at the minimum and 16 minutes on an average. The water fetching has to carry out at least once a day mainly in the early morning and at their lunch break.

Among 27 Barangays, 10 Barangays are already energized, however, kerosine is still used except two Barangays. It is purchased daily or every three days in non-energized household, and weekly in energized household. Their monthly expenses for kerosine are counted at 90 pesos in non-energized household and 25 pesos in energized household, respectively.

1.4. Project Components of ADPP

ADPP to be implemented immediately as a show window of the integrated agricultural and rural development consists of the following components:

1.4.1. Agricultural Development

- 1) Rice-Based Farming Development
 - Irrigated Rice-Based Farming: 2 places 25 ha each
 - Rainfed Rice-Based Farming: 2 places 10 ha each
- 2) Corn-Based Farming Development: 2 places 10 ha each
- 3) Coconut-Based Farming Development: 2 places 15 ha each
- 4) Abaca Development: 2 places 15 ha each
- 5) Hillside Farming/Agro-Forestry Development: 2 places 10 ha each
- 6) Livestock Development
 - Gandara Animal Breeding Center: existing
 - Animal Diagnostic and Treatment Center: 1 place
 - Carabao Dispersal Module: 2 Brgys 11 heads each
 - Goat Dispersal Module: 2 Brgys 25 heads each
 - Duck Dispersal Module: 2 Brgys 50 heads each
- 7) Nursery Development
 - Gandara Seed Farm: existing
 - Nursery Station: 2 places
 - Crop Protection Observation Stand: 4 places
- 8) Freshwater Fish Culture Development
 - Freshwater Fish Hatchery Station: 1 place
 - Backyard and Rice-Fish Culture: 2 Brgys

1.4.2. Agricultural Facilities Development

- 1) Irrigation Development
 - Gravity Irrigation Area: 4 CISs total 205 ha
 - Pump Irrigation Area: 2 PIPs total 250 ha
- 2) Drainage Development
 - Drainage with Irrigation: 3 areas total 195 ha
 - Drainage of On-Farm: 7 areas total 115 ha
- 3) Rural Road Development
 - Improvement/Upgrading Road: 12 km
 - Rural Road: 27 km with 5 bridges
 - Trunk Farm Road: 6 km with 1 bridge

4) Rural Water Supply Development

- San Jorge/Gandara Water Supply System:
 - Service population 11,259³
 - Daily max. demand 1,043 m³
 - Transportation pipeline 20km

5) Rural Electrification

- Energize:
 - 15 Brgys 830 households
 - Distribution line 30.3 km
 - Secondary line 10.5 km

6) Rural Health Development

- Solar Powered Cold Chain: 4 places

7) Development of Farmhouse

- Model Farmhouse: 2 houses

1.4.3. Development of Post Harvest and Marketing Service Assistance

1) Post Harvest

- Pedal/Small scaled power threshers and Power corn shellers.
- Multi-purpose dry-pavement and mechanical dryer
- Small scaled rice mill
- Coconut dryer, charcoal kiln and chain/disc saw

2) Marketing Service Assistance

- Marketing research assistance
- Tracks
- Meat cold storage

1.4.4. Development of Farmer's Organization

- Beneficiary farmer's organization for O & M
- Cooperative managerial organization for demonstration farms and agricultural-related programs

1.4.5. Agricultural Development and Promotion Center (ADPC)

- Office for managing all activities of ADPP
- Workshop and garages of agricultural machinery

- Laboratory for soil analysis and inoculants and seed analysis
- Training and extension
- Rural health unit
- Agricultural meteorological station
- Others

Table 1.3.1. Average Land Holding Area and Actual Cultivated Area by Type of Crop Production

	Land Holding Area (ha)		Actual Cultivated Area (ha)		Remarks
	Max.	Min.	Max.	Average	
Mainly Palay Production Area	26.0	0.6	24.0	1.3	10 Barangays
Mainly Corn Production Area	20.0	1.2	14.0	2.2	7 Barangays
Mainly Coconut Production Area	32.0	3.3	30.0	3.3	10 Barangays

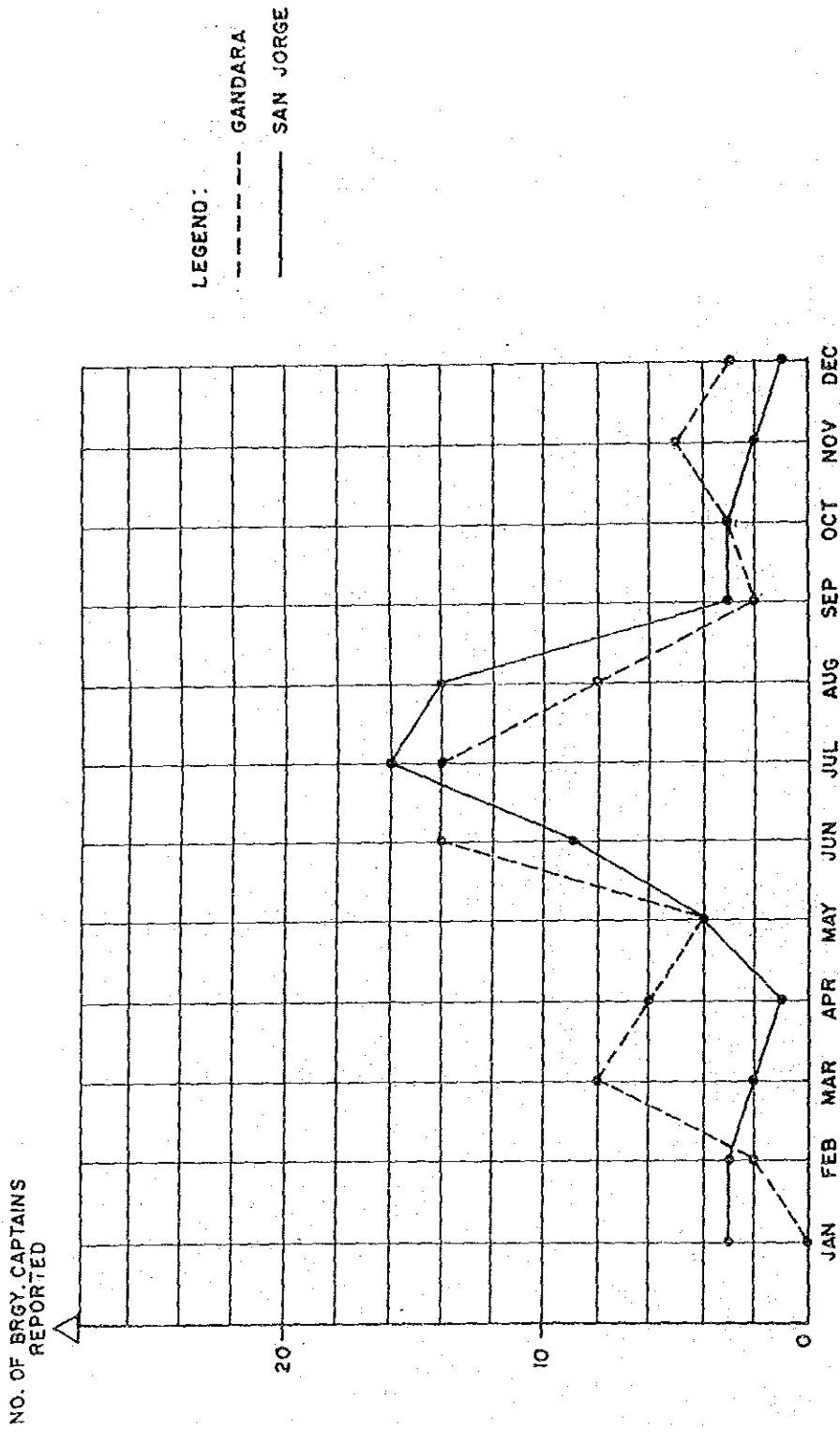
Source: Farm economy survey conducted by Study Team

Table 1.3.2. Crop Disposal by Tenure Status

Crop	Tenure Status	Disposal (%)				Payment to Land Owner
		Sale	Family Consumption	Seed		
Paddy	Owner-Cultivator	15	80	5	-	
	Part-Owner	40	50	5	5	
	Tenant	50	25	-	25	
Corn	Owner-Cultivator	90	8	2	-	
	Part-Owner	80	10	5	5	
	Tenant	50	25	-	25	
Coconut (copra)	Owner-Cultivator	100	-nil-	-nil-	-	
	Part-Owner	95	5	-nil-	-	
	Tenant	60	-nil-	-nil-	40	

Source: Farm economy survey conducted by Survey Team

FIGURE 1.3.1. RICE PURCHASING PATTERN IN ADPP AREA



NOTE: THE PURCHASING PRICE OF RICE IS 6-8 PESOS/KG. IT IS PURCHASED NORMALLY FROM SARI-SARI STORES.

SOURCE: FARM ECONOMY SURVEY CONDUCTED BY STUDY TEAM. TOTALLY 27 BARANGAY CAPTAINS ARE INTERVIEWED.

CHAPTER 2. AGRICULTURAL DEVELOPMENT

CHAPTER 2. AGRICULTURAL DEVELOPMENT

2.1. Present Agriculture

2.1.1. Topography, Soils and Land Use

The ADPP area presents a typical topography of the Samar province with considerable heavy unduration and narrow lowlands. The peak elevations of the hilly lands are about 50 to 150 m. The slope of lowlands are less than three percent, which are situated along the Gandara River or tributaries with the elevation below five meters above MSL.

Land system and soil series in the ADPP area is classified as follows:

Land System and Soil Series

<u>Land System</u>	<u>Major Soils</u>
i) Gandara (Major alluvial lowland)	San Manuel Clay Loam Bigaa Loam
ii) Agda (High sedimentary hills)	Catbalogan Clay Loam Faraon Clay

The soils of San Manuel Clay Loam are the most productive soils located along the river courses or in the plains formed by streams and classified into the "very good land" which can be cultivated without any limitations (See Appendix D). The Bigaa soils are classified into the "good land". However, the soils of Catbalogan Clay Loam and Faraon Clay are classified into "moderately good land" and "fairly good land", respectively. These lands require careful management and intensive conservation practices, suited for permanent crop with erosion control measures or for pasture and forest.

More than half of the lowland area are left as the swampy grass land. It is assumed that one of the major reasons for the existence of such large scaled idle land will be poor soil conditions even though the related data are not available. The lowlands with low elevation are exclusively utilized to grow paddy during wet season, while paddy and diversified crops like corn are planted during the dry season in the less area than that in the wet season. The elevated lowlands with the elevation above two meters are usually planted with corn, peanut, mungbean etc. in the dry season and with corn in the less areas during wet season due to poor drainage condition.

The land use study on the basis of the 1/5,000 topography map and the related data reveals that there are about 9,000 ha of the gross area in the ADPP area and the area comprise 1,000 ha of paddy field, 540 ha of corn land, 800 ha of coconut land, 40 ha of Abaca land and 6,620 ha of grass land, etc. (refer to Table 2.1.1)

2.1.2. Land Tenure

According to the DAR team office which administers the ADPP area as a part of their jurisdiction area, about 1,200 ha of paddy field is identified as the land transfer operation areas under the land reform program implemented through the Presidential Decree No. 27 enacted in 1972. However the area of only 6.8% were operated by the program as of May 1987. In the ADPP area, about 300 ha of paddy field and 130 ha of upland fields are programmed as the area of the land transfer operation. Consequently it shows that more than 30% of land under paddy and corn cropping in the ADPP area is subject to the land transfer program. It seems that not only the other farm land like coconut land and also the large scaled open grass land (hilly lands) are possessed by the absentee landlord. These coconut land and the open grass land are not utilized efficiently for the agriculture. This may be attributed by the above land tenure status (refer to Table E.1.2. in Appendix E).

2.1.3. Cropping Pattern and Crop Production

The shifting farming is traditionally practiced in most hilly land to a great extent, which makes the land use very extensive. Burning of the hilly land disturbs establishment of perennial crops. The rice-based farming is practiced in the lowland paddy area almostly under rainfed conditions. In the elevated lowland, the corn-based farming is exclusively employed. The coconut plantation is extensively developed with small density of coconut trees in the hilly area. Abaca plantation area is counted at 41 ha. During the field survey, the following constraints of crop production are found;

- The poor irrigation and drainage conditions and poor road systems hampered the agricultural development, especially the efficient land utilization and production efficiency. Then, crop harvests are vulnerable to damages of drought and flooding year by year.
- A shortage of draft animals causes the delay in the timely cultivation of paddy and corn which not only decreasing the yield due to late planting but also decreasing the cropping intensity.
- The use of certified seeds is limited. One of the reasons for it, is that the result of seed analysis is not obtained timely due to its far distance of the Regional Seed Analysis laboratory.
- The appropriate information of soils is lacking because the soil analysis are not available in the province.
- The extension services to the farmers are inadequate, especially in the remote Barangays where no access roads are available. In the entire area of San Jorge, composed of 41 Barangays, only four extension service staff inclusive of the Municipal Agriculture and Fishery Officer are assigned.
- The present crop production is estimated at about 1,900 tons of paddy, about 800 tons of corn, and about 130 tons of peanuts and other upland crop and 220 tons of coconut (copra) on the basis of the cropping intensities and unit yields (refer to Table 2.1.2).

2.1.4. Livestock and Freshwater Fish Culture

The average number of draft carabao per farm household is estimated at 0.5 to 0.6 heads according to the Municipal Agriculture and Fishery Offices and is considerably deficient for farming. It is reported that the common cause of carabao death is due to diseases which happen oftenly. One of the commonly prevailing diseases is "Liverfluke". It is because of non-availability of Animal Diagnostic and Treatment Laboratory in the province. The average number of swine and chicken varies between 1.4 and 8.9 heads per household according to the SIRDP-JICA farm management survey. The demand-supply balance on the province-wise shows that there is a large amount of deficiency in the supply of meat and eggs. Establishment of hatchery and nursery pond was tried at Barangay Diaz by DA, but the construction was stopped due to unavailability of fund (refer to Table 2.1.3).

2.2. Basic Concept of Agricultural Development

The basic concept of agricultural development is formulated to meet the target of the short term development programed in the Master Plan, taking into account the natural and socio-economic conditions, the opinions of inhabitants, and governmental policies as follows;

- To secure attainment of self-sufficiency in the supply of basic food.
- To stabilize the farm management by development of the multiple farming for avoidance of the typhoon/flood damages and maximization of the land/water utilization.
- To speed up the agricultural development by applying the on-farm trials and demonstration for the improvement of productive technology and for the introduction of new cash crop, livestock and poultry. (e.g. black pepper, coffee, fruit trees, vegetables, goat, duck, mushroom, and freshwater fish, etc.).
- To eliminate the bottleneck of the agricultural development at Barangay level with the assistance and coordination of the SIRDP office.

Table 2.1.1. Present Land Use

Land Category	Area (ha)	Remarks
1. Paddy Field	1,000	
- Irrigated	270	Non-functional
- Rainfed	730	
2. Corn Land	540	
3. Coconut Land	800	
4. Abaca Land	40	
Sub-Total	2,380	
5. Grass Land, etc.	6,620	
<u>Total</u>	<u>9,000</u>	

Source: JICA/SIRDP Study Team

Table 2.1.2. Present Crop Production

Crop	Intensity (%)	Planted		Production (ton)
		Area (ha)	Yield (ton/ha)	
1. Irrigated Paddy (270 ha)	(120)	320		512
- Paddy (Wet)	80	210	1.6	336
- Paddy (Dry)	40	110	1.6	176
2. Rainfed Paddy (730 ha)	(120)	870		1,392
- Paddy (Wet)	80	580	1.6	928
- Paddy (Dry)	40	290	1.6	464
3. Upland Field (540 ha)	(180)	970		
- Corn (Wet)	80	430	1.0	430
- Corn (Dry)	70	380	1.0	380
- Peanuts, etc.	30	160	0.8	128
4. Coconut Land (800 ha)				
- Coconut	100	800	0.4	220
5. Abaca Land (40 ha)				
- Abaca	100	40	0.4	16

Note: (1) The same cropping intensity and yield to these for the rainfed paddy are applied to estimate paddy production in the irrigated paddy because the irrigation facilities are not functional.
 (2) The coconut production are estimated on the basis of the assumed.

Table 2.1.3. Population and Death of Carabao

Year	Gandara			San Jorge		
	Population	No. of Death	Cause of Death	Population	No. of Death	Cause of Death
1983	5,799	110	Hemmorogic Septemia Internal parasites	426	172	Leverfluke Hemmorogic Septemia
1984	5,544	186	Hemmorogic Septemia Liverfluke	655	98	Hemmorogic Septemia
1985	5,543	98	Hemmorogic Septemia Liverfluke	814	105	Hemmorogic Septemia
<u>Average</u>	<u>5,685</u>	<u>137</u>		<u>707</u>	<u>109</u> ^{*1}	

Note : *1 ... It is estimated that the number of carabao is 0.55 head per farm household, based on 1279 of total farm household in 1988.

Source: DA, Samar Province

- To utilize as much as possible the existing organizations and institution for the agricultural development in the manner of the integration through effective training and development/improvement of the facilities and transportation.
- To strengthen and develop the basically needed agricultural facilities to serve the farmers in the ADPP area for the agricultural development.

2.3. Agricultural Development Plan

2.3.1. Rice-Based Farming Development

It is proposed that the two demonstration farms of the irrigated rice-based farming shall be established with a scale of one turn-out coverage area (about 25 ha) each on a part of the rehabilitating La Paz CIS, and another on the proposed pump-irrigation area in Bulao. The objective of the demonstration farms is to improve the rice-based farming system through efficient and equitable water distribution and an adherence to the scheduled cropping calendar which avoid severe flooding caused by late planting. Furthermore, it is proposed to introduce the irrigated diversified crops (like vegetables) during the dry season on a part of the service area and to improve other farming practices. Not only intensive technical support by the ADPP staff with the assistance of DA and NIA but also the supply of quality seeds, farm inputs and small-scaled farm machinery on the amortization basis shall be extended.

In the rainfed paddy areas, a similar demonstration farms shall be established as to improve the rainfed rice-based farming system through the development of on-farm drainage facilities and the introduction of diversified crops like mungbean during the dry season. Two demonstration farms with each about ten ha would be established in each of two Barangays.

Table 2.2.1. Agricultural Development Facilities

Facilities	Purpose	Location
1. Motor Pool and Workshop for Tractor	- To provide tractor services	ADPC
2. Soil Test Laboratory with soil Inoculants and Mushroom Spawn Units	- To test soils and produce soil inoculants and mushroom spawn	ADPC
3. Seed Analysis Laboratory	- To analyze seed	ADPC
4. Crop Protection Facilities	- To serve for crop protection with emphasis on surveillance and early warning system.	ADPC and three Barangays
5. Training and Extension Facilities	- To train the leaders of farmers' organization and others.	ADPC
6. Gandara Breeding Center (Strengthening)	- To supply stock animals and serve for artificial insemination	Existing
7. Animal Diagnostic and Treatment Center	- To provide veterinarian services	Gandara Breeding Center
8. Municipal Nursery	- To supply planting materials like trees and fast growing trees, etc.	Poblacion of San Jorge and Gandara
9. Freshwater Fish Hatchery	- To supply fingerlings of fresh water fish	Blanca Aurora
10. Abaca Seed Bank	- To multiply the improved varieties seedlings	Buena Vista

2.3.2. Corn-Based Farming Development

Two sites of the corn-based farming system demonstration farm with ten ha would be established in the strategic corn land areas, aiming to improve the system through decreasing the late planting area, application of crop rotation and other improvement of farming practices. Almost similar assistance to that of the rice-based farming development for the cooperative farmers shall be provided, including large tractor's service for the group use.

2.3.3. Coconut-Based Farming Development

The coconut-based farming farmers shall be selected in the designated land of about 15 ha for the multi-story cropping demonstration farms in each of two Barangays. The coconut farmers should be able to avail the multiple cropping with such crops as corn, upland rice, peanut, mungbean, root crops, ginger, black pepper, coffee, etc. in the new coconut plantation area of coconut rehabilitation area with quality varieties. PCA have implemented to establish various demonstration projects on the coconut-based farming inclusive of the multi-story cropping in different parts of the country. However, a few demonstration projects are placed in the ADPP area and its vicinity due to lack of fund.

2.3.4. Abaca Farming Development

The existing abaca varieties are not high yielding varieties. The introduction of the high yielding varieties coupled with the improvement in the fiber extraction process by using spindle stripping machines, is envisaged to increase the farm income in the remote areas. About 15 abaca demonstration farms shall be established in two Barangays. The proposed Abaca Seed Bank of 5.0 ha acreage as the abaca seedling farm shall be developed at Barangay Buenavista in order to supply high yielding abaca seedlings. The transferable technology on abaca farming have been developed by FIDA adequately.

2.3.5. Hillside Farming/Agroforestry Development

Although the technology of hillside farming and agroforestry is not yet established fully, the substantial steps to develop the technology is quite important because the sloping lands more than 15% of slope which are occupied about 50 percent of the ADPP area. Most of the sloping lands are left as the non-productive grass lands, where the traditional shifting farming is prevailing. The hill side farming shall be able to be employed in less sloping areas, while in the steeper lands agroforestry program should be introduced.

Nowadays a number of the hillside farming/agroforestry-based upland projects are being implemented in different parts of the Philippines. It is the subject of thorough research at the Forest Research Institute of UPLB as well as Visayas State college of Agriculture and BFD among the others. Though the DA of Samar province have proposed to implement the research/demonstration projects on the hillside farming in various places with technical assistance from above said institutions, no budget have been allocated to establish the projects in the ADPP area and its vicinity. Therefore, two demonstration farms of each 10 ha shall be established for hillside farming and for agroforestry in the ADPP areas as a show window of the slope land farming technology.

To avoid typhoon damages especially to the perennial crops inclusive of coconut, abaca, cacao and fruit trees, it is necessary to develop the windbreak forest belt in the significant locations to protect crops from strong wind damages.

2.3.6. Livestock Development

The utmost priority of the proposed livestock development plan should be given to the carabao dispersal to carabao-less farmers. Two carabao dispersal modules shall be established in two identified

Barangays. A male and ten female carabaos would be disposed to ten recipients in each module. To implement the carabao dispersal program, the close coordination with PCARRD should be made regarding the carabao improvement and multiplication. As the carabao are vulnerable to suffer from various diseases in the ADPP area, special attention on the disease control should be taken.

To minimize carabao butcher for meat, there must be alternative source of meat. To this, the dispersal of goat and poultry (duck and cockerel) is recommended in the livestock development plan. The recipients farmers of the dispersal program shall be selected under some guideline and agreement, where the dispersed animals and poultry are paid back in kind from their offspring. The repaid livestock and poultry shall be redispersed again to the other expansion areas of the program. (refer to Table 2.3.4)

The Gandara Breeding Station shall be strengthened to multiply the livestock and poultry sufficiently by means of increasing the stock animals and introducing artificial insemination equipment. To minimize outbreak of livestock disease it is proposed to establish an animal diagnostic and treatment center in the Gandara Breeding Station.

2.3.7. Freshwater Fish Culture Development

Under this program, two Barangays were selected as a pilot for the introduction of freshwater fish culture inclusive of rice fishculture through establishment of a hatchery station with nursery ponds, aiming to supply fish protein in the remote areas.

2.3.8. Proposed Cropping Pattern and Crop Production

The crops and cropping pattern which are indicated in Table 2.3.1 are proposed to apply in the ADPP area, following the proposed agricultural development strategy in the Master Plan. The crop

production for the proposed cropping pattern is estimated as shown in Table 2.3.2, where the cropping intensity in the paddy field is 180% with the target yield of 3.5 ton/ha and the production increase of other crops are also expected in case of "with ADPP (short term plan)". (refer to Table 2.3.4)

2.3.9. Proposed Agricultural Development Scheme

1) Demonstration farms

Relating to the proposed agricultural development plan, it is proposed to establish six kinds of on-farm demonstration scheme for the improvement of the existing farming systems under ADPP. The farm scale and the proposed location by scheme are shown in Table 2.3.3. Also it is proposed that the livestock development scheme in Table 2.3.4 will be implemented. The qualified participants of these schemes will be selected by farmers organizations in each strategic Barangays, where the whole Barangay people including tenants and small farmers are involved. Principally the participants must pay back from the their produces for the distributed farm facilities and materials or livestock and poultry. The breakdown of equipment and farm inputs of the schemes are listed up in Table 2.3.5.

2) Agricultural development facilities

For the execution of the proposed agricultural development, it is proposed to strengthen and develop the agricultural facilities as shown in Table 2.3.6. The purpose for the provision of the facilities as well as the proposed locations are also shown in the Table for each facility. Such facilities and equipment shown in Table 2.3.6 will be required in each agricultural development facility. The requirement of staff for each facilities are estimated as shown in Table 2.3.8.

Table 2.3.1. Estimated Cropping Intensity and Yields

Land/Crop	1987 (Present)		1992 (Short)		2007 (Long)		Remarks
	Intensity (%)	Yield (ton/ha)	Intensity (%)	Yield (ton/ha)	Intensity (%)	Yield (ton/ha)	
1. Rainfed Lowland (1,000 ha)			(545 ha)		(455 ha)		
- Paddy (Wet)	80	1.6	90	1.8	80	2.0	
- Paddy (Dry)	40	1.6	40	1.3	40	2.0	
- Legumes (Mungbean)			10	0.6	10	0.8	
2. Irrigated Lowland			(455 ha)		(455 ha)		
- Paddy (Wet)	0 ^{a/}	-	100	3.5	100	4.0	a/ Excluding about 270 ha of the total irrigation service area due to the non-functional facilities
- Paddy (Dry)	0 ^{a/}	-	60	1.5	60	4.0	
- Vegetables (stringbean)		5.0	20	7.0	20	10.0	
3. Corn Land (540 ha)			(640 ha) ^{b/}		(640 ha) ^{b/}		b/ It is assumed that about 100 ha of corn land will be developed through development of road networks.
- Corn (Wet)	80	1.0	100	1.5	100	2.5	
- Corn (Dry)	70	1.0	60	1.5	60	2.5	
- Legumes	30	0.3	40	0.9	40	1.2	
4. Coconut Land (800 ha)			(900 ha)		(1,000 ha) ^{c/}		c/ It is assumed that about 200 ha of coconut land will be developed through development of road networks.
- Coconut	100	0.4	100	0.8	100	1.5	
- Corn/Upland Rice	0		10	1.5	10	2.0	
- Legumes (Peanut)	0		10	0.9	10	1.2	
- Root Crops (Sweet Potato)	0		10	5.0	10	8.0	
- Perennial crops (Black Pepper)	0		10	0.3	10	0.5	
5. Abaca Land (400 ha)			(40 ha)		(200 ha)		d/ Replanting into HYV
- Abaca	100	0.40	100	0.6 ^{d/}	100	0.8	
6. Hillside Farming (Agro-forestry) (30 ha)			(30 ha)		(300 ha)		
- Corn/Upland Rice			10	1.5	10	2.0	
- Root Crops (Cassava)			20	7.0	20	12.0	
- Fruit Trees (Pili)			10	-	10	1.5	
- Fast Growing Trees			60	-	60	-	

Table 2.3.2. Crop Production (Short Term)

Crop	Intensity (%)	Planted		Yield (ton/ha)	Production (ton)
		Area (ha)	Area (ha)		
1. Irrigated Paddy (455 ha)	180	819			3,186
- Paddy (Wet)	100	455	3.5		1,593
- Paddy (Dry)	60	273	3.5		956
- Vegetables, etc. (Stringbean)	20	91	7.0		637
2. Rainfed Paddy (545 ha)	130	709			1,031
- Paddy (Wet)	80	436	1.5		654
- Paddy (Dry)	40	218	1.5		327
- Legumes (Mungbean)	10	55	0.9		50
3. Corn Land (640 ha)	200	1,280			1,766
- Corn (Wet)	100	640	1.5		960
- Corn (Dry)	60	384	1.5		576
- Legumes	40	256	0.9		230
4. Coconut Land (900 ha)	104	1,260			1,053
- Coconut	100	900	0.8		360
- Corn/Upland Rice	10	90	1.5		135
- Legumes (Peanut)	10	90	0.9		81
- Root crops (Sweet potato)	10	90	5.0		450
- Perennial Crop (Black pepper)	10	90	0.3		27
5. Abaca Land (40 ha)	100	40	0.6		24
6. Hillside Farming/ Agroforestry (20 ha)	100	20			31
- Corn/Upland Rice	10	2	1.5		3
- Root Crops (cassava)	20	4	7.0		28
- Fruit trees	10	2	-		-
- Fast growing trees	60	12	-		-
Total				3,908	6,468

Table 2.3.3. List of Demonstration Farm (Crops)

Item	Area (ha)	Equipment and Farm Inputs	Location
1. Rice Based Farming			
(1) Irrigated Rice-Based	20-30 x 2	Power riller, Power sprayer, Power thresher	1) La Paz, San Jorge...(S)
(2) Rainfed Rice-Based	10 x 2	Seeds, Farm inputs, post-harvest facilities	2) Bulao (S)
		Farm inputs, post-harvest facilities	1) San Jorge, Gandara...(G)
			2) Sapinit-Anquina
2. Corn-Based Farming	10 x 2	Tractor (customary service), Power corn shiler, seeds, farm inputs, Post-harvest facilities)	1) Poblacion (S)
3. Coconut-Based Farming	15 x 2	Seedlings, seeds of diversified crops	2) Cantaguic-Ranera (S)
		Farm inputs, Post-harvest facilities	1) Himai (S)
4. Abaca Cultivation	15 x 2	Seedlings, seeds of diversified crops, Farm inputs, stripping machine	2) Canyaki (S)
5. Hillside Farming/ agroforestry	10 x 2	Seedlings, seeds, farm inputs	1) Tomogbong (S)
6. Freshwater Fish Culture		Fingerlings	2) Pologon (G)
			1) Tomogbong (S)
			2) Cantaguic-Ranera (S)

Table 2.3.4. List of Livestock/Poultry Dispersal

Item	Dispersal Livestock/Poultry	Location
1. Carabao Module	10 female and one male carabao (3 years old) per 10 recipients	1) Hinogacan (G) 2) Rosalim (S)
2. Goat	21 heads per 10 recipients (20 female and one male)	1) Rawis (S) 2) Sinibaran (S)
3. Duck	50 heads per 10 recipients (40 female and one male)	1) San Miguel (S) 2) Sinibaran (S)
4. Broiler Cockerel	20 heads per 10 recipients	1) Pubagan (S) 2) Ngoso (G)

CHAPTER 3. AGRICULTURAL INFRASTRUCTURAL DEVELOPMENT

CHAPTER 3. AGRICULTURAL INFRASTRUCTURAL DEVELOPMENT

3.1. Irrigation Development

3.1.1. Present Condition

The climatic conditions such as uniform rainfall distribution, temperature, humidity and etc. are suitable for agriculture throughout a year except during typhoon with heavy rainfall.

Most of the existing paddy fields in the ADPP area located at the low lying area, has an elevation below five meters above the mean sea level (MSL). Those low lying areas located along both bank of the Sapinit River, the Baga Oring creek, the Sinibaran River and the Buenavista River, are very flat.

Almost all low lying areas in the ADPP are infected by schistosomiasis. The endemic area of schistosomiasis has spread after inundating the areas because the standing water is favorable conditions as an intermediate host of cercaria to multiply snails.

High water level of Gandara River occurred during the period of flood time by typhoon in November and December, was recorded at above five meters above MSL at the ADPP area, and a duration of the high water level was for more or less one week on Gandara River. The high water of Gandara River influences to the low lying areas as back water. The influenced water in the areas, therefore, stagnates for more or less three weeks. It is one of reasons that the capacity of the existing creeks is comparable small to drain stagnant water in the field.

Quantity and quality of water in Gandara River are suitable for irrigation in the ADPP area throughout a year. No salinity and adequate acidity (pH of 6.6 to 7.6) of water in the river are observed even at the high tide time and in the drought month.

3.1.2. Basic Concept of Irrigation Development

1) Rehabilitation of existing CISs

There are four CISs to be rehabilitated in the ADPP area, namely La Paz CIS (180 ha in the potential area), Quezon CIS (20 ha), Aurora CIS (35 ha) and San Agustin (35 ha). Among them, high priority would be given to the former three CISs on rehabilitation of the irrigation system including diversion dams damaged by typhoon and canal networks. The latter, San Agustin CIS is located at flat area with an elevation of about 1.25 meters above MSL, therefore, a rehabilitation by heightening the diversion dam is not recommended due to submergence of farm land at upstream.

2) Introduction of gravity irrigation system

The land slope of the area to be irrigated in the ADPP area, is very flat with elevation nearly zero meter at the middle reach of the existing creek. When the intake facility will be constructed at the said low lying area, the field at the upstream will be submerged during the irrigation. The suitable site to construct the proposed intake facility, therefore, would be near the foot hill.

3) Rehabilitation of pump irrigation facilities

There are eight pump irrigation systems (PIPs) constructed by the former FSDC along Gandara River in the ADPP area. All pumping stations are not operational now, because of damage by flood, shortage of repairing cost, etc. Beneficiaries of PISs have a willingness to repair the present facilities. The hydrological condition of Gandara River, especially high flood level, should be considered to plan pump irrigation systems in the ADPP area.

To meet the requirement of the said pumping system, the pump would be selected as "inclined pump", "electric motor drive", 12 inches diameter (about 300 mm), 15 m head, 55kw motor capacity, and $14 \text{ m}^3/\text{sec}$ (3,700 USGPM) pump capacity.

4) Introduction of small pump irrigation facilities

Almost all low lying areas with flat slope and low elevation are submerged at least once a year, especially in November and December, due to the high water level of Gandara River. When a feeder canal is provided in the area, it is easy to lift up irrigation water by portable/movable pump equipment. The proposed pump equipment can be operated by an engine and the weight of the equipment is not so heavy to remove it to the elevated area in order to avoid submergence of the equipment during the period of the high water level.

The proposed pump facility would be 5 inches (about 125 mm) diameter, about 10 m head, 1.2 m³/min. capacity and 150 to 200 kg weight. The maximum irrigable area is proposed at about 15 ha paddy field.

3.1.3. Irrigation Development Program

Based on the basic concept of the irrigation development in the ADPP area, the areas shown in Table 3.1.1 are listed up for the irrigation development program.

Table 3.1.1. Proposed Irrigation Program

<u>Name of Project</u>	<u>Outline of Facilities</u>	<u>Acraage</u> (ha)
<u>Gravity Irrigation System</u>		
La Paz CIS	to be rehabilitated (now under rehabilitation by NIA)	145
Queson CIS	to be rehabilitated (rehabilitation of an existing check gate, new construction of a check gate at the down stream of existing one and on-farm facilities)	30
Aurora CIS	to be rehabilitated (Rehabilitation of a check gate and on-farm facilities)	10
Pologon CIP	new construction (Provision of a check gate and on-farm facilities)	20
<u>Sub-total</u>		<u>205</u>
<u>Pump Irrigation System</u>		
Bulao PIP	to be rehabilitated (Water taken from the Gandara river by an inclined pump with motor drive)	130
Bulao south PIP	new construction (Provision of portable and movable small pumps along the Baga Oring creek)	120
<u>Sub-total</u>		<u>250</u>
<u>Total</u>		<u>455</u>

Table 3.2.1. Proposed Drainage Program

<u>River Basin</u>	<u>Brgy. Name</u>	<u>Project Area</u> (ha)	<u>Remarks</u>
1. Gandara river	La Paz	85	Duplicated with irrigation area
2. Ngoso creek	Bulao	95	- do -
	Pologon	15	7 ha, - do -
	<u>Sub-total</u>	<u>195</u>	
3. Gandara river	Buena Vista	30	Only drainage development
4. Buena Vista river	Ranera	5	- do -
	Anquiana	20	- do -
5. Sapinit river	Sapinit	20	- do -
	Rosalim	15	- do -
6. Ngoso creek	Diaz	20	- do -
	San Agustin	20	- do -
	<u>Sub-total</u>	<u>115</u>	
	<u>Total</u>	<u>310</u>	

Table 3.2.2. Location of Proposed Observatories

<u>Water Level Gauging Station</u>	<u>Rainfall Gauging Station</u>
1. Gandara poblacion	1. Gandara poblacion
2. Santo Niho on the left river	2. Brgy. Pologon
3. Middle reach of the Sapinit river	3. Brgy. Janipon
4. Janipon on the Buena Vista river	
5. Bulao on the Gandara river	

3.2. Drainage Development

3.2.1. Present Condition

1) Flood condition

The present drainage system in the ADPP area consists of the Gandara River basin and basins of its tributaries which are named as the Buenavista River including a tributary of the Sinibaran River, the Sapinit River including the Baga-Oring creek and the Ngoso creek. The drainage areas of those river basins are composed of two kinds of areas such as a hilly area with steep slope and a low lying area with flat level. The elevation of the highest portion of the hilly area is ranging from 50 to 150 m above MSL and the low lying area from zero to five meters above MSL which are partially cultivated as a paddy field or a corn field.

The ADPP area is placed under poor drainage conditions when the heavy rain caused by typhoon will cover the Gandara River basin. Water level of the river was risen up to four to five meters above MSL and the duration of its high water level was about one week. During the period, much excess water came into the low lying area and its inundation period was for two to three weeks at the area.

There is no gauging station in the area before starting the Master Plan Study by JICA on April, 1987. The gauging station for rainfall and water level data in order to analyze flood condition, has been constructed by JICA at Barangay Blanca Aurora in 1987. No other gauging station is available in and around the ADPP area. The observation of meteorological conditions should be started as soon as possible for the future studies to control flood of Gandara River, and also survey results of longitudinal profile and cross sections of Gandara River and its tributaries should be prepared prior to the flood control analysis of the river.

To solve this inundated conditions during the flood, the flood control analysis should be carried out based on the actual meteorological and hydrological observation data such as rainfall, water level at several points in the Gandara River basin and also geographical data like cross section and profile of not only the Gandara River but also its tributaries. It is necessary so long time to observe the flood conditions of the Gandara River for detail analysis of flood conditions. The observation period should be more than 20 years.

2) Schistosomiasis control

This poor condition is producing an environment to multiple snails as an intermediate host of schistosomiasis. The schistosomiasis is one of the big problems of farmers and inhabitants to decreases the man power of farmers in the ADPP area. The snails are spread over the low lying area by inundation water which transport those snails from the several colonies to almost all low lying area. The snail colonies are located at the lower portion with inundation water during the drought months from January to May due to lack of drainage canals as on-farm level.

The drainage development in the ADPP area aims at gaining the quick return for farmers and is defined as counter-measure to reduce schistosomiasis infected areas and number of cases of schistosomiasis. Regarding life cycle of schistosomiasis, by decrease of the snails, the number of victims will be reduced in cooperation with other treatment such as medical check up, prescription, and etc. The ill drainage conditions should be dissolved as soon as possible after finishing high flood at Gandara River.

3.2.2. Drainage Development

The drainage development in the ADPP area targets to reduce the number of schistosomiasis victims and to improve living environment of farmers' families and inhabitants in/around the area.

On the other hand, the observation of the meteorological conditions of Gandara River basin and its tributaries in the river basin is also important for the future analysis of flood control.

The flood control of Gandara River, however, needs huge amount of the project cost and long time for implementation of flood control program. In the development programs of ADPP, therefore, it is proposed that introduce of farm drains as on-farm facilities to reduce the schistosomiasis endemic area and establishment of observation network system related to flood of Gandara River.

1) Drainage development as schistosomiasis control

The component of the drainage development is to provide drainage canals with wooden pavement as on-farm facilities. The vertical side slope of drainage canal is effective to destroy the circumstance of living conditions for snail because snails usually can not live in the deep water area without vegetation.

Based on the field survey by DOH, the colony areas for the drainage improvement are found at ten Barangays in the ADPP area. The three colonies of schistosomiasis overlap the proposed irrigation development areas.

2) Drainage development on flood control

Considering the present flood condition, the following five proposed water level gauging stations and three rainfall gauging stations would be established in/around the ADPP area for the future studies. The observation, O & M works and data base of the collected data should be done by SIRDPO. (refer to Table 3.2.2)

3.3. Rural Road Development

3.3.1. Present Condition

The total length of existing roads in the ADPP area is about 26 km including 16 km of the road length of Maharlika Highway. The existing road density of the ADPP area is 0.28 km/km^2 (or 2.10 km/1,000 persons). The road density on the provincial level is 0.16 km/km^2 (or 1.63 km/1,000 persons). At the national level, the road density is 0.34 km/km^2 (or 2.6 km/1,000 persons). Thus, the road density of the ADPP area is placed between these two levels. However, the road density excluding the length of Maharlika Highway is lower than those of the two levels. It means that the road development in the ADPP area is left undeveloped.

However, there are many isolated/remote Barangays in the ADPP area. It requires comparatively high public investment for construction of roads in the area due to topography of the ADPP area composed of many rivers and hilly lands.

Many Barangays in the ADPP area are not accessible by roads except river transportation. Furthermore, road maintenance in the area is insufficiently carried out by DPWH and the Provincial Engineering Office at present due to shortage of quality equipment and budget for maintenance.

3.3.2. Basic Concept of Development

The development concept is to improve the accessibility from the poblacion to Barangays for transport of the input and output of agriculture, for implementation of development projects including the facilities of irrigation and drainage, water supply and rural electrification, and for linking educational facilities and medical/health facilities.

Particularly, the provision of the farm to market roads is primarily needed for the ADPP. The formulation of road network and the decision of road alignment are made on the basis of the following consideration;

- all Barangays are connected each other with roads as much as possible,
- proposed roads should be free from the damages caused by flooding and soil erosion,
- all proposed roads should be paved by gravel as all weather roads,
- the existing Barangay roads should be rehabilitated or upgraded due to the poor conditions.

The trunk farm road is proposed to take the way in the area of the large scale cultivating lands with irrigation facilities for the purpose of efficient supporting the agricultural productivity.

3.3.3. Components of Development

The cross section and alignment of the proposed Barangay roads (farm-to market roads) are generally designed based on the standard criteria of DPWH. According to the future traffic volume assumption in this study, the daily traffic volume of all roads will be less than 100 vehicles except for Maharlika Highway and the provincial road section of between San Jorge and Buenavista in the ADPP area. Therefore, the all weather road with gravel pavement would be proposed.

Farm-to-market roads is expected at 26.5 km in total length and five bridges with approximately 140 m liner length and 106 culverts to be included. On the other hand, total length for the road improvement with new 18 culverts furnished is estimated at 11.9 km.

Upon the completion of all proposed roads, the total length roads will be 64.4 km in the ADPP area and the road density would be 0.72 km/km^2 or 4.41 km/1000 population (using the figure in 2007).

The trunk farm road with 3 m width is also proposed with 6 kilometers in length, one bridge and 25 culverts.

As for sufficient carrying out the maintenance of the road some road equipments such as graders, dump trucks and bulldozers will be required for the ADPP area. Especially, the proposed farm roads should be maintained by the farmers mass participation under the guidance of the ADPP staff.

Available sites for crossing the Gandara river are considered at La Paz and Buenavista. Among the two sites, La Paz site is recommended for the crossing point. A site of Buenavista will take the roundabout way for linking site of Buenavista will take the roundabout way for linking Barangays of La Paz, Mombon and Puhagan.

The road between La Paz and Buenavista on the right bank of Gandara river would play a very important role in the road network of Samar province by linking from poblacion on the remote area. During the development period of the beneficial area along the road, the aforementioned road should be constructed by DPWH.

3.4. Rural Water Supply Development

3.4.1. Present Condition

The existing water supply facilities of about 40 places have been constructed in the ADPP area as the Level I services and their water resources are groundwater or spring water. Those facilities of about 70% with a dependable water resource are not well functional, since the construction of those facilities is rather difficult and costly because of the hard lock pan formation. The water service rates of San Jorge and Gandara municipalities are about 10% and 18%, respectively. Under this conditions, it is difficult to receive potable water for their living in the most Barangays in the ADPP area. Especially, schistosomiasis has spread over the ADPP area wherein the infection rate of schistosomiasis reach to 83% in San Jorge and 35% in Gandara municipalities.

To solve the unfavorable environment, water supply development in the municipalities of San Jorge and Gandara is considered as one of the high priority project among the development components of ADPP. Fortunately, there is the Binubucalan spring in Barangay Tomogbong with a suitable water resource for the said water supply development.

3.4.2. Basic Planning

1) Water service area and population

The water service area consists of 17 Barangays out of 27 in the ADPP area. These Barangays are mostly located along the proposed transmission pipeline from Barangay Tomogbong to Gandara Poblacion through the service area. The remaining ten Barangays located far away the proposed transmission pipeline, are not involved in the proposed service area and the said area will be covered by other system in the future.

The water service population by the water supply facilities of ADPP is planned based on the projected population for the year 2007 as shown in Table 3.4.1.

2) Water demand

The service level of ADPP is planned as Level-II Service (communal faucet system or stand posts of the piped water). Water demand is scheduled at 80 liter per capita per day (lpcd) for public faucets of some household connection in poblacions of San Jorge and Gandara and at 60 lpcd for community faucets in Barangays based on the rural water supply standard in the Philippines. The public faucets will be provided at ADPC, the public hospital, government offices, schools, church and an agricultural community center.

The water demand is projected as shown in Table 3.4.2.

3) Water resource

Binubucalan spring located at about 800 m southeast Barangay Tomogbong is considered as the water source of the water supply and has sufficient water discharge with good water quality throughout the year. The elevation of the spring is on a 59.6 m above MSL. The spring will be able to supply full discharge by gravity to cover the whole service area.

3.4.3. Preliminary Design

The water supply system is preliminarily designed for three major facilities; intake facility, transmission pipeline, and distribution pipeline (refer to Figure 3.4.1.).

1) Intake facilities

The proposed two intake wells are installed at Binubucalan spring. Intake pipeline made of Ductile Cast Iron Pipe with 300 mm in diameter and 880 m in length, will be provided for transporting about 1,200 m³ per day of potable water to a receiving well in Barangay Tomogbong.

The raw water undergoes in dosing the pre-chlorine at the receiving well and measuring water quantities. The chlorination should be done daily for disinfection of raw water by using bleaching powder or hypochlorous acid.

2) Transmission pipeline

Safe water for drinking is transported to the service area through transmission pipeline by gravity system. The transmission pipeline with 250 to 150 mm in diameter and about 20 km in length is buried under the road. The service faucet should not directly connect to the transmission pipeline, however it can get water from the distribution pipeline to each Barangay.

Table 3.4.1. Service Population in the Year 2007

Municipality	Total Population	Water Service Population	Service Rate
San Jorge	8,186	5,412	66.1 %
Gandara	6,438	5,847	90.8 %
Total	14,624	11,259	77.0 %

Table 3.4.2. Water Demand in the Year 2007

Branch No.	Name of Barangay	Population in 2007 (P)	Household in 2007 (H)	Water Consumption 1/c/d	Average Consumption C per (P) x (C) cmd	Daily Max. Demand D max=C per x 1.3 cmd	Hourly Max. Demand H max=C per x 2.5 cmd
0	Binubucalan Spring	300	53	60	18.0	23	45
T1	Tombong	448	93	60	26.9	35	67
T2	Blanca Aurora	253	42	60	15.2	20	38
T3	Hiney	313	52	60	18.0	23	45
T4	Buena Vista I	300	50	60	18.8	25	47
T5	Buena Vista II	273	48	60	16.4	21	41
T6	Bulao	446	79	60	26.8	35	67
T7	Lapaz	133	18	60	8.0	10	20
T8	Mambon	446	74	80	35.7	47	89
T9	San Jorge (Pop. II)	506	84	80	40.5	53	101
T10	Marcol (Pop)	359	60	60	21.5	28	54
T11	Anguiana	300	61	60	18.0	23	45
T12	Sapinit	427	71	80	34.2	45	86
Ts	San Jose Reservoir	422	70	80	33.8	44	85
T13	San Jorge (Pop. I)	486	81	80	38.9	51	97
T14	San Juan						
T15	Erenas						
	T1-T15 Sub Total	5,412	936		370.7	483	927
T16	San Agustin	558	106	60	35.3	46	88
T17	Hinogacan	214	48	60	12.8	17	32
T18	Pologan	245	44	60	14.7	19	37
T19	Diaz	279	56	60	16.7	22	42
T20	Ngoso	553	102	60	33.2	43	83
Tg	Gandara Reservoir						
T21	Mirca (Pop)	1,017	162	80	81.4	105	204
T22	Danala-ang (Pop)	1,110	166	80	88.8	115	222
T23	Adela Heights (Pop)	890	131	80	71.2	93	178
T24	Borabod II (Pop)	951	169	80	76.1	99	190
	T16-T24 Sub Total	5,847	984		430.2	560	1,076
	T1-T24 Grand Total	11,259	1,920		800.9	1,043	2,003

FIGURE 3.4.1. WATER SUPPLY DEVELOPMENT PLAN

