(which comprise about 13% of the basin's total area), the grasslands and brushlands (although sometimes taken over by the plantations), and marshlands have natural-type vegetation.

2.4.2 Wildlife

No virgin or undisturbed forests remain in the study area due to its long history of exploitation. Although there is no commercial forest or permitted logging, illegal logging and kaingin farming are going on unabated. It may be considered that wildlife could not thrive under these conditions.

Table 2.5 lists the threatened, rare and endangered wildlife species in the Luzon, and Tables 2.6 and 2.7 enumerate the wildlife species probably found in the study area.

2.5 Economic Activities

2.5.1 Agriculture

The intensively cultivated areas or croplands comprise about 44% of the basin's areal extent and are covered by economic crops or cultivated-type vegetation.

Table 2.8 presents the Economic Crop Area and Production by Type of Crop in the Study Area. Tarlac and Pangasinan are part of the "Rice Granary" (Central Luzon) of the Philippines while Benguet particularly Baguio and La Trinidad are referred to as the "Salad Bowl" of the country. The chief occupation or employment source in the basin is agriculture.

2.5.2 Fisheries

Table 2.9 lists the area and production of fishery in the Agno River basin. In the study area, Pangasinan has the basin's coastline and the richest fishery resources. Aside from its natural marine, brackish and freshwater fisheries, it engages in extensive brackish water aquaculture (milkfish and prawn), oyster

culture, sea-weed culture, and freshwater inland fishponds and rice-fish culture.

Although Tarlac and Benguet are both land-locked and not as rich in fishery resources, Tarlac and Pangasinan share the Poponto Swamp area (called Mangabol Marsh in Pangasinan). Traditionally, the marsh has been a productive area for freshwater fish and crustaceans, mollusks and water fowl. Colisao Creek in Pangasinan is a known spawning or breeding ground for migratory fish species.

2.6 Aesthetics and Cultural Tribes

2.6.1 Aesthetics and Archaeological Sites

Table 2.10 lists the reservations and archaeological sites in and around the Study Area. These are composed of 6 national parks, 1 municipal park, 1 barangay forest park, 2 watershed forest reservations (Ambuklao and Binga), 3 military reservations, and 10 archaeological sites (2 in Pangasinan and 8 in Benguet). Fig. 2.6 shows their locations in the map of the study area.

2.6.2 Cultural Tribes

Ilocanos are the predominant or the most numerous ethnic group in the Study area comprising the biggest ethnic group in Tarlac, Pangasinan and Benguet. The natives of Pangasinan are the next largest group, followed by the Pampangos and the Tagalogs, in that order. The cultural minorities present in the study area are: the natives of Benguet (the Kankanais and the Inibaloys), the Bolinao or Sambal, Bontoks, Ifugaos, and the Kalingas (in decreasing number). Other cultural minorities present are the Ayta, Ilanum, Isinai, Ivantan, Subanon, and Yogod. Table 2.11 contains the population and location of cultural minorities in the study area, and Fig. 2.6 shows their location.

2.7 Public Health

2.7.1 Water-borne Parasitic Diseases

Since the project involves the impounding of floods, the spread of water-borne diseases such as malaria might be caused by the project. The historical mortality and morbidity rates were compiled for 1975 to 1987 on Table 2.12.

In the three provinces, malaria incidence rates took an upward trend with Benguet showing the highest morbidity incidence, followed by Tarlac, and the least Pangasinan. Other water-borne parasitic diseases are not reported in the study area.

2.7.2 Water Supply

Table 2.13 shows the percentage of households utilizing the various water supply levels in the Agno River basin in 1985.

Only Benguet is served by a waterworks system of significant coverage. Water supply remains a problem in Benguet. Due to decreasing water pressure, water rationing is practiced during the summer months. In Pangasinan and Tarlac, most households depend on private deep or shallow wells for water supply. Most industries and commercial establishments are installing their own deep wells for their industrial and domestic water needs.

3. ENVIRONMENTAL IMPACT ASSESSMENT (EIA) IN THE MASTER PLAN STAGE

3.1 Methodology of EIA for the Project

To attain the objectives of this environmental study , Initial Environmental Examination (IEE) is conducted. IEE is essentially an initial examination of the environmental effect potentials of the proposed project based mostly on the preliminary information which can be readily obtained. The IEE thus, is a first approach of EIA by scooping. Through the IEE, it is determined whether an EIA will be required in the next Feasibility Study stage.

A checklist method is applied as a basic tool of IEE in this environmental study, because it is one of the useful initial tools for identification of impacts and evaluation of their significance of them. The checklist is prepared by using major items of environmental effect as rows and major project components as columns. The expected effects are evaluated from A to C for each project component with classification whether positive or negative. The checklist items are selected taking into consideration the feature of the project and the guidelines prepared by GOP and the Asian Development Bank (ADB). (Refer to Table 3.1)

3.2 Result of IEE for the Project

The result of EIA for the Project is summarized in Table 3.1.

3.2.1 Agno River

The major components/schemes of flood control in the Agno River are the San Roque dam, Moriones-Lower O'Donnell dam, river improvement works along the Agno River and Poponto retarding basin. The schemes which are expected to cause relative significant effects on the environment are the San Roque dam and Moriones-Lower O'Donnell dam.

First of all, resettlement issues are expected especially at the inundation area of Moriones-Lower O'Donnell dam. Agricultural lands in the proposed reservoir areas are also to be affected by inundation. Secondly, erosion

problems in the upstream and downstream areas are expected because both are located in the erosion susceptible area with slope 8° - 15°. Water quality deterioration may not be caused by the dams, but eutrophication and saline water intrusion might be expected.

As for the river improvement works in the Agno River and Poponto retarding basin, there may be no crucial environmental effects caused by the project, though several environmental impacts are expected.

3.2.2 Pantal-Sinocalan River

The major schemes of the Pantal-Sinocalan River flood control are the river improvement works and Binalonan floodway.

Although no crucial environmental issues are expected by the project, water quality deterioration in the downstream area of the Sinocalan River might be caused by the diversion of flood water from the Tuboy river to the Angalacan River through the Binalonan floodway.

3.2.3 Cayanga-Patalan River

The major schemes of the Cayanga-Patalan River flood control are the river improvement works and the Bued closing dike. However, the Bued closing dike is not planned to be constructed in the river, so it can be considered that the environmental impacts caused by the dike are similar to those of the river improvement works.

Several environmental impacts are expected by the project, but there are no crucial environmental effects caused by the project. The significance of the possible impacts can be reduced by taking proper countermeasures.

3.3 Conclusion and Recommendation

3.3.1 Conclusion of IEE for the Project

(1) According to the EIA guideline of DPWH, the project shall be required to undertake an EIA report, because it includes two large scale dams and the project area is considered prime agricultural lands.

(2) Among the proposed schemes of the Project, San Roque dam and Moriones-Lower O'Donnell dam may have environmentally crucial impacts, such as resettlement problem and encroachment of agricultural lands. Thus, more careful attention shall be paid to those impacts.

(3) As for the other schemes, no crucial environmental effects may be expected by the Project. However, several low or medium level of significant impacts may be expected, so further environmental study shall be required to make clear the expected impacts, in order to propose proper and possible countermeasures.

3.3.2 Environmental Effects to be Studied in the Feasibility Study Stage

Through the result of IEE in the Master Plan stage, the following major environmental effects shall be focused in the further environmental study. However, the scope of work of the environmental study is also determined by the detailed plan of the selected high priority schemes in this project. Therefore, the concrete and specific scope of work to be studied in the Feasibility Study should be rearranged.

- To evaluate qualitatively and quantitatively about resettlement problems, and to prepare proper resettlement programs for the San Roque and Moriones-Lower O'Donnell dams,

- To evaluate qualitatively and quantitatively about the evacuation of the local people and to prepare proper programs,

- To evaluate qualitatively and quantitatively about the loss of agricultural lands in the proposed reservoir areas and Binalonan floodway area,

- To assess the possibility of eutrophication of the proposed reservoir areas, and the water quality deterioration by the operation of the Binalonan floodway,

- To assess the impairment of navigation in the Agno River and the Allied Rivers,

- To assess the magnitude of soil erosion and to recommend necessary management plans.

TABLES

Table 2.1 LAND CLASSIFICATION OF 4 PROVINCES IN THE STUDY AREA

Unit : ha

Province	Total Area	Certified Alienable and Disposable Land			Forest Land								
							Classified						
		Total	Farm Land	Built-up Area	Total	Unclassified	Total	Established Forest Reserve	Established Timber Land	National Parks Gross/RA	Military Reservation	Civil Reservation	Fish Ponds
Philippines	30,000,000	14,117,753 (47.1%)	9,725,150 (34.4%)	4,392,603 (12.7%)	15,882,247 (52.9%)	881,157 (2.9%)	15,001,090 (50.0%)	3,271,504 (10.9%)	10,015,427 (33.4%)	1,342,416 (4.5%)	130,330 (0.4%)	165,935 (0.6%)	75,478 (0.2%)
Benguet	265,538	87,897 (33.1%)	40,777 (15.4%)	47,120 (17.7%)	177,641 (66.9%)	13,030 (4.9%)	164,611 (62.0%)	19,735 (7.4%)	138,810 (52.3%)	5,512 (2.1%)	554 (0.2%)	-	-
Pangasinan	536,818	406,395 (75.7%)	190,829 (35.5%)	215,566 (40.2%)	130,423 (24.3%)	2,847 (0.5%)	127,576 (23.8%)	22,875 (4.3%)	102,792 (19.1%)	92 (0.0%)	288 (0.1%)	923 (0.2%)	606 (0.1%)
Nueva Ecija	528,433	330,985 (62.6%)	190,785 (36.17%)	140,200 (26.43%)	197,448 (37.4%)	13,726 (2.6%)	183,722 (34.8%)	84,500 (16.0%)	31,679 (6.0%)	3,504 (0.7%)	63,900 (12.1%)	139 (0.0%)	-
Tarlac	305,345	184,975 (60.6%)	101,183 (33.1%)	83,792 (27.5%)	120,370 (39.4%)	-	120,370 (39.4%)	-	83,115 (27.2%)	2 (0.0%)	36,588 (12.0%)	665 (0.2%)	-
Agno/Allied Basins	1,636,134	1,010,252 (61.75%)	523,574 (32.0%)	486,678 (29.75%)	625,882 (38.25%)	29,603 (1.81%)	596,279 (36.44%)	127,110 (7.77%)	356,396 (21.78%)	9,110 (0.56%)	101,330 (6.19%)	1,727 (0.10%)	606 (0.04%)

Source : Philippine Forestry Statistics 1988 FOREST MANAGEMENT BUREAU, DENR

Table 2.2 MINERAL RESERVES AND PRODUCTION BY TYPE, QUANTITY AND LOCATION

Mineral and Non-Mineral Resources	Benguet		Pangasinan		Tarlac	
	Reserves (1981-Thousand MT)	Annual Production (1984-MT)	Reserves (1981-Thousand MT)	Annual Production (1984-MT)	Reserves (1980-MT)	Annual Production
Metallic						
Gold	659,244.8	10.4	NDA	0.032	NDA	NDA
Copper	843,913.7	21,286.0	318.9	2,662.0	NDA	NDA
Cadmium	47.2	NDA			NDA	NDA
Molybdenum	111,526.0	NDA			NDA	NDA
Zinc	488.9	2,181.0			NDA	NDA
Iron (lamp Ore)					NDA	NDA
Titaniferous Magnetite Sand					153,800.0	NDA
Manganese					190,000.0	NDA
Chromite Ore			987.4	NDA	NDA	NDA
Silver	NDA	13.9	NDA	1.122	NDA	NDA
Copper Concentrate			NDA	14,220.0 DMT	NDA	NDA
Refractory			NDA	614.0 DMT	NDA	NDA
Non-Metallic						
Limestone (Cement Raw Materials)			811,167.0	811,167.0	NDA	NDA
Shale Clay			NDA	175,660.0	NDA	NDA
White Clay			NDA	423.0	NDA	NDA
Limestone Ore	980.0	NDA	50.0	NDA	NDA	NDA
Pyrite Ore	387.4	NDA			NDA	NDA
Silica Rock	2,580.0	NDA			NDA	NDA
Silica Sand	540,939.6	NDA			NDA	NDA
Cement			NDA	13,001,373.0 bags	NDA	NDA
Sand and Gravel	5,215,800.0 cu m	27,327.0 cu m	NDA	77,594.0 cu m	NDA	NDA
Stones, Cobbles, Boulders	NDA	4,157.0 cu m	NDA	17.0 cu m	NDA	NDA
Aggregates	NDA	13,148.0 cu m			NDA	NDA
Quickline	NDA	14,161.0			NDA	NDA
Pyrite Concentrate	NDA	3,870.0	NDA	13,895.0 DMT	NDA	NDA
Asbestos			1,466,625.0	NDA	NDA	NDA
Salt				52,795.0	NDA	NDA
Guano				9.0	NDA	NDA

Sources:

a. Medium-Term Ilocos Region Development Plan, 1987-1992, RDC Region I
b. Bureau of Mines and Geo-Sciences, Region I
c. Bureau of Mines, 1984
d. PDS, 1984, Provincial Government Of Pangasinan
e. Agno River Basin Framework Plan, NWRC, 1983

Table 2.3 PARAMETERS OF WATER QUALITY CRITERIA

Quality Parameter	Fresh Surface Water					
Class	AA	A	B	C	D	E
Color, Units		75	50	50		
Temperature ^{o}C		30	30	3(e)	3(e)	
Transparency			(c)	(c)	(c)	
Dissolved Oxygen		5	5	5	3	2
5-day BOD at $20^{o}C$		10	15	20		
Total Dissolved Solids				1,000	1,000	
Total Solids	(a)	(a)		2,000	2,000	
pH	(a)	6.5-8.5	6.5-8.5	6.5-8.5	6.0-8.5	5.0-9.0
Coliform, MPN/100 mℓ	50	5,000	1,000	5,000		
Phenolic substances	(a)	(a)	0.002	0.02		

Remarks: 1. (a) National standards for Drinking Water in the Philippines
(b) Shall not be present in concentration to cause deleterious or abnormal biotic growth.
(c) Secchi disk shall be visible at a minimum depth of one (1) meter.
(d) Recommended maximum concentration for irrigating citrus is 0.07 mg/ℓ.
(e) rise in temperature.
2. All values are maximum permissible except for Dissolved Oxygen which is minimum permissible.
3. All units in mg/ℓ except those indicated.
4. Water usage and classification of fresh surface water:

Classifications	Best usage
- Class AA	For source of public water supply. This class is intended primarily for water having watersheds which are uninhabited and otherwise protected and which require only approved disinfection in order to meet the National Standards for Drinking Water (NSDW) of the Philippines.
- Class A	For source of water supply that will require complete treatment (coagulation, sedimentation, filtration and disinfection) in order to meet the NSDW.
- Class B	For primary contact recreation.
- Class C	For the propagation and growth of fish and other aquatic resources.
- Class D	For agriculture, irrigation, livestock watering and industrial cooling and processing.
- Class E	For navigational use.

Source: Rules & Regulations of the National Pollution Control Commission (1978), section 69, Table 1 - NPCC Water Quality Criteria (1978)

Table 2.4 UPPER AGNO RIVER SURFACE WATER QUALITY, DECEMBER 1983 - NOVEMBER 1984

Fixed Point A; Binga Dam Downstream

Month	Flow Rate (m^3/s)	Water Temp. (°C)	pH	EC (μS/cm)	DO (mg/ℓ)	Turb. (ppm)	SS (mg/ℓ)	Cu (mg/ℓ)	Zn (mg/ℓ)	As (mg/ℓ)	Ca (mg/ℓ)	Mg (mg/ℓ)	CN (mg/ℓ)	SO_4 (mg/ℓ)
Dec.	21.58	24.8	8.8	220	6.6	14.5	4	0.003	0.005	0.0031	25	5.6	–	22
Feb.	10.86	27.3	8.5	240	6.5	4.9	7	0.003	0.010	0.0026	37	6.0	<0.01	26
Mar.	20.13	29.5	9.0	220	6.7	8.0	3	0.003	0.010	0.0023	23	5.7	<0.01	28
Apr.	33.86	31.7	9.0	210	6.8	2.6	3	0.004	0.010	0.0033	26	5.7	<0.01	29
May	18.13	31.0	8.8	230	7.0	4.1	12	0.003	0.005	0.0031	30	5.9	<0.01	30
June	46.53	30.7	8.7	230	7.3	4.6	6	0.003	0.003	0.0032	27	6.0	<0.01	30
July	43.75	30.1	8.8	230	7.1	3.2	3	0.003	0.003	0.0033	29	6.0	<0.01	30
Aug.	67.14	27.8	8.8	220	8.9	4.3	3	0.003	0.004	0.0021	28	5.6	<0.01	22
Sept.	71.59	29.4	8.4	170	6.7	67.6	41	0.003	0.004	0.0010	22	4.8	<0.01	14
Oct.	45.75	26.9	9.0	170	7.2	8.0	9	0.003	0.006	0.0008	25	4.7	<0.01	19
Nov.	50.01	27.0	9.2	180	7.3	3.7	23	0.003	0.002	0.0015	21	5.1	<0.01	20
Average	39.03	28.7	8.8	200	7.0	15.7	10	0.003	0.006	0.0024	26	5.4	<0.01	23

– : No data
* : Average of Cu is calculated on the ground that the Cu concentrations below the detection limit are regarded one half of the limit value;
0.005 x 1/2 = 0.0025

Fixed Point B; Ambaranga River Downstream of BCI & ISMI

Month	Flow Rate (m^3/s)	Water Temp. (°C)	pH	EC (μS/cm)	DO (mg/ℓ)	Turb. (mg/ℓ)	SS (mg/ℓ)	Cu (mg/ℓ)	Zn (mg/ℓ)	As (mg/ℓ)	Ca (mg/ℓ)	Mg (mg/ℓ)	CN (mg/ℓ)	SO_4 (mg/ℓ)
Dec.	2.80	24.9	8.3	1400	6.9	270	210	0.075	0.005	0.0344	258	13.8	–	541
Feb.	1.62	26.8	7.9	1600	7.1	870	650	0.545	0.010	0.0323	280	24.3	1.11	749
Mar.	1.41	28.1	8.2	1600	7.6	690	420	0.220	0.010	0.0380	191	24.4	0.13	841
Apr.	1.22	30.2	8.3	1600	7.4	690	630	0.200	0.010	0.0531	338	26.7	0.22	834
May	1.81	29.5	8.2	1400	6.8	470	700	0.467	0.008	0.0239	239	17.6	0.18	675
June	2.31	29.1	8.1	1100	7.1	690	880	0.181	0.009	0.0179	199	17.9	0.23	522
July	4.99	27.9	8.1	940	7.5	210	280	0.168	0.006	0.0151	156	20.5	0.20	444
Aug.	7.47	26.7	8.2	840	7.4	630	830	0.213	0.009	0.0159	147	18.0	0.51	390
Sept.	19.19	29.2	7.8	730	7.2	860	1400	0.135	0.010	0.0047	118	20.4	0.25	274
Oct.	6.05	26.5	8.0	960	7.2	300	420	0.188	0.039	0.0106	179	19.0	0.32	458
Nov.	7.37	25.7	8.2	880	7.5	230	320	0.132	0.008	0.0140	143	17.7	0.26	831
Average	5.11	27.7	8.1	940	7.3	570	820	0.179	0.012	0.0143	161	19.4	0.31	474

– : No data

Fixed Point C; Albian Creek Downstream of Philex T. Dam 1

Month	Flow Rate (m^3/s)	Water Temp. (°C)	pH	EC (μS/cm)	DO (mg/ℓ)	Turb. (ppm)	SS (mg/ℓ)	Cu (mg/ℓ)	Zn (mg/ℓ)	As (mg/ℓ)	Ca (mg/ℓ)	Mg (mg/ℓ)	CN (mg/ℓ)	SO_4 (mg/ℓ)
Dec.	1.20	21.7	8.5	860	8.0	500+	3700	0.010	0.005	0.0010	187	6.3	–	383
Feb.	0.76	25.7	8.5	1200	7.4	2000+	10000	0.008	0.010	0.0006	258	8.0	0.01	702
Mar.	0.43	28.8	8.6	1700	6.8	1900+	18000	0.020	0.010	0.0010	317	8.6	0.01	781
Apr.	0.41	28.6	8.3	1200	7.7	2000+	22000	0.010	0.008	0.0006	357	10.5	0.00	809
May	0.76	27.7	8.2	1200	7.5	2000+	13000	0.006	0.010	0.0003	257	9.2	0.01	640
June	2.12	26.8	7.9	760	7.7	2000+	10000	0.008	0.009	0.0004	143	9.1	0.01	355
July	4.03	25.0	7.7	590	7.8	1800+	6600	0.003	0.003	0.0004	100	6.4	0.00	238
Aug.	4.99	23.4	8.1	620	7.7	2000+	9000	0.003	0.004	0.0003	95	7.3	0.01	226
Sept.	7.73	26.5	7.3	510	7.4	1200+	3900	0.006	0.008	0.0003	79	12.2	0.00	203
Oct.	3.17	25.0	8.4	600	7.5	2000+	11000	0.003	0.004	0.0008	126	6.1	0.01	287
Nov.	4.12	21.6	8.5	510	8.0	2000+	4500	0.005	0.003	0.0005	86	4.7	0.01	193
Average	2.70	25.5	8.2	640	7.7	1700+	10000	0.005	0.006	0.0004	116	8.2	0.01	278

– : No data

Fixed Point D; Manaa Creek Downstream of Philex T. Dam 2

Month	Flow Rate (m^3/s)	Water Temp. (°C)	pH	EC (μS/cm)	DO (mg/ℓ)	Turb. (ppm)	SS (mg/ℓ)	Cu (mg/ℓ)	Zn (mg/ℓ)	As (mg/ℓ)	Ca (mg/ℓ)	Mg (mg/ℓ)	CN (mg/ℓ)	SO_4 (mg/ℓ)
Dec.	0.81	23.7	8.1	900	8.1	500+	1200	0.014	0.005	0.0017	207	7.2	–	433
Feb.	0.55	24.6	8.4	1100	7.3	1270	5800	0.005	0.010	0.0011	236	8.0	0.01	655
Mar.	0.41	26.2	8.3	960	7.7	820	630	0.008	0.010	0.0018	196	7.0	0.01	521
Apr.	0.45	28.2	8.1	1400	7.3	190	390	0.004	0.008	0.0013	314	8.4	0.01	747
May	0.72	27.9	8.1	1200	7.4	1600+	9200	0.004	0.013	0.0011	258	9.3	0.01	632
June	1.60	26.5	7.9	740	7.8	1900+	13000	0.003	0.006	0.0004	143	6.4	0.01	338
July	2.08	26.1	7.8	630	7.5	1400+	3800	0.003	0.005	0.0007	108	5.5	0.01	265
Aug.	2.76	21.8	8.0	470	7.6	880	1700	0.003	0.003	0.0004	80	3.6	0.01	173
Sept.	3.21	27.6	7.5	430	7.4	110	150	0.006	0.006	0.0006	68	6.3	0.01	160
Oct.	1.37	25.6	8.1	880	7.2	460	580	0.003	0.005	0.0004	195	6.4	0.01	439
Nov.	2.12	23.4	8.2	710	7.6	1100	2300	0.003	0.004	0.0005	118	3.5	0.00	276
Average	1.46	25.6	8.0	690	7.5	890+	3200	0.004	0.005	0.0007	151	5.7	0.01	310

– : No data

Fixed Point E; Agno River Downstream of San Roque

Month		Flow Rate (m^3/s)	Water Temp. (°C)	pH	EC (μS/cm)	DO (mg/ℓ)	Turb. (ppm)	SS (mg/ℓ)	Cu (mg/ℓ)	Zn (mg/ℓ)	As (mg/ℓ)	Ca (mg/ℓ)	Mg (mg/ℓ)	CN (mg/ℓ)	SO_4 (mg/ℓ)
1983	Dec.	22.13	25.4	8.3	430	7.1	–	1200	0.010	0.005	0.0041	71	6.7	–	98
1984	Feb.	14.63	26.4	8.0	470	7.0	900	990	0.011	0.014	0.0045	81	7.3	0.01*	124
	Mar.	32.27	28.9	8.2	440	7.1	610	920	0.011	0.010	0.0049	62	7.6	0.01	115
	Apr.	32.37	31.1	8.3	430	7.0	290	510	0.018	0.006	0.0043	52	6.9	0.01	96
	May	46.41	30.1	8.3	420	7.1	770	1300	0.012	0.005	0.0041	53	7.0	0.01	104
	June	61.48	27.6	8.2	410	7.2	850	1400	0.018	0.003	0.0032	49	6.3	0.02	89
	July	80.24	25.4	8.2	370	7.2	880	1600	0.036	0.003	0.0031	47	6.6	0.04	88
	Aug.	265.25	26.1	8.1	240	7.2	1500	2900	0.014	0.003	0.0023	31	5.1	0.02	47
	Sept.	198.90	26.6	8.1	250	7.2	360	410	0.011	0.004	0.0019	33	5.7	0.02	48
	Oct.	114.53	26.3	8.2	330	7.3	590	2300	0.015	0.006	0.0018	47	5.7	0.01	88
	Nov.	104.82	26.3	8.2	330	7.4	310	690	0.012	0.003	0.0021	41	5.9	0.01	77
Average		88.46	27.3	8.2	310	7.2	700	1600	0.015	0.004	0.0026	41	5.9	0.02	70

* : Concentrations below the detection limit are regarded one half of the limit value, so that CN content is *0.01 mg/ℓ even if many of the daily data are below the limit.*
– : No data

Source; JICA, 1985 Restudy of the San Roque Multipurpose Project

Table 2.5 THREATENED, RARE AND ENDANGERED WILDLIFE SPECIES IN LUZON

1	Birds	
1.1	Asiatic Honey Buzzard (Fernis apivorus)*	- Luzon
1.2	Barred Honey Buzzard (Persis celebensis)*	- Luzon
1.3	Black-wiged Kite (Elanus caerulens)*	- Northern Luzon
1.4	Bleeding Heart Pegion (Gallicolumba luzonica)*	- Luzon
1.5	Blue-naped Parrot (Tanygnathus lucionensis)*	- Luzon, Sierra Madre
1.6	Brahminy Kite (Hariastus indus intermedius)*	- Luzon
1.7	Crested Goshawk (Accipiter trivirgatus)*	- Luzon
1.8	Eastern Sarus Crane (Grus antigone sharpii)*	- Luzon
1.9	Gray Frog Hawk (Accipiter soloensis)*	- Luzon
1.10	Koch's Pitta (Pitta kochi)*	- Luzon
1.11	Marsh Harrier (Circus aeruginosus)*	- Luzon
1.12	Mosque Swallow (Hirundo striolata striolata)*	- Luzon
1.13	Peregrine Falcon (Falco peregrinus)*	- Luzon
1.14	Philippine Eagle (Pithecopaga jefferyi)*	- Luzon
1.15	Philippine Falconet (Microhierax erythrogonys)*	- Luzon
1.16	Pied Harrier (Circus melenoleusus)*	- Luzon
1.17	Oriental Hobby (Falcon severus)*	- Luzon
1.18	Osprey (Pandion haliaetus)*	- Luzon
1.19	Rufous Hornbill (Buceros hydrocorox)*	- Luzon
1.20	Sunda Ground Thrush (Zoothera andromedae)*	- Luzon
2	Mammals	
2.1	Brown-tailed Northern Luzon Fruit Bat (Carpomys phaenrus)	- Mt. Data
2.2	Philippine Bush Rat (Batamoys grantii)	- Mt. Data
2.3	Philippine Deer (Ceruns philippinensis)*	- Luzon
3	Amphibians	
3.1	Horned Forest Frog (Platymantis cornutus)	- Luzon
3.2	Luzon Forest Frog (Platymantis subterritris)	- Luzon
3.3	Luzon Narrow-mouthed Tree Frog (Kaloula rigida)	- Baguio
4	Reptiles	
4.1	Banded Worm Snake (Calamaria bitorgus)	- Luzon
4.2	Barred Coral Snake (Calliophis calligaster)	- Luzon
4.3	Biyer's Sphenomorphus (Sphenomorphus beyeri)	- Northern Luzon
4.4	Black-sided Sphenomorphus (Sphenomorphus decipiens)	- Luzon
4.5	Cuming's Flap-legged Gecko (Luperosaurus cumingi)	- Luzon
4.6	Cumings Eared Skink (Otosaurus cumingi)	- Luzon
4.7	Gervais Worm Snake (Calamaria gervaisi)	- Nationwide
4.8	Girard's Tree Skink (Lipinia vulcanium)	- Luzon
4.9	Gray's monitor (Varamus grayi)*	- Philippines
4.10	Highland Sphenomorphus (Sphenomorphus luzonensis)	- Benguet
4.11	Large Hemadactylid Gecko (Hemadactilus garnoti)	- Luzon
4.12	Myer's Snake (Myersophis alpestris)	- Banawe, Mt. Province
4.13	Northern Four-Fingered Burrowing Skink (Brachimeles wrighti)	- Northern Luzon
4.14	Northern Water Snake (Natrix spilogaster)	- Luzon
4.15	Philippine pryophiops (Dryphiops philippina)	- Luzon
4.16	Philippine Blunt-Headed Snake (Bioga angulata)	- Luzon
4.17	Variable Monitor Lizard (Varamus salvator)	- Philippines
4.18	White-spotted Flying Lizard (Draco ornatus)	- Luzon
4.19	White-spotted Sphenomorphus (Sphenomorphus leucospilos)	- Luzon

Source: Protected Areas and Wildlife Bureau, 1988.
"Statistics on Philippine Protected Areas and Wildlife Resources"

* Found in the Agno River Basin

Table 2.6 WILDLIFE MAMMALS PROBABLY FOUND IN THE STUDY AREA

Common Name	Region I	Region III
Brown-Tailed Northern Luzon Fruit Bat	x	
Bushy-Tailed Cloud Rat	x	
Common Philippine Field Rat	x	x
Geoffrey's Rousette	x	x
Greater Phil. Short-nosed or Dog-faced Fruit Bat	x	x
Horsefield's Pipistrelle	x	x
Least Flat-headed Bat	x	x
Malay Civet or Tangalong Civet	x	x
Malay False Vampire Bat	x	x
Northern Luzon Rind Rat	x	
Palm Civet		x
Philippine Dawn Bat	x	x
Philippine Deer	x	x
Philippine Chestnut House Mouse	x	x
Philippine Gray Water Rat	x	
Philippine Monkey or Macaque	x	x
Philippine Sheath-Tailed Bat	x	x
Slender-Tailed Cloud Bat	x	
Striped Water Rat	x	x
Temminck's Yellow Bat	x	x
Wild Pig	x	x

Source : Protected Areas and Wildlife Bureau, 1980. "Statistics on Philippine Protected Areas and Wildlife Resources".

Table 2.7 BIRDS PROBABLY FOUND IN THE STUDY AREA

Common Name	Scientific Name	Region I	Region III
Asiatic Honey Buzzard	Pernis apivorus	x	x
Asiatic Migratory Quail	Coturnix coturnix	x	x
Asiatic Sparrow Hawk	Accipiter gularis	x	x
Asiatic Grasshopper Warbler	Locustella certhiola		x
Banded Rail	Rallus p. philippinensis	x	x
Barred Honey Buzzard	Pernis celebensis	x	x
Barred Rail	Rallus t. torquatus	x	x
Black Bittern	Dupetor f. flavicollis	x	x
Black Coot	Fulica atra	x	x
Black-necked Dabchick	Podiceps nigricollis nigricollis		x
Black-crowned Night Heron	Nycticorax nycticorax	x	x
Black-naped Blue Monarch	Hypothymis azurea	x	x
Black-naped Oriole	Oriolus chinensis	x	x
Black-winged Kite	Elanus caeruleus	x	x
Blue Rock Thrush	Monticola solitarius	x	x
Blue-faced Booby	Sula dactylatra	x	x
Brahminy Kite	Haliastus indus intermidius	x	x
Brown Booby	Supla leucogaster	x	x
Brown-banded Rail	Rallus mirificus		x
Cattle Egret	Egretta s. sacra	x	x
Celestial Blue Monarch	Hypothymis coelestis	x	x
Chinese Least Bittern	Ixobrychus s. sinensis	x	x
Chinese Pond Bittern	Ardeola bacchus	x	x
Cinnamon Least Bittern	Ixobyrychus cinnamomeus	x	x
Common Bittern	Botaurus s. scallaris	x	x
Common Dabchick	Podiceps ruficollis	x	x
Common Shoveler	Anas clypeata	x	x
Common Teal	Anas crecca	x	x
Cotton Teal	Nettapus coromandelianus	x	x
Dusky Thrush	Turdus obscurus	x	x
Dwarf Rail	Porzana pusilla	x	x
Eastern Sarus Crane	Grus antigone sharpii	x	x
Wedge-Tailed Shearwater	Piffinus pacificus	x	x
European Pochard	Aythya ferina	x	x
European Widgeon	Anas penelope	x	x
Gallinule	Gallinula chloropus lozanoi	x	x
Garganey Teal	Anas querquedula	x	x
Glossy Ibis	Plegades alcinellus	x	x
Common Fantail Warbler	Cisticola juncidis	x	x
Golden-Headed Fantail Warbler	Cisticola exilis	x	x

Common Name	Scientific Name	Region I	Region III
Gray Frog Hawk	Accipiter soloensis	x	x
Gray Heron	Ardea cinerea	x	x
Great Reed Warbler	Acrocephalus arundinaceus	x	x
Greater Egret	Egretta alba	x	x
Greater Scaup Duck	Aythya marila	x	x
Great Cormorant	Phalacrocorax carbosinensis	x	
Green-faced Parrot Finch	Erythrura Viridifacies	x	x
Isabella Oriole	Oriolus isabellae	x	
Japanese Bittern	Gorsachius goisagi	x	x
Jungle Fowl	Gallus gallus	x	x
Kestrel	Falco tinnunculus	x	x
Large-billed Crow	Corvus macrohynchos	x	x
Lesser Egret	Egretta intermedia	x	x
Lesser Frigate Bird	Fregata a. ariel	x	x
Little Egret	Egretta garzetta	x	x
Little Mangrove Heron	Botorides striatus	x	x
Little Pied Flycatcher	Ficedula westermanni	x	x
Long-Tailed Ground Warbler	Bradypterus caudatus	x	
Malay Bittern	Gorsachius melanophus	x	x
Malaysian Fantail	Rhipidura javanica	x	x
Marsh Harrier	Corcus aeruginosis	x	
Megapode	Megapodius freycinet	x	x
Mountain Leaf Warbler	Phylloscopus trivirgatus	x	x
Mountain Tailor Bird	Orthotomus cucullatus	x	x
Narcissus Flycatcher	Muscicopa narcissina	x	x
Narcissus Flycatcher	Ficedula narcissina	x	x
Oriental Anhinga	Anhinga rufa	x	x
Oriental Hobby	Falco severus	x	x
Oriental Tree Pipit	Anthus hodgeoni	x	x
Osprey	Pandion haliaetus	x	x
Pacific Swallow	Hirundo tahitica	x	x
Painted Quail	Coturnix chinensis	x	x
Peregrine Falcon	Falco peregrinus	x	x
Petchora Pipit	Anthus gustavi	x	x
Pheasant-tailed Jacana	Hydrophasianus chirurgus	x	x
Philippine Banded Crake	Rallina eurozonoides	x	x
Philippine Bulbul	Hypsipetes philippinus	x	
Philippine Glossy Starling	Aplonis panayensis	x	x
Philippine Mallard	Anas luzonica	x	x
Philippine Pelican	Pelecanus philippensis	x	x

Common Name	Scientific Name	Region I	Region III
Philippine Falconet	Microhierax erythrogenys	x	x
Pied Harrier	Circus melanoleucus	x	x
Pied Triller	Lalago nigra	x	x
Pintail	Anas acuta	x	x
Plain Swamphen	Amaurornis olivaceus	x	x
Purple Heron	Ardea purpurea	x	x
Purple Swamphen	Porphyrioc porphyric	x	x
Pygmy Flowerpecker	Dicaeum pygmaeum		x
Red-Throated Pipit	Antheus cervinus	x	x
Reef Egret	Egretta sacra	x	x
Richard's Pipit	Anthus novaeseeladiae	x	x
Ruddy Crake	Porzana fusca	x	x
Rufous Night Heron	Nycticorax caledonicus	x	x
Ruby Throat	Crithocus calliope	x	x
Schach Shrike	Lanius schach	x	x
Schrenck's Least Bittern	Ixobrychus eurhythmus	x	x
Sooty Rail	Porzana tabuensis	x	x
Serpent Eagle	Spilornis holospilus	x	x
Sheldrake	Tadorna tadorna	x	x
Short-crested Blue Monarch	Hyphothymis helenae	x	
Slaty-breasted Rail	Rallus striatus	x	x
Spotbill Duck	Anas poecilorynchs	x	
Spotted-Button Quail	Turnix ocellata	x	
Striated Canegrass Warbler	Megalurus palustris	x	x
Striped-Button Quail	Turnix sylvatica	x	x
Striped-Headed Creeper	Rhabdornis mysticalis	x	x
Sunda Ground Thrush	Zoothera andromedae	x	x
Tuffed Duck	Aythya fuligula	x	x
Wandering Whistling Duck	Dendrocygna arcuata	x	x
Water Cock	Gallicrex cineres	x	x
Wedgetailed Shearwater	Puffinus pacificus	x	x
White-browed Rail	Poliolimnas cinereus	x	x
White Ibis	Threskiornis aethiopica	x	x
White-bellied Black Woodpecker	Dryocopus javensis	x	x
White-breasted Swamphen	Amaurornis phoenicurus	x	x
White-faced Shearwater	Puffinis leucomelas	x	x
Whittled Bulbul	Pycnonotus urostictus		x
Worcester's Button Quail	Turnix worcesteri	x	x
Yellow-bellied Flycatcher	Pachycephala philippinensis	x	x
Yellow-breasted Wren-warbler	Cerygone sulphurea	x	x
Yellow-vented Bulbul	Pycnonotus goiavier	x	x

Source: Protected Areas and Wildlife Bureau, 1980. "Statistics on Philippine Protected Areas and Wildlife Resources".

Table 2.8 ECONOMIC CROP AREA AND PRODUCTION BY TYPE OF CROP

CROP	AREA (HA.)			PRODUCTION (mt)		
	Benguet (1987)	Tarlac (1985)	Pangasinan (1988)	Benguet (1987)	Tarlac (1985)	Pangasinan (1988)
1. Palay	5941	72860	220442	11061	176120.5	551848.9
2. Corn	NDA	2290	29704	NDA	2111	41625.2
3. Rootcrops	3913	3945	1372	60365		7951
3.1 Camote	NDA	2800	NDA	NDA	14000	NDA
3.2 Cassava	NDA	40	NDA	NDA	100	NDA
3.3 Gabi	NDA	70	NDA	NDA	175	NDA
3.4 Garlic	NDA	510	NDA	NDA	91.8	NDA
3.5 Ginger	NDA	5	NDA	NDA	15	NDA
3.6 Peanuts(unshelled)	NDA	480	NDA	NDA	720	NDA
3.7 Onion						
3.7.1 Bermuda(bulb)	NDA	20	NDA	NDA	48	NDA
3.7.2 Others	NDA	20	NDA	NDA	48	NDA
4. Vegetables	14788	2022	7341			
4.1 Leafy Vegetables	6402	4	87	101285		
Camote Tops	NDA	NDA	10	NDA	NDA	30000[c]
Malunggay	NDA	NDA	50	NDA	NDA	60000[c]
Mustard	NDA	2	17	NDA	7	17.935
Kangkong	NDA	none	10	NDA	NDA	13
Cabbage	NDA	NDA	none	NDA	5	none
Pechay	NDA	2	none	NDA	NDA	none
4.2 Fruit Vegetables	4129	2018	7254	34125		
Ampalaya	NDA	130	333	NDA	260	1070.666
Squash(Kalabasa)	NDA	110	298	NDA	605	2241.26
Eggplant	NDA	900	3522	NDA	5400	2277.374
Patola	NDA	10	95	NDA	20	118.225
Pepper(Black)	NDA	none	none	NDA	none	none
Pepper(Red)	NDA	3	2	NDA	4.5	24.002
Tomato	NDA	850	2652	NDA	4675	43332.525
Upo	NDA	10	57	NDA	36	138.521
Okra	NDA	NDA	10	NDA	NDA	13
Cucumber	NDA	5	40	NDA	7.5	87.696
Sitao(String Beans)	NDA	NDA	145	NDA	NDA	149.8
Segarillas(Winged Beans)	NDA	none	100	NDA	none	118.445
Dry/Green Beans & Peas	NDA	NDA	none	NDA	NDA	NDA
4.3 Root Vegetables	4257	NDA	NDA	71347	NDA	NDA
5. Legumes (Mongo)	NDA	3400	12309	NDA	1445	11339
6. Non-Food Crops	2351	15410	9955			
6.1 Flowers	424	none	none	5506140[b]	NDA	NDA
6.2 Coffee	1721	NDA	none	3491	NDA	NDA
6.3 Tiger Grass	206	none	none	104300[c]	none	NDA
6.4 Tobacco	NDA	1410	8342	NDA	7512	10194
6.5 Cotton	NDA	NDA	1031	NDA	NDA	1031
6.6 Sugar Cane	NDA		582[a]	NDA		2491.4[a]
6.6.1 Centrifugal		12600			49635.12	
6.6.2 Muscovado or Panutsa		1400			6920	
7. Fruit Trees	3229	329.5	6238			71114
7.1 Mango	460	150	NDA	3469	4800	NDA
7.2 Banana	1687	33	NDA	31504	27720[d]	NDA
7.3 Citrus	431	1.5	NDA	1920	2.88	NDA
7.4 Avocado, etc.	651	NDA	NDA	5627	none	NDA
7.5 Cashew w/ nuts	NDA	25	NDA	NDA	61.5	NDA
7.6 Watermelon	NDA	80	NDA	NDA	300	NDA
7.7. Caimito	NDA	18	NDA	NDA	27000[b]	NDA
7.8 Chico	NDA	10	NDA	NDA	10000[b]	NDA
7.9 Jackfruit	NDA	6	NDA	NDA	225[b]	NDA
7.10 Guyabano	NDA	6	NDA	NDA	375[b]	NDA
7.11 Tieza	NDA	NDA	NDA	NDA	NDA	NDA
8. Coconut(nuts x 1000)	none	NDA	8851[a]	NDA	NDA	27682[a]

Legend: a - 1987 data, 1988 - NDA b - dozen c - bundles d - bunches
Data Sources: Department of Agriculture, Region I; Bureau of Statistics

Table 2.9 AREA AND PRODUCTION OF FISHERIES BY SOURCES

SOURCES	PROVINCE					
	Benguet (1984)		Pangasinan (1987)		Tarlac (1985)	
	Area(ha)	Production(mt)	Area(ha)	Production(mt)	Area(ha)	Production(mt)
1. Inland Fisheries						
1.1 Freshwater fishpond	1.7736	51.534 (tilapia, carp)	958.69	1435.80 (tilapia)	852.20	974.55 (tilapia,mudfish)
1.2 Brackishwater fishpond	0	0	15450.70	23176.00 (milkfish,prawn)	0	0
1.3 Communal fishing grounds (lakes,rivers, creeks,reservoirs,swamps)	NDA	NDA	7303.84	759.49	1117.60	NDA
1.4 Oyster farms	0	0	38.06	1758.52	0	0
1.5 Rice-fish Culture	NDA	NDA	10.63	4.46	66.80	NDA
Total	1.7736	51.534	23761.92	27134.26	2036.60	974.55
2. Marine Fisheries						
2.1 Municipal Fisheries	0	0	NDA	13668.800	0	0
2.2 Commercial Fisheries (more than 7 fathoms deep)	0	0	*	987.000	0	0
Total	0	0	NDA	14655.800	0	0
Reference:	1985 Provincial Development Plan, Provincial Government of Benguet		BFAR, Dagupan City		1986 Socio-Economic Profile, Provincial Planning and Development Office, Tarlac	

NDA - No Data Available
NA - Not Applicable

* Fishing Grounds:

Lingayen Gulf	Olanen Bay	Dasol Bay	Lucap Bay
China Sea	Caquiputan Channel	Tambac Bay	Sual Cove

Table 2.10 LIST OF PARKS, RESERVATIONS AND ARCHAEOLOGICAL SITES IN OR NEAR THE STUDY AREA

Name	Location	Area (ha)
1. National Parks (NP)		
1.1 Manleluag Hot Spring NP	Mangatarem, Pangasinan	92
1.2 Capas Death March Monument NP	Capas, Tarlac	2
1.3 Mt. Data NP	Bokod, Tublay and Kabayan, Benguet	DNA
1.4 Mt. Pulog NP	Buguias and Kabayan, Benguet	DNA
1.5 Hundred Islands NP	Alaminos, Pangasinan	DNA
1.6 Agoo-Damortis Seashore NP	Agoo, La Union	DNA
2. Municipal Park		
2.1 San Manuel MP	Lapalo, San Manuel, Pangasinan	3
3. Barangay Forest Park		
3.1 Calunetan BFP	Calunetan, Sison, Pangasinan	1.1
4. Watershed Forest Reservation (WFR)		
4.1 Lower Agno WFR	Tuba, Itogon and Benguet, Baguio City San Manuel and San Nicolas, Pangasinan	48,854
4.2 Ambuklao-Binga WFR	Atok, Bokod and Buguias, Benguet	73,350
5. Military Reservation		
5.1 Camp John Hay and Phil. Military Academy		554
5.2 Clark Air Base, Camp. Aquino, Camp O'Donnell	Tarlac	36,588
5.3 Military Reservation (PC)	Manaoag, Pangasinan	288
6. Civil Reservation		
6.1 DNA	Pangasinan	923
6.2 DNA	Tarlac	665
7. Archaeological Site		
7.1 Aquino Site	Parangking, Calasiao, Pangasinan	73,350
7.2 Agbayani Site	Bayambang, Pangasinan	
7.3 Opdas Rockshelter	Kabayan, Benguet	
7.4 Ambacdet Rockshelter	Kabayan, Benguet	
7.5 Tenongchol Rockshelter	Kabayan, Benguet	
7.6 Timbac Cave A	Kabayan, Benguet	
7.7 Timbac Cave B	Kabayan, Benguet	
7.8 Bangao	Kabayan, Benguet	
7.9 Naapay	Kabayan, Benguet	
7.10 Pacso	Kabayan, Benguet	

Note ; Items 7.3 to 7.10 are burial (mummies) sites
DNA : Data not Available

Table 2.11 POPULATION AND LOCATION OF CULTURAL MINORITIES IN THE AGNO RIVER BASIN, 1983

Ethnic Group	Population	Location In Study Area
Ayta or Agta	100	Tarlac (CAMILING, TARLAC)
	115	Pangasinan (SAN NICOLAS, SUAL, UMINGAN, URDANETA)
	25	Nueva Viscaya (KAYAPA)
Bolinao or Sambal	125	Benguet (BAGUIO, ITOGON, TUBA)
	29,795	Pangasinan (Anda, Bani, Bolinao, DAGUPAN CITY, Dasol, INFANTA, SAN NICOLAS)
	1,180	Tarlac (BAMBAN, CAPAS, GERONA, TARLAC)
	89,010	Zambales (BOTOLAN, Cabangan, CANDELARIA, Castillejos, Iba MASINLOC, Olongapo, PALAUIG, San Antonio, San Felipe, San Marcelino, STA CRUZ, Subic)
Bontoc or Igorot	15,015	Benguet (Atok, BAGUIO, Bakun, BOKOD, ITOGON, LA TRINIDAD Mankayan, TUBA, TUBLAY)
	75	Pangasinan (Dasol, SAN QUINTIN)
	25	Nueva Viscaya (Aritao, Kasibu, KAYAPA)
Inibaloi or Ibaloi	68,960	Benguet (ATOK, BAGUIO, Bakun, BOKOD, BUGUIAS, ITOGON, KABAYAN, Kapangan, LA TRINIDAD, Sablay, TUBA, TUBLAY)
	565	La Union (Burgos, PUGO, ROSARIO, San Fernando)
	280	Nueva Ecija (CARRANGLAN, Laur, LUPAO)
	11,040	Nueva Viscaya (Aritao, Bamban, Diadi, Dupax(S), Kasibu KAYAPA, Quezon, STA. FE, A. Castaneda)
	750	Pangasinan (MABINI, MANAOAG, SISON, URDANETA)
	55	Tarlac (CAMILING, CAPAS)
Ifugao	3,725	Benguet (BUGUIAS, KABAYAN, BOKOD)
	100,805	Ifugao (BANAWE, HUNGDUAN, KIANGAN, Lagare, Mayoyoa, Potia)
	11,925	Nueva Viscaya (Aritao, Bamban, Bayombong, Diadi, Dupax(N), Kasibu, Quezon, STA. FE, Solario, Villa Verde, A. Castaneda)
	25	Pangasinan (Dasol)
Ilanum	20	Nueva Viscaya(KAYAPA)
Isinai	25	Benguet (BAGUIO)
	55	La Union (STO. TOMAS)
	55	Nueva Ecija (CUYAPO, Laur)
	145	Pangasinan (Alaminos, STA. BARBARA, STA. MARIA, URDANETA)
Ivatan	20	Benguet (BAGUIO)
	75	Nueva Ecija (CARRANGLAN, San Jose City, Talavera)
	25	Tarlac (TARLAC)
Kankanai	79,155	Benguet (BAGUIO, Bakun, BOKOD, BUGUIAS, ITOGON, KABAYAN, Sablay, TUBA, TUBLAY)
	25	Ifugao (HUNGDUAN)
	75	Pangasinan (AGUILAR, MANAOAG)
Kalinga	2,565	Benguet (ATOK, BAGUIO, Bakun, ITOGON, Mankayan, Sablay, TUBA, TUBLAY)
Subanon	25	Pampanga (Lubao, MABALACAT)
Yogod	100	Nueva Viscaya (Bambang, Diadi, KAYAPA)

Source: 1983 Philippine Statistical Yearbook, NSCD, NEDA
Note: Capitalized places are within the study area

Table 2.12 MALARIA MORBIDITY AND MORTALITY RATES PER 100,000 POPULATION

Year	Location							
	Philippines		Benguet		Pangasinan		Tarlac	
	Morb.	Mort.	Morb.	Mort.	Morb.	Mort.	Morb.	Mort.
1975	63.7	2.4	17.7	2.0	10.7	0.2	1.1	0.3
1976	81.3	2.3	8.6	1.0	11.2	0.3	22.1	0.5
1977	66.6	2.2	3.7	2.8	6.8	0.5	31.4	-
1978	77.7	2.4	21.2	0.5	5.2	0.6	22.8	0.4
1979	68.2	2.5	24.6	0.4	5.2	0.5	0.3	0.04
1980	82.1	2.2	20.6	1.3	12.0	1.0	2.3	-
1981	89.1	2.2	11.9	-	6.6	0.5	3.5	0.3
1982	79.7	1.9	21.7	0.8	3.2	0.4	9.2	0.4
1983	105.9	2.1	29.0	1.2	3.1	0.3	1.4	0.4
1984	202.1	1.7	18.4	0.8	6.7	0.1	8.3	0.1
1985	223.1	2.1	42.0	0.7	20.2	0.7	19.4	0.3
1986	221.7	2.1	26.2	0.7	12.8	0.3	10.1	0.4
1987	211.1	2.1	37.4	0.4	23.1	0.4	43.6	0.4

Table 2.13 RATIO OF TOTAL HOUSEHOLDS AVAILING OF THE 3 TYPES OF WATER SUPPLY

Water Supply Classification	Benguet	Pangasinan	Tarlac
Level I - deep/shallow wells open dug wells, unimproved springs	26%	93%	96%
Level II - waterworks system with public faucets	41%	1%	-
Level III - waterworks system connected to individual households	33%	6%	4%

Table 3.1 RESULT OF IEE FOR THE PROJECT

River	Agno River				Pantal-Sinocalan River		Cayanga-Patalan River	
Scheme / Checklist Item	San Roque Dam	Moriones-O'Donnell Dam	River Improvement	Popont Retering Basin	River Improvement	Binaloan Floodway	River Improvement	Bued Closing Dike
A) Problems due to the Location								
1. Resettlement/evacuation	-/B	-/A	-/C	-/C	-/C	-/B	-/C	-/C
2. Encroachment of cultural tribes	o	o	o	o	o	o	o	o
3. Land value changes	+/A	+/A	+/A	+/A	+/A	+/A	+/A	+/A
4. Encroachment of agricultural lands	-/B	-/A	o	o	o	-/B	o	o
5. Depreciation of forestry	o	o	o	o	o	o	o	o
6. Inundation of mineral resources	-/C	o	o	o	o	o	o	o
7. Encroachment of historical/cultural values	o	o	-/C	o	o	o	o	o
8. Watershed erosion/silt runoff	-/C	-/C	o	o	o	o	o	o
9. Effects on groundwater hydology	=	=	o	o	o	-/C	o	o
10. Impairment of navigation	o	o	-/C	o	-/C	o	-/C	o
11. Encroachment of precious ecology	o	o	o	o	o	o	o	o
12. Migrating valuable fish species	o	o	o	o	o	o	o	o
B) Problems related to the Design								
1. Road erosion	-/B	-/B	o	o	o	o	o	o
2. Water light conflicts	-/C	o	o	o	o	o	o	o
3. Loss of community and recreation areas	o	-/B	o	o	o	-/C	o	o
4. Intensification of traffic congestion	o	o	o	o	o	o	o	o
5. Aesthetic and landscape	o	o	o	o	o	o	o	o
6. Prevention of accessibility	-/C	-/C	o	=	o	o	o	o
C) Problems in Construction Stage								
1. Soil erosion and silt runoff	-/C	-/C	o	o	o	o	o	o
2. Hazards to workers and nearby residents	-/C	-/C	-/C	o	-/C	-/C	-/C	o
3. Spread to communicable diseases	o	o	o	o	o	o	o	o
4. Deterioration of water quality	o	o	o	o	o	o	o	o
D) Problems in Operation Stage								
1. Downstream erosion / aggradation	-/C	-/C	o	o	o	o	o	o
2. Deterioration of water quality	o	o	o	o	o	-/B	o	o
3. Intrusion of saline water	-/C	o	o	o	o	o	o	o
4. Eutrophication	-/B	-/C	o	=	o	o	o	o
5. Encroachment of precious ecology	o	o	o	o	o	o	o	o
6. Depreciation of fisheries	+/C	o	o	o	o	o	o	o
7. Vector disease hazards	o	o	o	-/C	o	o	o	o
8. Aesthetic and landscape	o	o	o	o	o	o	o	o

Note: (1) /:Upper side is the expected effect, and lower side is its significanc

(2) o: No effect expected,
+: Positive effect expected,
-: Negative effect expected,
=: Neutral effect expected, i.e. there may be a change but such change will be neither beneficial and harmful,

(3) A: Effect which has relatively high level of significance,
B: Effect which has relatively medium level of significance,
C: Effect which has relatively low level of significance,

FIGURES

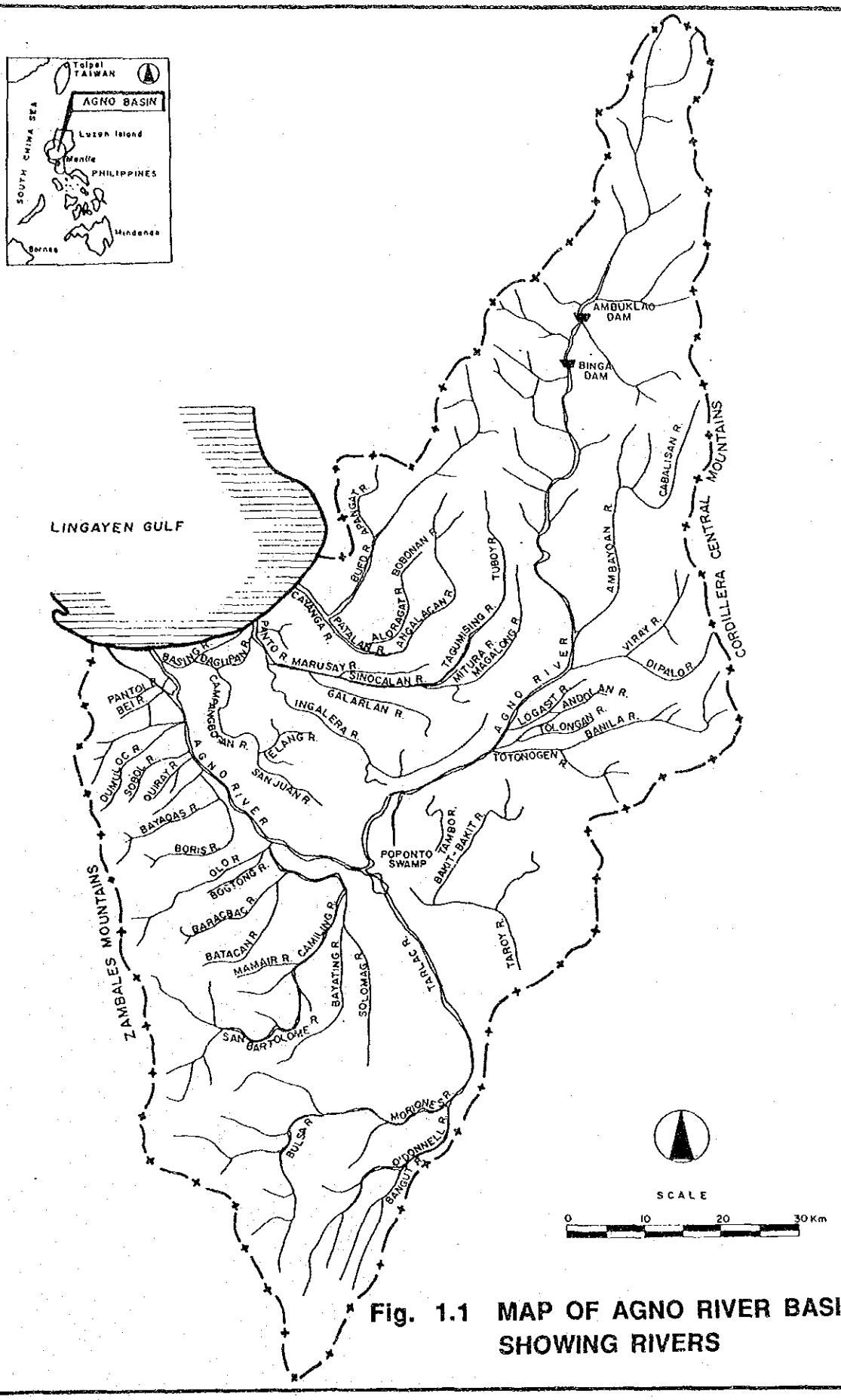

Fig. 1.1 MAP OF AGNO RIVER BASIN SHOWING RIVERS

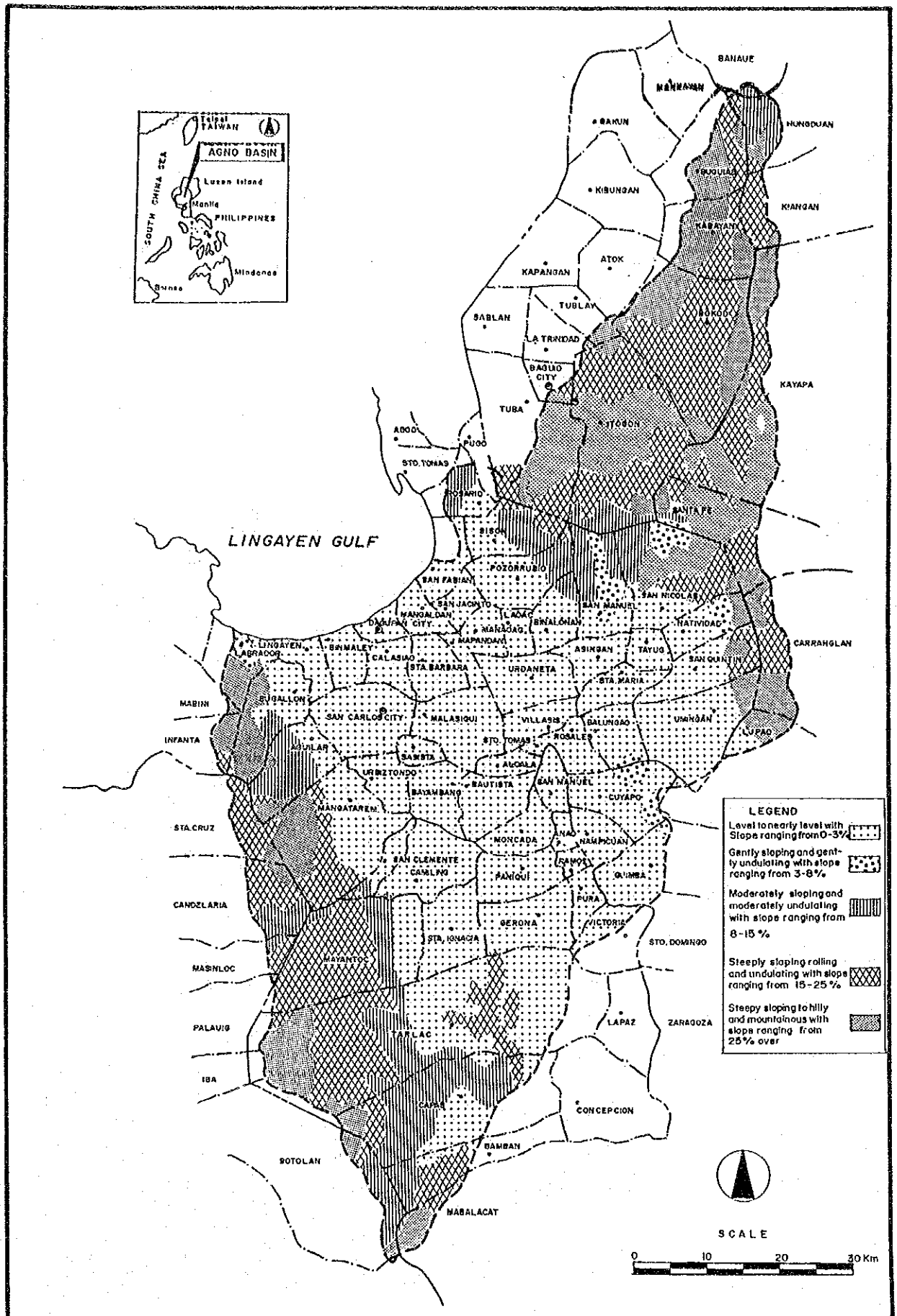

Fig. 2.1 GENERAL SLOPES, AGNO RIVER BASIN

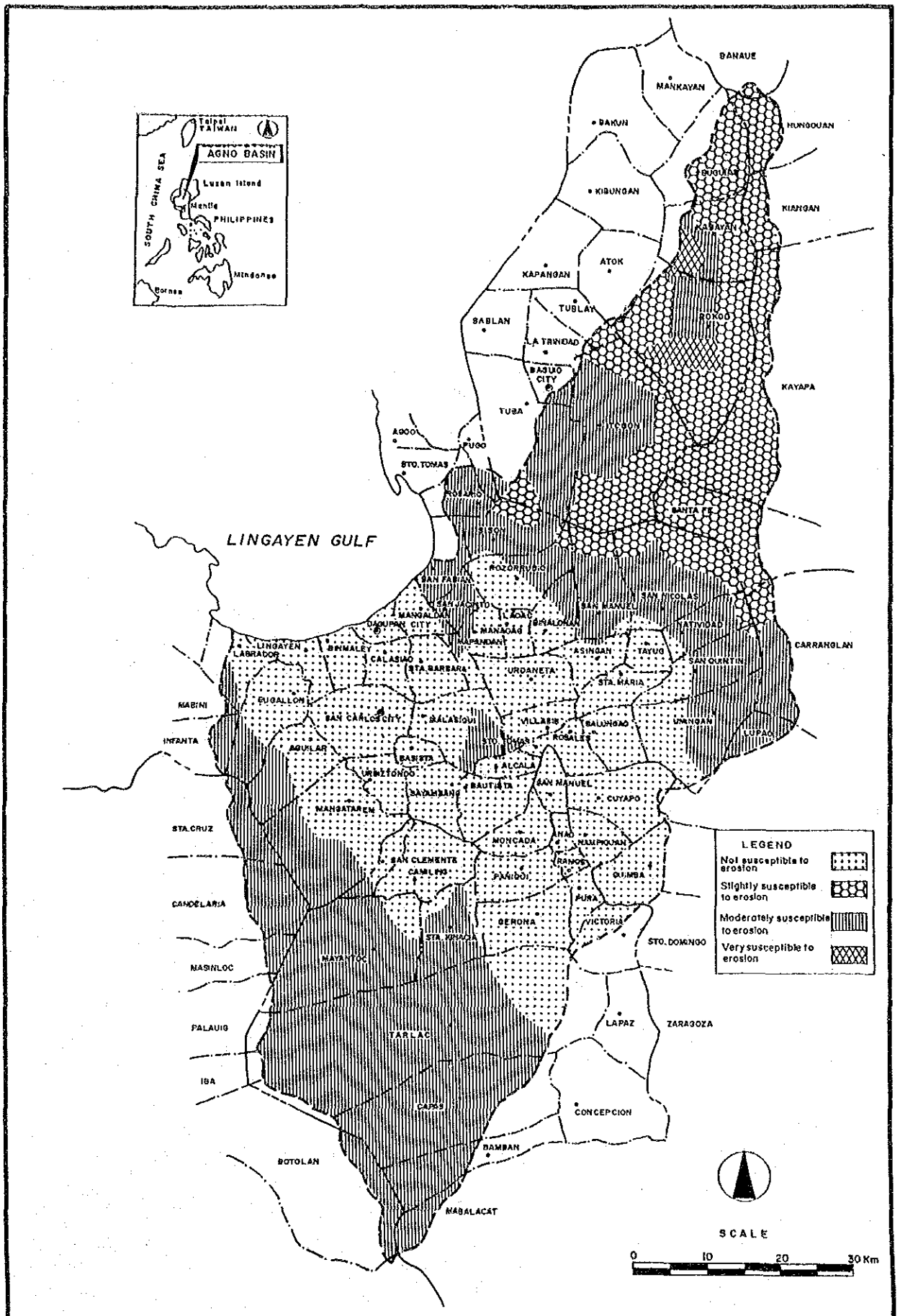

Fig. 2.2 SOIL EROSIN SUSCEPTIBILITY MAP, AGNO RIVER BASIN

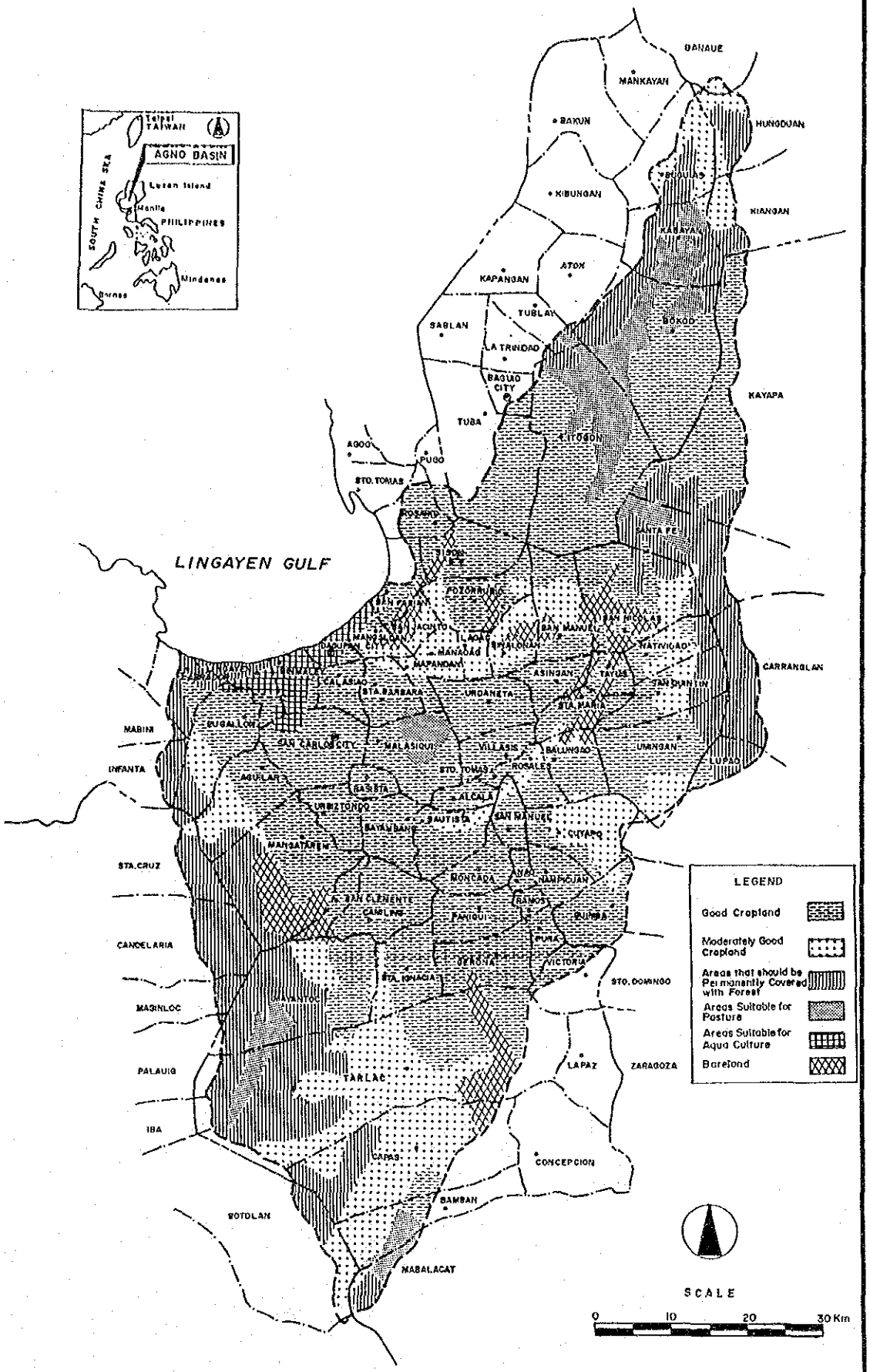

Fig. 2.3 LAND CAPABILITY MAP, AGNO RIVER BASIN

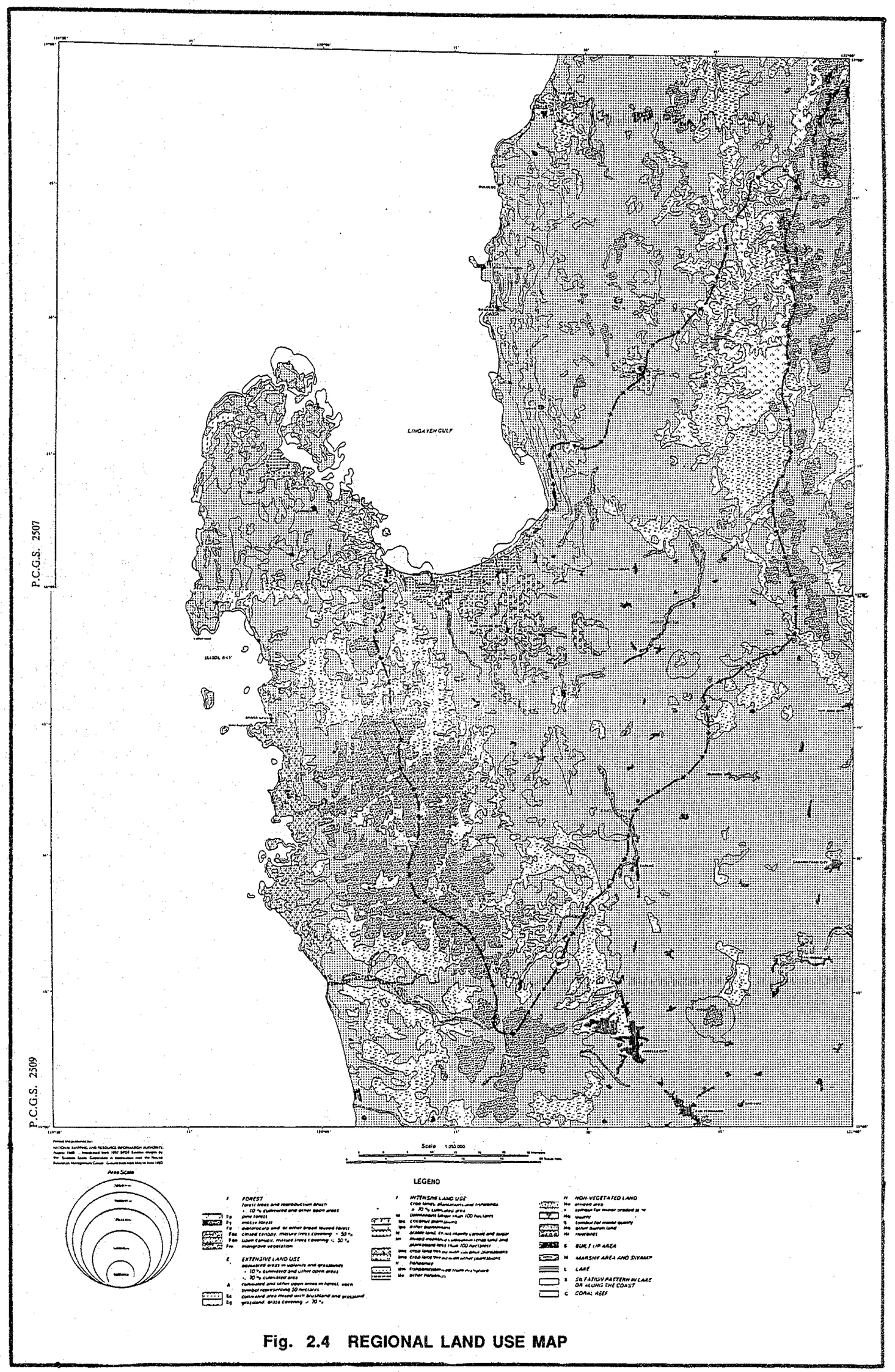

Fig. 2.4 REGIONAL LAND USE MAP

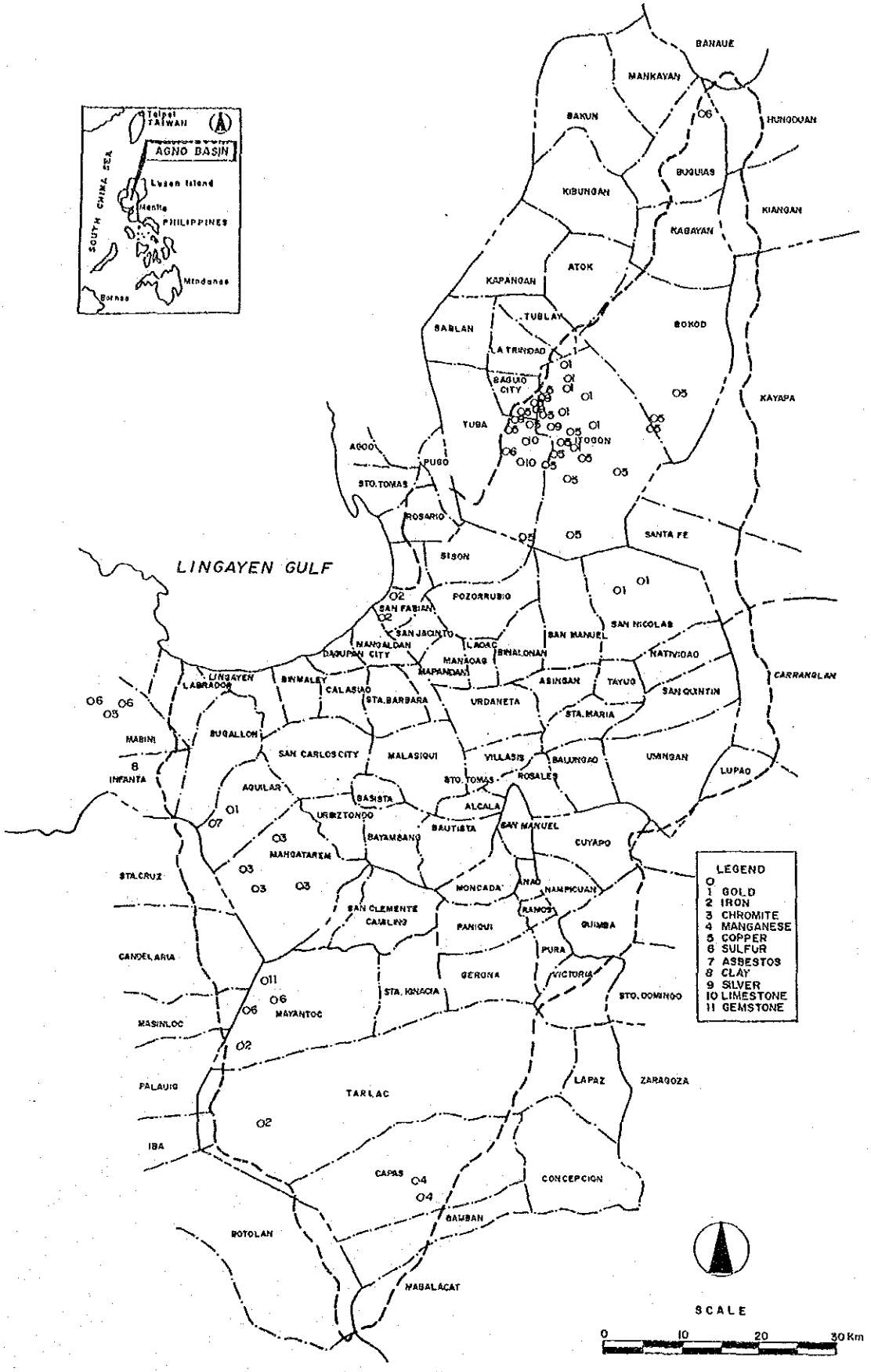

Fig. 2.5 LOCATION MAP OF MINERAL DEPOSIT IN THE AGNO RIVER BASIN

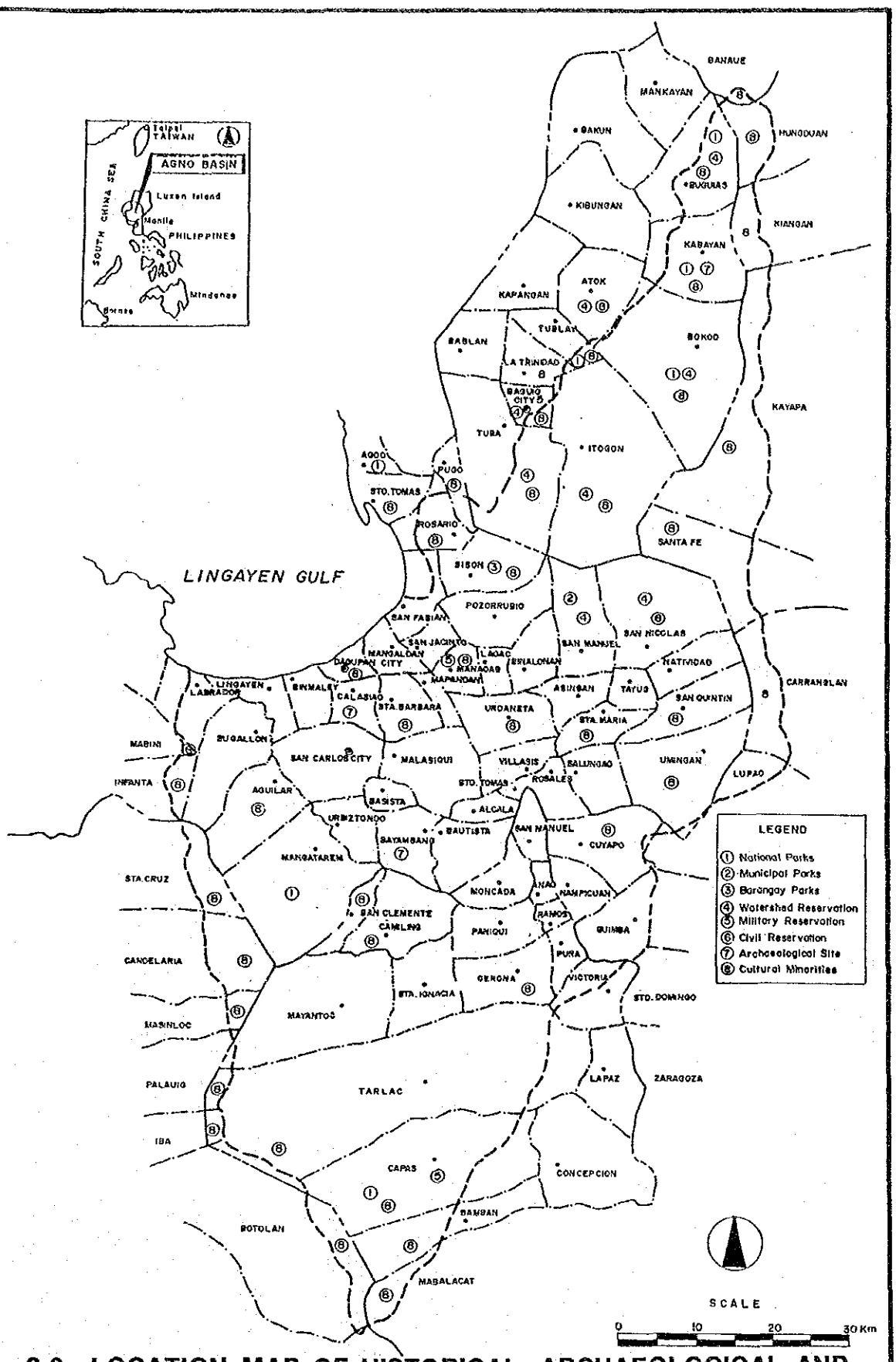

Fig. 2.6 LOCATION MAP OF HISTORICAL, ARCHAEOLOGICAL AND TOURISM SITES, PARKS, RESERVATIONS AND CULTURAL MINORITIES