

**Appendix 3**

**Household Survey Questionnaire  
Agriculture Section**



**National Planning and Development Agency  
Census and Statistics Unit**



The World Bank



United Nations Development Program



Asian Development Bank



Japan International Cooperation Agency

**POVERTY ASSESSMENT PROJECT  
HOUSEHOLD SURVEY 2001**

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Household interviewed by	Code		Day	Month	Year
		Visit 1			
		Visit 2			
		Visit 3			
Supervised in the field by	Code		Day	Month	Year
		Visit 1			
		Visit 2			
Data entered by	Code		Day	Month	Year
		Session 1			
		Session 2			
		Session 3			

Distrito	Distrito Code
Posto	Posto Code
Suco	Suco Code
Aldeia	Aldeia Code
Head of the Household	HH Serial Number

Job No.	Task	Team	HH No.

**STRICTLY CONFIDENTIAL**

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**SECTION 9: FARMING, LIVESTOCK, FORESTRY AND FISHERIES**

**PART A: PLOTS**

(1) During the last year (from (MONTH, YEAR to MONTH, YEAR) has any member of your household cultivated crops, or has any member of your household owned or controlled any arable land? YES 1  NO 2

>> PART D (Forestry)

**FARM PLOTS**

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P L O T  I D	(2)	(3)		(4)		(5)	(6)	(7)
	Please tell me about each plot of land that a member of your household cultivated, or any plot of arable land a member of your household controlled, even though it does not belong to your household. Include also garden plots. Please describe or give me the name of each plot.	Who in this household makes the decisions about this plot of land?  WRITE DOWN THE NAME OF THE HOUSEHOLD MEMBER AND THE PERSON'S ID CODE. ASK THIS PERSON QUESTIONS 4-21.		What is the area of this plot?  AREA UNITS: SQ. METRES ARES (10m x 10m) HECTARES (100m x 100m) OTHER ( )		What kind of land is this?  BACA SEMUA PILIHAN PADA DAFTAR DI BAWAH INI ANNUAL CROPS OR FALLOW 1 TREE CROP LAND 2 FOREST 3 >>8 PASTURE 4 >>8 PLANTATION 5 BUSH/UNDERBRUSH 6 GRASSLAND 7 SWAMP 8 GARDEN/GARDEN PLOT 9 WATER SURFACE 10 >>8 HOUSE/BUILDING 11 OTHER ( ) 12	Did you plant crops on the entire plot or only a part of it? If part, indicate approximately how much was cropped.  NONE 1 1-25% 2 25-50% 3 50-75% 4 ENTIRE 5 >>8	Why did you not crop the entire plot?  CROP ROTATION 1 LACK OF INPUTS 2 LACK OF MANPOWER 3 LACK OF EQUIPMENT 4 LACK OF ANIMAL POWER 5 NO WATER SOURCE 6 NO ROAD 7 PROBLEMS WITH SOIL 8 OTHER RISKS 9
		NAME OF PLOT	NAME	CODE	AMOUNT	AREA CODE	OTHER ( )	CODE
1								
2								
3								
4								
5								
6								
7								
8								
9								

**RESPONDENT: HOUSEHOLD HEAD OR MOST INFORMED HOUSEHOLD MEMBER**

SECTION 9: FARMING, LIVESTOCK, FORESTRY AND FISHERIES

PART A: PLOTS

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	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	
P L O T  I D	What is the tenure status of this [PLOT]?	How did your household acquire this [PLOT]?	What legal title or ownership rights do you have for this plot of land?	How many years has your household farmed/cultivated or had a right to this [PLOT]?	Does another household dispute the ownership if this [PLOT] by your household?	If you were to sell this [PLOT] of land today, how much could you sell it for?	In general, what is the slope of this[PLOT]?	Is this [PLOT] irrigated?	
	OWNER 1	INHERITED 1		IF LESS THAN 1 YEAR PUT "0"				YES, SIMPLE IRRIGATION 1	
	PART OWNER 2	OPENED 2	DEED 1					YES, SEMI-TECHNICAL 2	
	RENTED FROM SOMEONE 3 >>13	PURCHASED 3	SALES RECEIPT 2					FLAT 1	YES, TECHNICAL IRRIGATION 3
	RENTED TO SOMEONE 4	USE RIGHT GIVEN	CUSTOMARY					SLIGHT SLOPE 2	
	PUBLIC LAND 5 >>13	BY LOCAL LEADER 4	RIGHT 3			YES 1		MODERATE SLOPE 3	NO 4
	PRIVATE LAND 6	OCCUPIED 5	OTHER ( ) 4			NO 2		STEEP SLOPE 4	>>19
	OTHER ( ) 7	OTHER ( ) 6	NONE 5						
						YEARS		RUPIAH	
1						00000000,000			
2						00000000,000			
3						00000000,000			
4						00000000,000			
5						00000000,000			
6						00000000,000			
7						00000000,000			
8						00000000,000			
9						00000000,000			

RESPONDENT: HOUSEHOLD HEAD OR MOST INFORMED HOUSEHOLD MEMBER

SECTION 9: FARMING, LIVESTOCK, FORESTRY AND FISHERIES

PART A: PLOTS

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P L O T  I D	(16)	(17)	(18)	(19)	(20)					(21)	(22)
	Is the irrigation seasonal or year-round?	What is the mode of irrigation on the [PLOT]?	Who manages the irrigation system that is used on the [PLOT]?	How far is this [PLOT] from the road?	What were the main crops grown on this [PLOT] during the last year, during both dry and wet seasons?					How do you cultivate your field?	Did your household harvest any coffee in the past 12 months?
		TUBEWELL 1 DITCH/CANAL 2 POND/TANK 3 RIVER 4 SPRING 5	SELF-MANAGED 1 FARMER COMMUNITY 2 AGENCY MANAGED 3 COMMUNITY MANAGED 4 OTHER ( ) 5		USE THE CROP CODES ABOVE  LIST UP TO FIVE CROPS, PUTTING THEM IN ORDER OF IMPORTANCE					BY HAND 1 TRAMPLING WITH OWN ANIMALS 2 TRAMPLING WITH RENTED ANIMALS (RENCAH) 3 TRACTOR 4	YES 1 NO 2
	SEASONAL 1 YEAR-ROUND 2	MIXED OTHER ( )		KM	1ST	2ND	3RD	4TH	5TH		
1											
2											
3											
4											
5											
6											
7											
8											
9											

RESPONDENT: HOUSEHOLD HEAD OR MOST INFORMED HOUSEHOLD MEMBER

### CROP CODES

Rice	1
Maize	2
Cassava	3
Coffee	4
Kidney Bean	5
Sweet Potato	6
Potato	7
Tubers ("umbi-umbian")	8
Squash	9
Mung Bean	10
Coconut	11
Peanuts	12
Vegetables	13
Bananas	14
Fruit trees	15

SECTION 9: FARMING, LIVESTOCK, FORESTRY AND FISHERIES

PART B: CROPS HARVESTED SECTION 9: FAI

KODE TANAMAN	(1)		(2)		(3)	(4)		(5)	(6)	(7)		(8)	(9)	(10)	(11)	(12)		
	Did you harvest any [CROP] during the last year, since [MONTH] [YEAR]?		What is the area of the plot you grow this [CROP] on?		How many times per year do you harvest this [CROP]?	What was the total yield of [CROP] in the last year, since [MONTH] [YEAR]?		What percentage of the [CROP] you harvested during the last year was sold?	What price did you get for the [CROP] you sold?	To whom did you sell this [...]?		What percentage of the [CROP] harvested did you barter in exchange for other goods?	After it was harvested, what percentage of [CROP] was lost to insects, rodents, rotting or some other problem?	What percentage of the [CROP] harvested during the last year was given to pay laborers or make other payments?	What percentage of the [CROP] harvested during the last year has already been consumed by your household?	How much [CROP] did household buy in the months? ONLY AS RICE, CORN AND C.		
	ASK QUESTION 1 FOR EACH CROP BEFORE ASKING QUESTIONS 2-16	AREA UNIT:																
	CROP NAME	YES	NO	AMOUNT	AREA UNIT		AMOUNT	UNIT CODE	%	RUPIAH	UNIT CODE	1ST	2ND	%	%	%	%	AMOUNT
						ONCE A YEAR			IF 0 >> 8	IF MORE THAN ONE PRICE, GET THE AVERAGE PRICE								IF NONE, PU
						TWICE A YEAR												
						THREE TIMES A YEAR												
						MORE THAN THREE												
01	Gogo rice																	
02	Rice																	
03	Maize																	
04	Cassava																	
05	Coffee (Cherries)																	
06	Coffee (Dry beans)																	
07	Kidney bean																	
08	Sweet potatoe																	
09	Potatoe																	
10	Taro (Talas/Kontas)																	
11	Squash																	
12	Mung bean																	
13	Soy bean																	
14	Coconut																	
15	Peanuts																	
16	Vegetables																	
17	Bananas																	
18	Other fruit																	

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UNIT CODE: Kg. - 1 Kaleng (11 Litres) - 2 Kaleng Susu (390 g) - 3 Buah - 4 Karung (50Kg) - 5 Karung (100Kg) - 6

KODE SATUAN:

RESPONDENT: HOUSEHOLD HEAD OR MOST INFORMED HOUSEHOLD MEMBER



KODE TANAMAN	KODE UNIT	(13)	(14)	(15)	(16)
		While [CROP] was still growing in the field, did you have any loss of the crop due to pests or plant diseases?	What pests caused the loss while the crop was growing?	While the [CROP] was in storage, did you have any loss of the crop due to pests or plant diseases?	What pests caused the loss while the crop was in storage?
T 10*	UNIT CODE	YES, MAJOR LOSS	1 MICE/RODENTS	4 YES, MAJOR LOSS	1 MICE/RODENTS
		YES, MINOR LOSS	2 OTHER ANIMALS	5 YES, MINOR LOSS	2 FUNGI
		NO	3 OTHER ( )	6 NO	3 OTHER ( )
		>> 15		>>NEXT CROP	
		1ST	2ND	1ST	2ND

01					
02					
03					
04					
05					
06					
07					
08					
09					
10					
11					
12					
13					
14					
15					
16					
17					
18					

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1: Kg. - 1 Kaleng (11 Liter) - 2 Kaleng Susu (390 g) - 3 Buah - 4 Karung (50Kg) - 5 Karung (100Kg) - 6

RESPONDENT: HOUSEHOLD HEAD OR MOST INFORMED HOUSEHOLD MEMBER

SECTION 9: FARMING, LIVESTOCK, FORESTRY AND FISHERIES

PART C: AGRICULTURAL INPUTS

(1) In the past year have you used manure, fertiliser or pesticides or herbicides on your crops?

YES	1 >>4	
NO	2	

(2) In the past year have you purchased or been given for free any maize, rice or bean seeds?

YES	1 >>4	
NO	2	

(3) Why did you not use fertiliser, pesticides or herbicides on your crops?

>> PART D	
DO NOT LIKE TO USE	1
DO NOT REQUIRE	2
DO NOT KNOW HOW TO USE	3
NOT AVAILABLE	4
TOO EXPENSIVE	5
TOO FAR TO CARRY	6
OTHER ( )	7

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INPUT CODE	(4)	(5)	(6)		(7)	(8)		(9)		(10)		(11)		(12)			
	Did you use any [INPUT] for your crops in the last year?	Why did you not use [INPUT]?	How much [INPUT] did you purchase during the past year?	UNIT	How much did you spend in total to purchase [INPUT] during the past year?	RUPIAH	Where did you purchase this [INPUT] during the past year?	How much of [INPUT] did you receive for free?	AMOUNT	UNIT	From whom did you receive this [INPUT] during the past year?	1ST SOURCE	2ND SOURCE	How much [INPUT] did you produce yourself during the past year?	AMOUNT	UNIT	Which crops did you use the [INPUT] for?
	YES 1 >>6 NO 2	DO NOT LIKE TO USE 1 DO NOT REQUIRE 2 DO NOT KNOW HOW TO USE 3 NOT AVAILABLE 4 TOO EXPENSIVE 5 TOO FAR TO CARRY 6	IF '0' >> 9 Kg. 1 Litre 2		IF '0' >> 11 Kg. 1 Litre 2		SUMBER PERTAMA SUMBER KEDUA				PRIVATE INDIVIDUAL 1 PRIVATE FIRM 2 COOPERATIVE 3 GOVERNMENT 4 NGO 5 FRIEND/RELATIVE 6 LANDLORD 7 OTHER ( ) 8			Kg. 1 Litre 2			CROP CODE 1ST 2ND 3RD
INPUT	OTHER	7	AMOUNT	UNIT	RUPIAH			AMOUNT	UNIT	SOURCE	SOURCE	AMOUNT	UNIT	1ST	2ND	3RD	
6001	Manure																
6002	Fertiliser																
6003	Pesticide																
6004	Herbicide																
6005	Rice Seeds																
6006	Maize Seeds																
6007	Bean Seeds																

RESPONDENT : HOUSEHOLD HEAD OR MOST INFORMED HOUSEHOLD MEMBER



**SECTION 9: FARMING, LIVESTOCK, FORESTRY AND FISHERIES**

**PART E: FARMING EQUIPMENT**

I M P L E M E N T C O D E		(1)
		How many [IMPLEMENTS] does your household own today?
		IF "0" >>NEXT IMPLEMENT
	IMPLEMENTS	AMOUNT
7001	Hoes	
7002	Axes	
7003	Shovels	
7004	Picks	
7005	Big knife	
7006	Sickle/Reaping hook	
7007	Hand thresher	
7008	Rice miller	
7009	Crop drying area	
7011	Tarp/Canvas	
7012	Basket	
7013	Small cart pushed by person	

(2)

Did your household own or rent any farm equipment such as tractors, plows, threshers, pumps or oxcarts in the last year?

YES 1

NO 2 >>PART F

**PERALATAN PERTANIAN**

E Q U I P M E N T C O D E		(3)	(4)	(5)	(6)
		During the last year has any member of your household owned a [EQUIPMENT]?	During the last year, has any member of your household rented a [EQUIPMENT]?	How many days in total did you rent [EQUIPMENT] during the past year?	How much did you spend per day to rent the [EQUIPMENT]?
	EQUIPMENT	YES 1 NO 2	YES 1 NO 2 >>NEXT EQUIPMENT	DAYS	RUPIAH/DAY

7021	Tractor				_____ ,000
7022	Machine pulled plow or harrower				_____ ,000
7023	Animal pulled plow				_____ ,000
7024	Mechanical water pump				_____ ,000
7025	Motorized thresher				_____ ,000
7026	Rice winnower				_____ ,000
7027	Rice/Com mill				_____ ,000
7028	Motorized insecticide pump				_____ ,000
7029	Hand insecticide pump				_____ ,000
7031	Manual coffee grinder				_____ ,000
7032	Motorized coffee grinder				_____ ,000
7033	Ox cart				_____ ,000

**RESPONDENT: HOUSEHOLD HEAD OR MOST INFORMED HOUSEHOLD MEMBER**

**SECTION 9: FARMING, LIVESTOCK, FORESTRY AND FISHERIES**

**PART F: LABOUR & FARM PRODUCE**

**FARM LABOUR**

(1)

Did your household hire any farm labourers in the past year?

YES	1	
NO	2 >>6	

**FARM PRODUCE**

(7)

Did your household sell any farm products for cash in the past year?

YES	1	
NO	2	

>> PART G

TYPE OF LABOURER	CODE	(2)	(3)	(4)	(5)
		How many [TYPE] labourers did your household hire for farm work in the last year?	How many days in total (including exchange days) did you hire [TYPE] labourers during the past year?	Did you pay [TYPE] in cash, in kind or both?	What is the wage for one day for [TYPE] labour on the farm?
		ASK FOR ALL TYPES BEFORE ASKING Q 3-5		PAID IN KIND	INCLUDE THE VALUE OF IN KIND PAYMENTS
				PAID IN CASH	
				PAID IN BOTH	
					DAILY WAGE RUPIAH

(8)	(9)
During the past 12 months, has your household sold [PRODUCE] for cash?	How much did you receive from the sale of [PRODUCT] in the past year?
ASK QUESTION 8 FOR ALL ITEMS FIRST, PUTTING A CROSS [X] IN THE APPROPRIATE BOX. THEN ASK Q. 9 FOR ALL ITEMS THAT WERE SOLD FOR CASH BY THE HOUSEHOLD	
ITEM	NO YES CODE RUPIAH

Male adult	1				_____,000
Female adult	2				_____,000
Child [< 15 YRS]	3				_____,000

Eggs			6001	_____,000
Meat			6002	_____,000
Animal hides			6003	_____,000
Bananas			6004	_____,000
Other fruit			6005	_____,000
Other (____)			6006	_____,000

(6)

In the last 12 months, how much did you spend for:

	RUPIAH
Transportation for marketing crops	_____,000
Irrigation	_____,000

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**RESPONDENT: HOUSEHOLD HEAD OR MOST INFORMED HOUSEHOLD MEMBER**

SECTION 9: FARMING, LIVESTOCK, FORESTRY AND FISHERIES

PART G: LIVESTOCK

(1) Did any member of your household raise or own livestock, poultry or any other domesticated animal before the violence in 1999, or in the last year, since [MONTH], [YEAR]?

YES	1	
NO	2 >> PART H	

A N I M A L  C O O D E	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
	Either before the violence in 1999, or during the last year, has any member of your household raised any [ANIMALS]?	How many [ANIMALS] were owned by your household before the violence in 1999?	How many young [ANIMALS] are owned by your household today?	If you sold one of those young [ANIMALS] today, how much money could you get for it?	How many adult [ANIMALS] are owned by your household today?	If you sold one of those adult [ANIMALS] today, how much money could you get for it?	How many of your [ANIMALS] did you sell during the last year?	How much did your household receive for the sale of all these [ANIMALS] during the last year?	How many of your [ANIMALS] died or were lost to disease during the last year?	How many of your [ANIMALS] were stolen during the last year?	How many of your [ANIMALS] did your household eat during the last year?
	FIRST ASK QUESTION 2 FOR ALL ANIMALS, THEN ASK QUESTIONS 3-15 FOR EACH ANIMAL BEFORE GOING TO THE NEXT ONE.							IF "0" >>10	INCLUDE VALUE OF IN KIND PAYMENTS		
	YES 1 NO 2										
	ANIMAL >>NEXT ANIMAL	NUMBER	NUMBER	RUPIAH	NUMBER	RUPIAH	NUMBER	RUPIAH	NUMBER	NUMBER	NUMBER
8001	Buffalo			_____ ,000		_____ ,000		_____ ,000			
8002	Bali cow			_____ ,000		_____ ,000		_____ ,000			
8003	Cow			_____ ,000		_____ ,000		_____ ,000			
8004	Horse			_____ ,000		_____ ,000		_____ ,000			
8005	Pig			_____ ,000		_____ ,000		_____ ,000			
8006	Goat			_____ ,000		_____ ,000		_____ ,000			
8007	Sheep			_____ ,000		_____ ,000		_____ ,000			
8008	Chicken			_____ ,000		_____ ,000		_____ ,000			
8009	Duck			_____ ,000		_____ ,000		_____ ,000			
8011	Other (____)			_____ ,000		_____ ,000		_____ ,000			

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RESPONDENT: HOUSEHOLD HEAD OR MOST INFORMED HOUSEHOLD MEMBER

**SECTION 9: FARMING, LIVESTOCK, FORESTRY AND FISHERIES**

A N I M A L  C O D E	(13)	(14)
	How many [ANIMALS] did your household purchase during the last year?	How many of your [ANIMALS] are vaccinated?
	NUMBER	NUMBER
8001		
8002		
8003		
8004		
8005		
8006		
8007		
8008		
8009		
8011		

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RESPONDENT: HOUSEHOLD HEAD OR MOST INFORMED HOUSEHOLD MEMBER

**SECTION 9: FARMING, LIVESTOCK, FORESTRY AND FISHERIES**

**PART H: FISHING AND AQUACULTURE**

(1) Has any member of your household raised fish or been engaged in fishing in the past twelve months?

YES	1	
NO	2 >>24	

(2) **BOATS:** Do you use a boat for fishing?

YES	1	
NO	2 >>12	

(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
What type of boat do you use for fishing?	What is the ownership of the boat?	How long have you owned the boat?	What is the length of the boat?	What is the width of the boat?	How old is the hull?	How many members are there in the crew?	What is the source of power for the boat?	If you were to sell this boat today, how much would you get for it?
	OWNED 1						PADDLE/SAIL 1	
CANOE (BASIC) 1	SHARED OWNED 2						LONG TAIL 2	
CANOE (PLANKS) 2	LEASED 3 >>6						OUTBOARD MOTOR 3	
WOODEN BOAT 3	GOVERNMENT OWNED 4 >>6						INBOARD DIESEL 4	
OTHER ( ) 4	OTHER ( ) 5 >>6	YEARS	METRES	METRES	YEARS	NUMBER	OTHER ( ) 5	RUPIAH

01									_____ ,000
02									_____ ,000
03									_____ ,000

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RESPONDENT: HOUSEHOLD HEAD OR MOST INFORMED HOUSEHOLD MEMBER



SECTION 9: FARMING, LIVESTOCK, FORESTRY AND FISHERIES

PART H: FISHING AND AQUACULTURE

FISHING:

(12)		(13)	(14)		(15)	(16)	(17)	(18)	
What type of fishing gear do you use? LIST RESPONSES IN ORDER OF IMPORTANCE		Are there times and places you cannot fish because traditional rules prohibit it?	How long does it take to reach the fishing ground you usually go to?		How many days in the last 12 months did you boat go fishing?	How much money did you and your crew earn in the last 12 months from fishing?	Of this amount, how much did you keep?	What percent of your fish catch do you sell?	
HAND CATCH	1		ONE-WAY TIME ON AVERAGE					IF "0" >> 23	
SPEAR	2								
HAND LINE	3								
GILL NET	4								
CAST NET	5								
FISH/CRAB POT	6 YES								1
TRAP	7 NO								2
BEACH SEINE	8								
	1ST	2ND	HOURS	MINUTES	DAYS	RUPIAH	RUPIAH	%	
01						□□□□□,000	□□□□□,000		
02						□□□□□,000	□□□□□,000		
03						□□□□□,000	□□□□□,000		

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RESPONDENT: HOUSEHOLD HEAD OR MOST INFORMED HOUSEHOLD MEMBER

SECTION 9: FARMING, LIVESTOCK, FORESTRY AND FISHERIES

PART H: FISHING AND AQUACULTURE

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(19)			(20)			(21)		(22)		(23)	
What percentage of your catch is large, medium and small fish?			What is the average price of each fish category you sell?			Who do you sell the fish to?		How do you transport the fish for selling?		What percent of your fish catch do members of your household consume?	
						SELL AT MARKET	1	SOLD IMMEDIATELY AT THE PORT			1
						TRADER	2	ON FOOT			2
						RELATIVE	3	ANIMAL			3
						FRIEND/NEIGHBOR	4	BIKE			4
						OTHER INDIVIDUAL	5	MOTORCYCLE			5
						RESTAURANT	6	BUS			6
						HOTEL	7	CAR/TAXI			7
						WHOLESALE	8	OTHER ( )			8
						RETAILER	9				
						OTHER ( )	10				
PERSEN (%)			RUPIAH/KG								
2 KG - KEATAS	KG 0,5 - 2	KG 0 - 0,5	2 KG - KEATAS	KG 0,5 - 2	KG 0 - 0,5					%	

01				□□□□□,000	□□□□□,000	□□□□□,000			
02				□□□□□,000	□□□□□,000	□□□□□,000			
03				□□□□□,000	□□□□□,000	□□□□□,000			

RESPONDENT: HOUSEHOLD HEAD OR MOST INFORMED HOUSEHOLD MEMBER



## **ANNEX D. METEOROLOGY AND HYDROLOGY**

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**Table D-1 Rainfall Station with Monthly Records Available (1/2)**

No.	Name	Elevation m msl	Latitude-S		Longitude-E		Monthly Records	
			deg.	min	deg.	min	Duration	Year
1	Dili	4	8°	34'	125°	33'	1953 - 1999	47
2	Atauro(Mmau-meta)	4	8°	16'	125°	36'	1955 - 1974	20
3	Dare	498	8°	36'	125°	34'	1953 - 1974	22
4	Baucau	527	8°	30'	126°	24'	1956 - 1999	44
5	Vemasse	6	8°	31'	126°	20'	1957 - 1974	18
6	Laga	65	8°	29'	126°	36'	1956 - 1974	19
7	Venifale	775	8°	38'	126°	20'	1956 - 1974	19
8	Baguia	400	8°	38'	126°	39'	1956 - 1974	19
9	Quelicai	720	8°	37'	126°	33'	1957 - 1974	18
10	Manatuto	4	8°	31'	126°	01'	1957 - 1974	18
11	Soibada	700	8°	52'	125°	57'	1952 - 1974	23
12	Lospalos	394	8°	32'	127°	00'	1953 - 1974	22
13	Luro	425	8°	33'	126°	50'	1957 - 1974	18
14	Iliomar	400	8°	43'	126°	50'	1953 - 1974	22
15	Lautem	174	8°	22'	126°	56'	1957 - 1974	18
16	Tutuala	376	8°	24'	127°	16'	1957 - 1974	18
17	Lore	100	8°	39'	127°	01'	1958 - 1974	17
18	Laivai	36	8°	25'	126°	45'	1960 - 1974	15
19	Viqueque	46	8°	52'	126°	22'	1957 - 1974	18
20	Ossu	688	8°	44'	126°	22'	1952 - 1974	23
21	Ainaro	809	9°	00'	125°	31'	1952 - 1974	23
22	Hato-Builico-Ainaro	1908	8°	55'	125°	31'	1957 - 1975	19
23	Zumalai-Ainaro	108	9°	10'	125°	27'	1953 - 1976	24
24	Same	550	9°	00'	125°	39'	1956 - 1977	22
25	Alas-Manufahi	280	9°	01'	125°	47'	1953 - 1978	26
26	Bbenato-Manufahi	7	9°	10'	125°	43'	1962 - 1979	18
27	Suai-Covalima	71	9°	20'	125°	15'	1964 - 1980	17
28	Fohorem-Covalima	599	9°	17'	125°	05'	1953 - 1981	29
29	Occusse	2	9°	12'	125°	26'	1956 - 1999	44
30	Mmaliana-Bobonaro	200	8°	59'	125°	14'	1953 - 1974	22
31	Bobonaro	850	9°	02'	125°	20'	1957 - 1974	18
32	Fatu Bessi-Bobonao	610	8°	46'	125°	20'	1952 - 1974	23
33	Liquisa	25	8°	36'	125°	20'	1956 - 1974	19
34	Algarve(Fazenda)	916	8°	41'	125°	20'	1952 - 1974	23
35	Gleno-Ermera	770	8°	43'	125°	27'	1968 - 1974	7
36	Ermera	1160	8°	45'	125°	24'	1968 - 1974	7
37	Maubisse	1432	8°	51'	125°	36'	1970 - 1974	5
38	Oe Silo	472	9°	21'	124°	23'	1959 - 1974	16
39	Nitibe	775	9°	21'	125°	13'	1958 - 1964	7
							1966 - 1974	9
40	Lahane	80	8°	35'	125°	35'	1970 - 1974	5
41	Be Suco	20	9°	08'	125°	53'	1971 - 1974	4
42	Remexio	875	8°	37'	125°	40'	1956 - 1964	9
							1966 - 1974	9
43	Aileu	930	8°	44'	125°	34'	1955 - 1964	10
							1966 - 1974	9
44	Balibo	566	8°	58'	125°	03'	1955 - 1964	10
							1966 - 1974	9
45	Atabac	375	8°	49'	125°	09'	1955 - 1964	10
							1966 - 1974	9
46	Lolotoe	520	9°	09'	125°	16'	1956 - 1964	9
							1966 - 1974	9
47	Mau Mali	200	8°	58'	125°	13'	1970 - 1974	5

**Table D-1 Rainfall Station with Monthly Records Available (2/2)**

No.	Name	Elevation m msl	Latitude-S		Longitude-E		Monthly Records	
			deg.	min	deg.	min	Duration	Year
48	Maubara	15	8 °	37'	125 °	12'	1956 - 1964	9
							1966 - 1974	9
49	Atsabe	1200	8 °	56'	125 °	24'	1957 - 1964	8
							1966 - 1974	9
50	Late Foho	1449	8 °	50'	125 °	26'	1957 - 1964	8
							1966 - 1974	9
51	Turiscai	1187	8 °	50'	125 °	42'	1956 - 1964	9
							1966 - 1974	9
52	Fatu Berliu	650	8 °	57'	125 °	53'	1958 - 1964	7
							1966 - 1974	9
53	Laclubar	1101	8 °	45'	126 °	55'	1957 - 1964	8
							1966 - 1974	9
54	Barique	300	8 °	51'	126 °	04'	1955 - 1964	10
							1966 - 1974	9
55	Lachuta	350	8 °	47'	125 °	08'	1957 - 1964	8
							1966 - 1974	9
56	Vato Lari	237	8 °	47'	126 °	34'	1953 - 1972	20
57	Biu Bau	220	8 °	32'	125 °	28'	1983 - 1985	3
58	Ue Lalubo(Quiras)	54	9 °	00'	126 °	01'	1966 - 1974	9
59	Natar Bora	15	9 °	00'	126 °	05'	1966 - 1974	9
60	We Berec	135	9 °	01'	125 °	54'	1963 - 1971	9

Table D-2 Average Monthly Rainfall in East Timor (1/2)

No.	Name	Elevation m msl	Latitude-S		Longitude-E		Monthly average rainfall (mm)												Yearly (mm)
			deg.	min	deg.	min	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	
1	Dili	4	8	34'	125	33'	139	135	149	90	83	60	32	27	23	35	70	149	992
2	Atauro(Mmau-meta)	4	8	16'	125	36'	191	196	123	79	62	47	30	9	8	22	82	129	978
3	Dare	498	8	36'	125	34'	254	286	250	127	88	64	37	21	13	41	122	224	1527
4	Baucau	527	8	30'	126	24'	244	253	198	155	76	43	19	12	16	12	84	208	1320
5	Vemasse	6	8	31'	126	20'	111	108	101	86	81	30	29	18	22	25	59	111	781
6	Laga	65	8	29'	126	36'	117	139	105	73	66	33	20	12	8	18	55	113	759
7	Venilale	775	8	38'	126	20'	311	297	24	121	99	57	45	16	13	26	167	278	1454
8	Baguia	400	8	38'	126	39'	283	295	261	249	405	318	176	52	28	30	117	271	2485
9	Queicai	720	8	37'	126	33'	271	247	275	192	136	78	48	20	19	44	154	278	1762
10	Manatuto	4	8	31'	126	01'	112	105	84	69	46	60	18	11	15	19	36	93	668
11	Soibada	700	8	52'	125	57'	355	368	308	227	294	160	129	44	32	37	142	285	2381
12	Lospalos	394	8	32'	127	00'	228	186	197	201	313	254	126	33	35	23	94	217	1907
13	Luro	425	8	33'	126	50'	263	264	255	199	176	111	71	26	17	63	153	269	1867
14	Iliomar	400	8	43'	126	50'	191	191	173	242	205	344	180	54	28	17	88	165	1878
15	Lautem	174	8	22'	126	56'	109	121	128	117	97	59	29	13	11	24	114	154	976
16	Tutuuala	376	8	24'	127	16'	185	153	146	204	198	171	111	29	22	20	77	156	1472
17	Lore	100	8	39'	127	01'	143	158	151	201	312	253	143	52	33	24	94	120	1684
18	Laivai	36	8	25'	126	45'	95	97	73	76	102	64	50	11	8	6	40	84	706
19	Viqueque	46	8	52'	126	22'	214	202	160	171	244	204	122	36	25	27	70	167	1642
20	Ossu	688	8	44'	126	22'	300	309	233	176	206	156	116	36	25	28	103	259	1947
21	Ainaro	809	9	00'	125	31'	309	361	350	267	210	121	90	49	48	92	295	462	2654
22	Hato-Builico-Ainaro	1908	8	55'	125	31'	453	404	315	194	166	87	42	23	11	50	196	342	2283
23	Zumelai-Ainaro	108	9	10'	125	27'	198	168	128	123	153	103	89	37	16	23	88	192	1318
24	Same	550	9	00'	125	39'	372	365	318	282	445	287	192	63	52	77	218	389	3060
25	Alas-Manufahi	280	9	01'	125	47'	278	266	191	167	274	190	131	45	33	37	117	212	1941
26	Bbenato-Manufahi	7	9	10'	125	43'	168	147	111	127	220	164	101	27	17	22	66	164	1334
27	Suai-Covalima	71	9	20'	125	15'	174	179	126	126	140	115	96	36	14	35	89	180	1310
28	Fohorem-Covalima	599	9	17'	125	05'	182	172	159	109	186	136	80	27	28	41	161	213	1494
29	Oecusse	2	9	12'	125	26'	235	268	172	56	56	15	17	13	8	34	82	129	1085
30	Mmaliana-Bobonaro	200	8	59'	125	14'	429	366	292	136	94	45	23	17	16	64	220	340	2042
31	Bobonaro	850	9	02'	125	20'	466	384	305	210	155	75	44	32	35	107	255	370	2438
32	Fatu Bessi-Bobonao	610	8	46'	125	20'	503	452	401	278	136	59	41	35	67	136	346	478	2932
33	Liquisa	25	8	36'	125	20'	214	180	160	138	165	112	62	44	35	39	95	201	1445



**Table D-2 Average Monthly Rainfall in East Timor (2/2)**

No.	Name	Elevation m msl	Latitude-S deg. min	Longitude-E deg. min	Monthly average rainfall (mm)												Yearly (mm)
					Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	
34	Algarve(Fazenda)	916	8° 41'	125° 20'	324	359	254	150	108	50	42	25	34	76	218	276	1916
35	Glono-Ermera	770	8° 43'	125° 27'	301	309	227	146	99	51	40	29	26	74	185	254	1741
36	Ermera	1160	8° 45'	125° 24'	474	326	429	273	208	64	43	19	83	223	431	436	3009
37	Maubisse	1432	8° 51'	125° 36'	163	174	237	184	123	25	61	47	40	3	122	153	1332
38	Oe Silo	472	9° 21'	124° 23'	394	379	253	60	57	10	7	8	9	32	150	211	1570
39	Nitibe	775	9° 21'	125° 13'	457	392	257	73	21	13	2	4	8	21	253	164	1665
40	Lahane	80	8° 35'	125° 35'	251	298	252	44	72	26	12	11	8	6	223	204	1407
41	Be Suco	20	9° 08'	125° 53'	193	146	116	172	177	128	75	24	31	37	97	239	1435
42	Remexio	875	8° 37'	125° 40'	360	480	440	277	126	67	43	16	20	31	161	300	2321
43	Aileu	930	8° 44'	125° 34'	305	240	203	97	73	27	18	17	24	107	238	395	1744
44	Balibo	566	8° 58'	125° 03'	327	290	261	60	47	17	9	4	5	27	120	208	1375
45	Atabae	375	8° 49'	125° 09'	363	387	154	82	59	29	12	10	22	46	130	246	1540
46	Lolotoe	520	9° 09'	125° 16'	376	378	287	300	429	357	233	71	68	73	279	344	3195
47	Mau Mali	200	8° 58'	125° 13'	296	370	450	52	97	35	2	16	63	116	168	223	1888
48	Maubara	15	8° 37'	125° 12'	144	161	128	53	79	51	44	17	26	16	70	148	937
49	Atsabe	1200	8° 56'	125° 24'	390	403	325	146	118	28	23	13	15	53	180	330	2024
50	Late Foho	1449	8° 50'	125° 26'	486	464	431	157	105	40	31	21	33	83	265	417	2533
51	Turiscari	1187	8° 50'	125° 42'	322	338	298	145	138	86	56	22	21	39	191	395	2051
52	Fatu Berliu	650	8° 57'	125° 53'	317	349	244	237	376	211	108	21	41	59	141	254	2358
53	Laclubar	1101	8° 45'	126° 55'	335	386	237	147	158	83	51	11	17	41	205	365	2036
54	Barique	300	8° 51'	126° 04'	329	369	335	199	276	161	97	44	42	34	137	259	2282
55	Lacluta	350	8° 47'	125° 08'	340	368	382	215	281	223	150	28	33	55	195	329	2599
56	Vato Lari	237	8° 47'	126° 34'	197	216	184	209	311	244	164	52	21	27	70	187	1882
57	Biu Bau	220	8° 32'	125° 28'	57	132	94	91	120	13	0	0	0	64	10	103	684
58	Ue Laluhu(Quiras)	54	9° 00'	126° 01'	140	188	150	115	308	187	129	33	29	17	71	150	1517
59	Natar Bora	15	9° 00'	126° 05'	154	192	169	174	288	233	138	11	31	15	71	198	1674
60	We Berec	135	9° 01'	125° 54	217	217	193	127	295	199	119	13	35	33	69	206	1723

Table D-3 Monthly Rainfall by Location

(unit: mm)

Station	Elevation (m)	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Total
<b>Northern Coastal Area</b>														
Manatuto	17	112	105	84	69	46	60	18	11	15	19	36	93	668
Baucau	527	244	253	198	155	76	43	19	12	16	12	84	208	1,320
<b>Southern Coastal Area</b>														
Viqueque	46	214	202	160	171	244	204	122	36	25	27	70	167	1,642
Alas	280	278	266	191	167	274	190	131	45	33	37	117	212	1,941
<b>Mountain Area</b>														
Same	550	372	365	318	282	445	287	192	63	52	77	218	389	3,060
Ainaro	809	309	361	350	267	210	121	90	49	48	92	295	462	2,654
<b>Other Area</b>														
Oecussi	2	235	268	172	56	56	15	17	13	8	34	82	129	1,085
Atauro	4	191	196	123	79	62	47	30	9	8	22	82	129	978

**Table D-4 Monthly Temperature by Location**

(unit: °C)

Station	Elevation (m)	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Total
<b>Northern Coastal Area</b>														
Manatuto	17.0	26.9	26.8	26.9	26.8	26.6	25.7	25.3	24.8	25.2	26.3	27.2	27.2	26.3
Baucau	527.0	23.6	23.5	23.5	23.7	23.5	23.1	22.4	22.7	23.3	24.1	25.0	24.0	23.5
<b>Southern Coastal Area</b>														
Viqueque	46.0	28.5	28.3	27.4	26.9	26.3	25.6	24.7	25.4	26.0	27.0	28.8	28.9	27.0
Suai	71.0	28.9	28.7	28.5	27.0	26.8	24.3	24.0	25.2	26.2	27.1	28.8	29.0	27.0
<b>Mountain Area</b>														
Ermera	1,160.0	20.8	20.9	20.9	20.6	20.3	19.9	19.6	19.9	20.4	20.9	20.9	20.9	20.5
Ainaro	809.0	20.5	22.3	21.9	21.6	20.4	18.7	18.1	19.2	20.7	21.6	22.5	22.8	20.9
<b>Other Area</b>														
Oecussi	2.0	27.0	26.7	26.6	26.3	27.0	26.1	25.8	25.6	25.6	26.3	27.3	27.5	26.5
Atauro	4.0	27.8	27.5	27.6	27.9	27.5	26.6	26.2	26.3	27.0	28.1	28.7	28.3	27.5

**Table D-5 Monthly Relative Humidity by Location**

(unit: %)

Station	Elevation (m)	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Total
<b>Northern Coastal Area</b>														
Manatuto	17	76	77	76	67	68	65	61	60	63	67	70	72	69
Baucau	527	90	91	87	80	80	75	72	68	67	66	73	84	78
<b>Southern Coastal Area</b>														
Viqueque	46	80	81	79	81	83	83	82	88	80	74	74	75	80
Suai	71	74	75	74	72	77	78	75	74	71	67	67	72	73
<b>Mountain Area</b>														
Ernera	1160	85	86	84	79	79	75	76	74	68	69	77	81	78
Ainaro	809	79	85	84	70	77	82	76	69	58	68	74	81	75
<b>Other Area</b>														
Oecussi	2	80	83	82	75	72	68	66	69	71	73	75	78	74
Atauro	4	67	73	75	71	71	70	68	69	69	68	68	71	70

Figure D-1 Location of Meteorological Stations

D-8

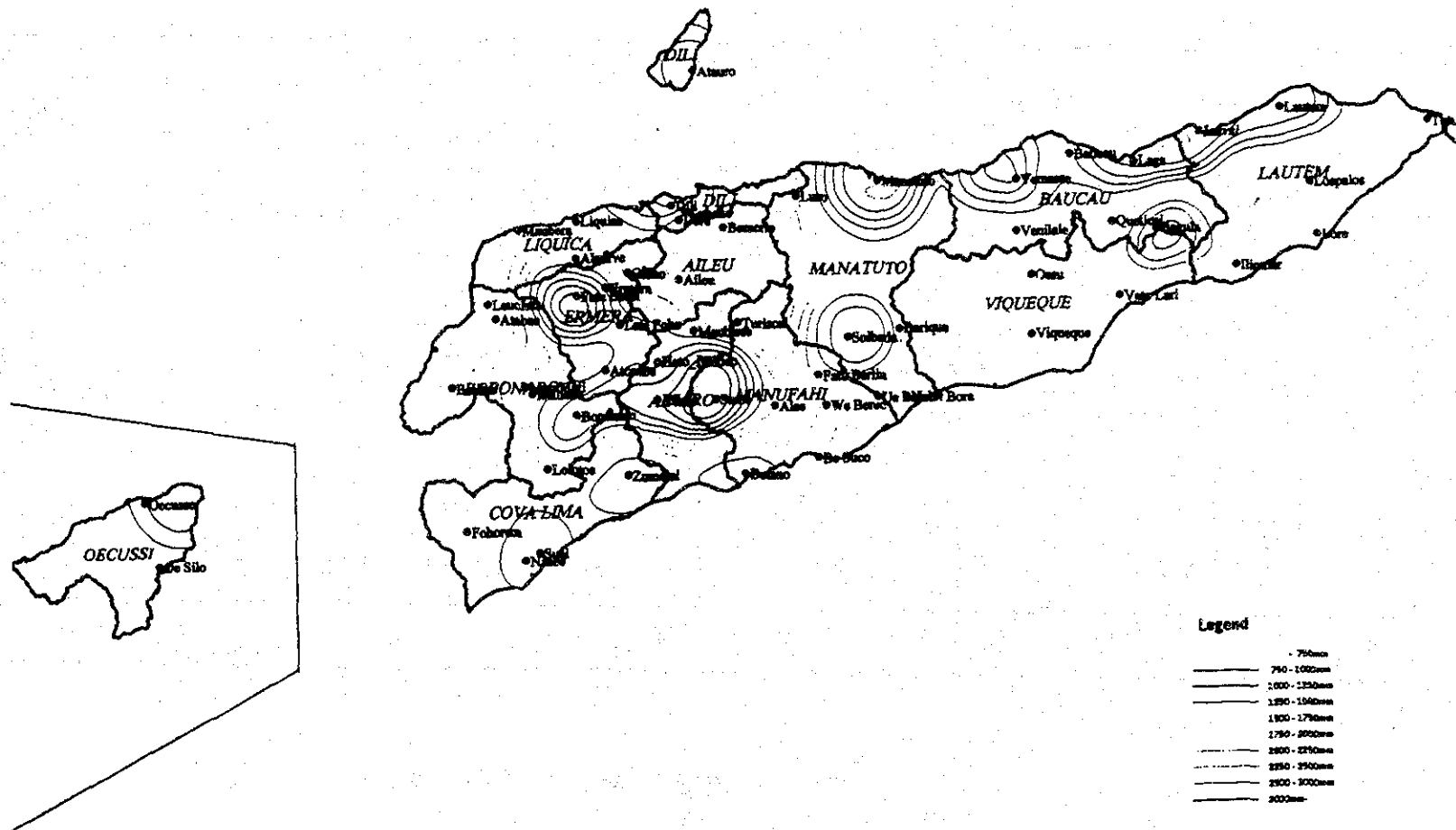
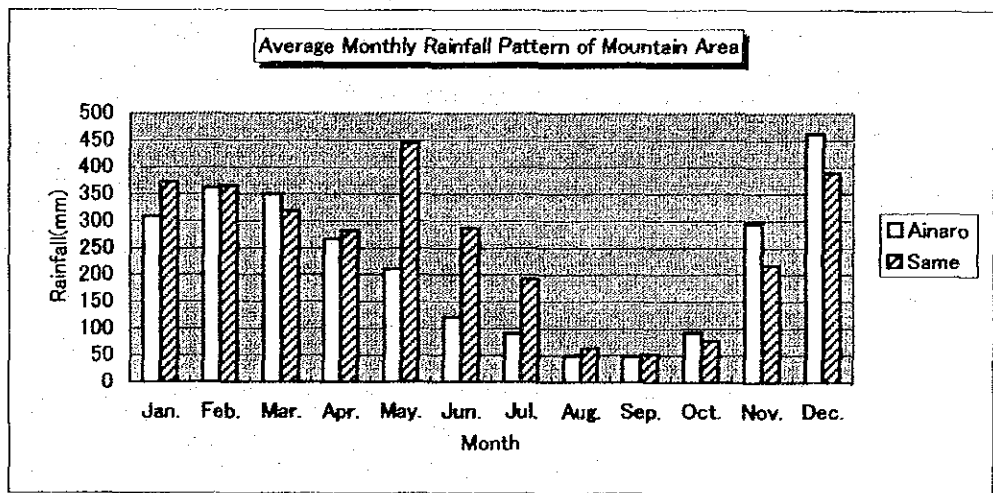
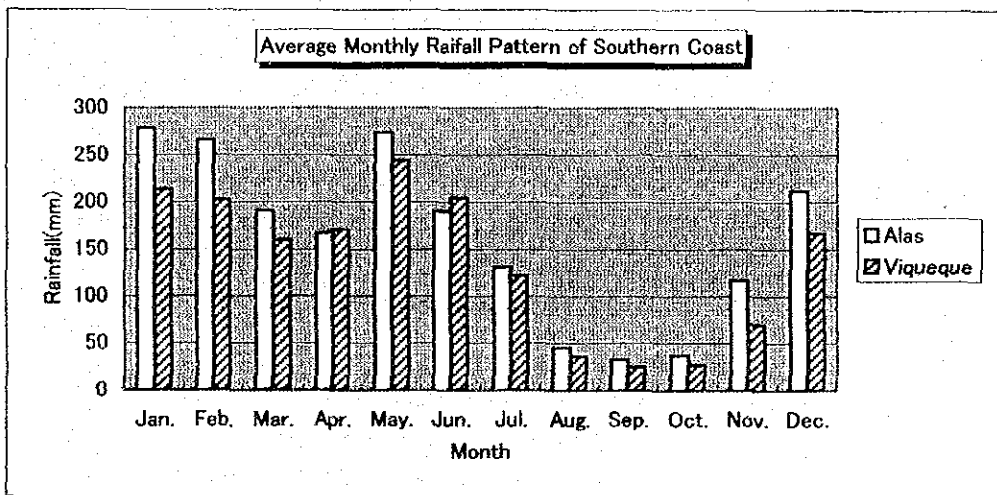
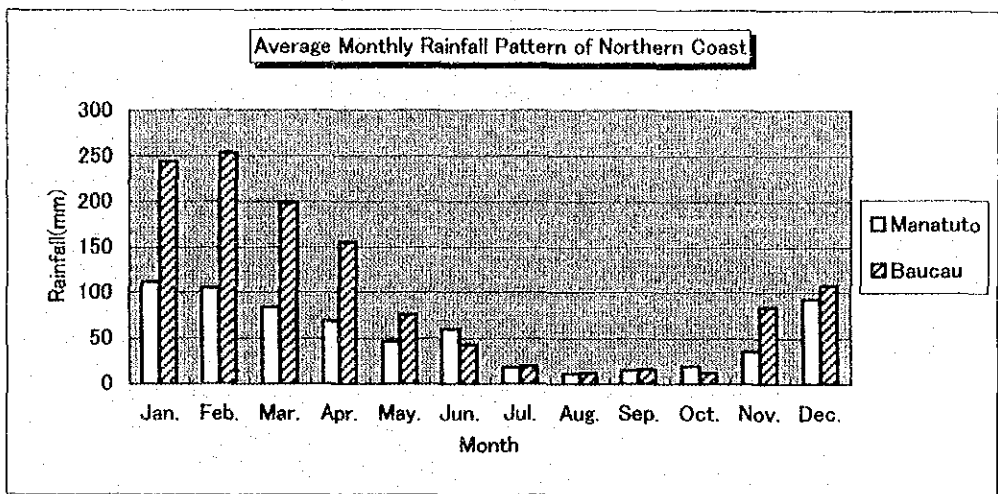
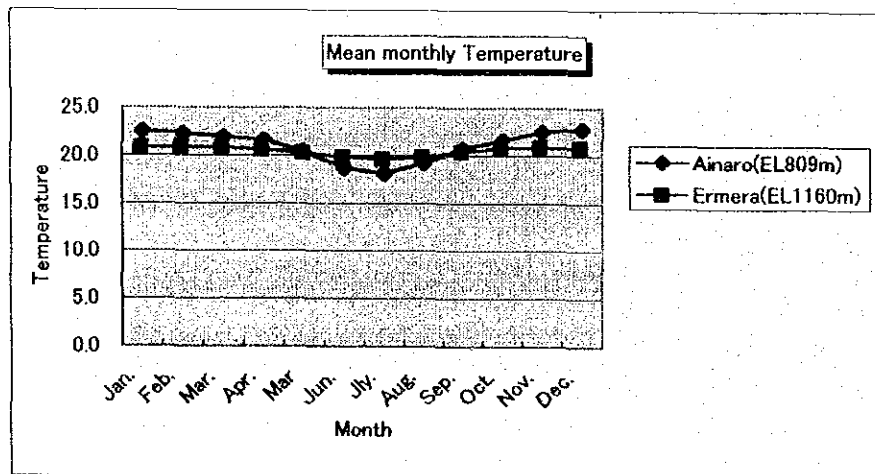
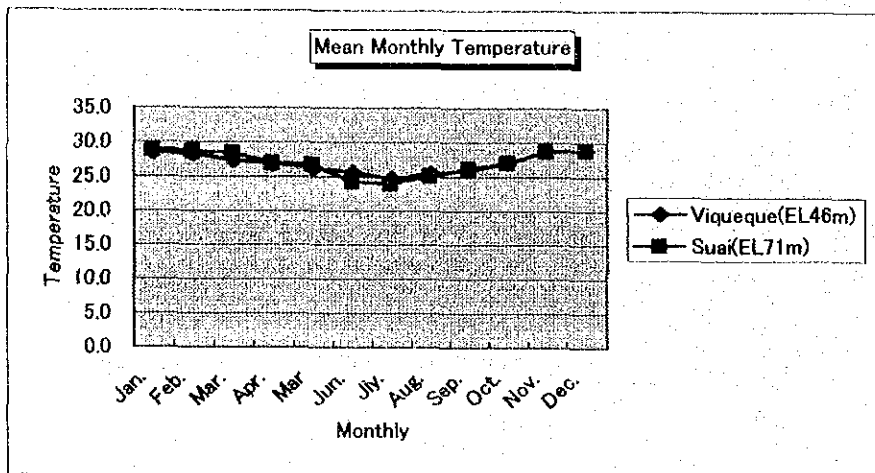
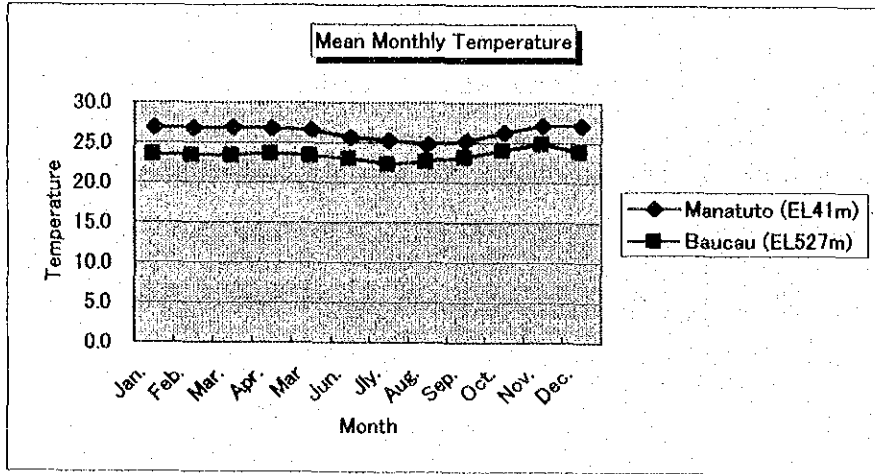


Figure D-2 Typical Average Monthly Rainfall Pattern



**Figure D-3 Average Monthly Temperature**



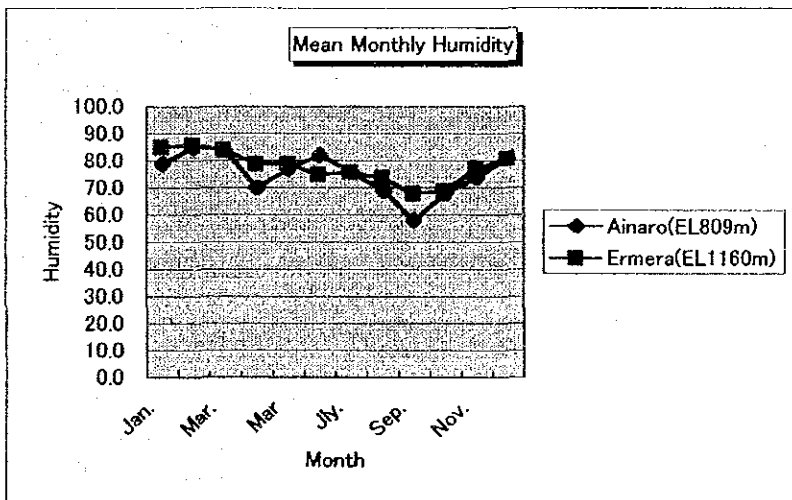
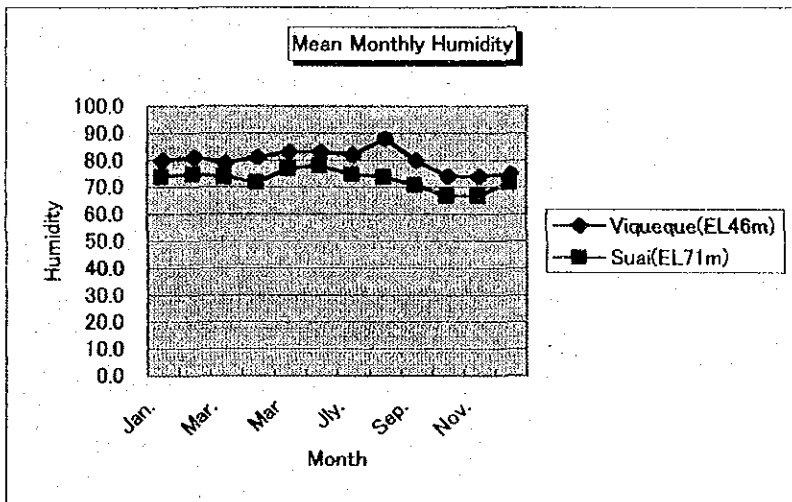
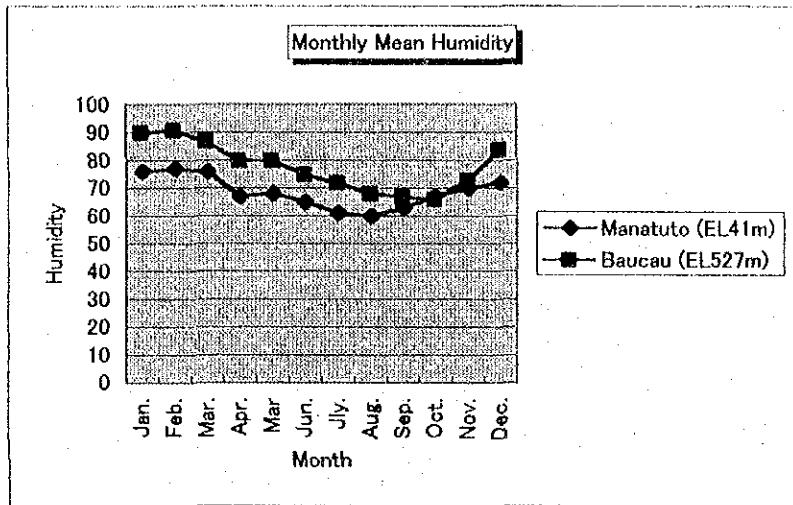
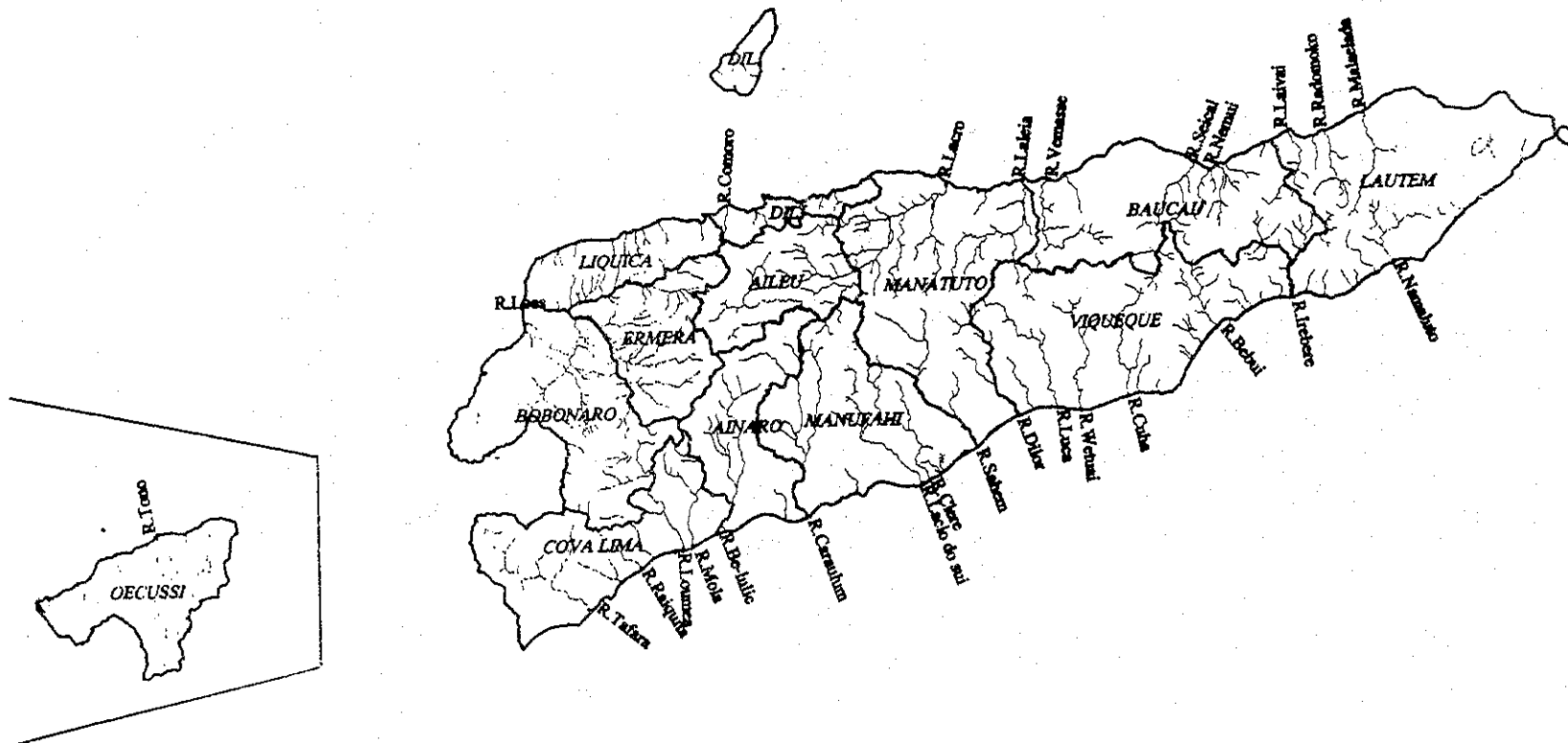




Figure D-4 Location of Main Rivers



## **ANNEX E. SOIL AND LAND USE**

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## **E-1. Introduction**

East Timor, is predominantly mountainous country which occupies the eastern half of the islands of East Timor now named Timor Lorosae. It has a land area of about 1,460,938 ha, including the enclave of Oecussi in the West Timor Lorosae is about 400 Km, North of Darwin Australia. The country economy predominately thrive on agriculture, with 75-80 percent of the population living in rural areas as most of the farmers subsistence depends on maize, root crops cassava, sweet potato, taro, rice, beans, tree crops and to some extent livestock farming. The objective of Japan International Cooperation Agency (JICA) is to Study the Integrated Agricultural Development Potentials of East Timor.

## **E-2. Soils**

The soil of East Timor is a continental fragments. The geologic formation is largely made up of limestone and sedimentary rocks. The highest peak or altitudinal range is about 3000 meters above sea level. Three (3) major soil moisture regimes have been identified covering the island of Timor Lorosae; these are Udic, Ustic and Ardic. The wet climatic zone results in the Udic soil moisture regime, in which the rooting zone of the soil does not dry out for more than 90 cumulative days in a year, a dry season of less than five months.

This area covers the districts of Aileu and Ainaro and parts of Bobonaro and the southern coastal area.

In lower rain shadow areas the dry season last for more than five months and sufficiently pronounced the area to be described as "Ustic" soil moisture regime where soils dry out 90 consecutive days or more. The Ustic regime stretches along east west axis but through the centre part of eastern end of Timor and cover the coastal area band along the north coast stretching from northern Lautem district, West ward towards Manatuto or an area where the dry season exceeds more than nine (9) months and Aridic soil moisture regimes are encountered.

According to soil map provided at ETDA-DAA, GIS section, there are fourteen (14) kinds of soil types that were identified in terms of Great Soil Groups of the (USDA) United States Department of Agriculture, Soil Taxonomy. These soils belong to any orders of Entisols, Inceptisols, Mollisols, Alfisols and Ultisols. These soils were classified further into Great Soil Groups under Entisols are Ustorthents, Tropofluvents, Ustifluvents; order Inceptisols these are Tropaquepts, Dystrypepts, Eutropepts, Ustropepts and Humitropepts, order Mollisols the Great Soil Groups are Calciustolls and Rendolls; order Alfisols these are Rhodustalfs, and Haplustalfs while order Ultisols two (2) Great Soil Groups, Tropudults and Haplustults.

The Morphological characteristic of the great soil groups was discussed in chronological order.

### **Ustorthents**

These are the Ustorthents of mid and low altitudes that have an Ustic soil moisture

regime. These soils commonly on a very recent exposed regolith, mostly in soft sedimentary deposits or in thin regolith, over hard rocks. Their vegetation in East Timor consist of deciduous forest and savannah grasses. The surface soils are mostly brownish in colour and the subsoils are moderately deep with matrix colour of greyish brown to dark greyish brown clay loam and sandy loam. Most of these soils have moderate to steep slopes. These soils have loamy skeletal subsoils. Included in these soils are some areas with shallow soil depth lithic Ustorthents. These soils have lithic contact within 50 cm of the surface soil; or shallower than 50 cm. And a depth less than <25 cm is the most common. It has an aggregate land area of about 191,180 hectares.

### **Tropofluvents**

These are the fluvents that have Udic moisture regime. These soils occur in the flood plain of streams and rivers in intertropical regions that have pronounced oceanic climate. These soils have loamy skeletal or sandy skeletal subsoil. The surface soils are greyish brown to brown, loam, silt loam and loamy sand textures. The Tropofluvents are flooded frequently unless they are protected by levees. Most alluvial sediments came from eroding soil and river stream banks and contain an appreciable amount of organic carbon brought down from the undulating to rolling lands hills and mountains. The percentages of organic carbon decrease regularly as depth increases. These soils are usually cultivated to rice, maize and other diversified crops adopted in the locality. This land constitutes an area of 108,840 hectares.

### **Ustifluvents**

Ustifluvents comprise a fairly small proportion in East Timor soils and the area is restricted, to actively flooding alluvial terraces. Sediment deposition in sufficient quantity and the soil horizons have little chance to develop. These alluvial soils are highly stratified with textures ranging with sorted gravels to clays, but most frequently silt loam, sandy loam, at the surface with coarser layers at depth. Most Ustifluvents are well drained with some areas with imperfect drainage in old river channels. Salinity is not a problem except areas adjacent to the seashore.

The slope range from 0-2 percent with considerable micro-relief resulting from past river erosion and deposition. Due to severe yearly flooding cropping of these soils does not occur during rainy season. Ustifluvents are used extensively in cattle grazing and intensively for growing rice plants with irrigation during the dry season. When surface is devoid with vegetative cover and the soil texture is sandy loam, to loamy sand problem in wind erosion may arise. The Ustifluvents soils have an Ustic soil moisture regime and represent an area of 24,205 hectares of lands.

### **Tropaquepts**

The Tropaquepts constitute a very small portion of the total study area in East Timor. Tropaquepts are mostly greyish soils with mottling of reddish yellow to yellowish brown in the subsoils the ground water table fluctuates in the subsoils but remains relatively high for long periods during the year. Tropaquepts soils are found in depression, on the alluvial plains and are associated with the slightly lower river terraces Tropofluvents.

During the rainy season, Tropaquepts soils are flooded and generally too wet for

agricultural crops except rice plants, unless some drainage outlets and flood protection dikes are provided. In some places the favourable moisture regime is used by the farmers to grow other crops during the early part of dry season to take advantage of retained soil moisture in the surface soil. Under natural condition when the lands are not cultivated, these soils support the lush growth of grasses and sedges and could provided much needed forage for livestock especially during the dry season.

The local farmers know very well the climatic condition of their respective area. They usually plant rice late to avoid flooding problem especially on depressions where Tropaquepts soils are situated. Some areas near the seashore may have sodic and saline condition that may appear in these soils. One consideration and attention must be given for the development of agriculture. These soils covers an aggregate area of 102,075 ha..

### **Dystropepts**

Dystropepts soils occur extensively in East Timor with an area of 581,489 Ha. These soils is moderately developed soil structure, strongly leached in semi-dry zones, brown to reddish brown topsoil with Udic moisture regime, generally deep with strong subsoils. The sites is wide spread, strongly dissected to hilly and mountain areas, mostly on steep slopes, with increase rainfall precipitation, the soils are subject to strong acid leaching resulting in pH value below 4,5. The base saturation is low to very low. Surface soil texture varies from clay loam, loam to silt loam, and finer textures at depth, stones are common throughout the profiles in most cases.

Due to favourable moisture regime, soil texture and structure, these soils are heavily utilized for cultivation in the upland. The major limitation that restricts the used of Dystropepts is topography many areas with steep slopes are unsuitable for any kind of use that exposes the soil surface to direct raindrops impact and runoff. The suitability of Dystropepts of growing crops is often determined by gradient and shape of the slopes on which they occur. This land covers an aggregate area of 581,489 ha.

### **Eutropepts**

The soil Eutropepts are generally brown, moderately developed subsoils, strongly leached in semi-dry zones. Eutropepts soils have Udic moisture regime and base saturation percentages is medium to high and soil reaction above pH > 4,5. They contain weatherable minerals of silicate clays that are not entirely kaolinitic. The most common parent materials of Eutropepts are derived from mafic rocks or sedimentary rocks that rich are in calcium bearing minerals, limestone is also frequently at the origin of the Eutropepts. Many well drained to moderately well drained soil in young alluvial valleys belong to the Eutropepts. The topography is flat to gently sloping.

These soils are usually cultivated to upland rice and wetland rice and other diversified crops adapted in the locality. This soil represent an area 81,760 Ha, included in these soils are some areas that are not mappable with Aquic moisture regime.

### **Ustropepts**

Ustropepts are Tropepts that have an Ustic moisture regime and have base saturation by  $(\text{NH}_4\text{AC})$  by 50 percent or more in all sub horizons between depths of 25 cm to 100 cm. These soils have moderately developed subsoils, weakly leached in semi-dry zones with brown to dark grey topsoils. Most of these soils have strong to steep slopes and are shallow over rock. Some have gentle slopes. Given the wide range of water availability in Ustic pedons and the presence of long dry season drought stress may be one of the common limitation that affect the use of Ustropepts. This type of soils is commonly found in inland hills and mountains calcareous and basaltic to intermediate igneous rocks. The physical and chemical soil characteristics do not show any attributes that would seriously limit plant growth. The physical quality indicators are the fine silt content and the adequate water holding capacity. These soils cover an aggregate area of 161,226 ha.

### **Humitropepts**

The Humitropepts are moderately developed soils, strongly leached in semi-dry zones usually at the higher altitudes and have thick brown topsoils and yellowish brown to yellow and stony subsoils. They are acid soils with Udic moisture regime. They have many properties in common with Dystropepts except with their higher organic matter contents. This is not an indication of better nitrogen availability. The colder temperatures lower the mineralization rates of organic matter and their acid reaction and phosphate deficiency reduce biological nitrogen fixation.

The isothermic temperature regime of Humitropepts makes them suitable for a group of crops that are different from those adopted to the warmer Isohyperthermic soils of the lowland. The typical crops on these soils are tea, Arabica coffee, root crops like (*Solanum tuberosum*), white potato and other selected leafy vegetables suited to the climatic condition. These lands cover an aggregate area of 9,396 ha.

### **Calciustolls**

Calciustolls are developed in areas of limestone bedrock on gently sloping, gently undulating to hilly landform. The most important features of Calciustolls soils are dark surface horizon and normally very dark greyish brown to black topsoil, clayey 15 to 20 cm thick. The subsoils has moderate to strong sub angular blocky structure. The B-horizons are brown to dark brown, dark red clay with no mottles. C-horizons are calcic, having more than 15%  $\text{CaCO}_3$  that exhibit yellowish red matrix soil colour. These soils occur in drier regions and it is expected that the soil reaction is neutral to alkaline. The soil moisture regime is Ustic, where soils dry out 90 consecutive days or more. The vegetation of Calciustolls soils range from open savannah to grassland in the drier regions in East Timor to monsoon forest where effective precipitation is greater. Although Calciustolls soils are somewhat resistant to erosion than Ustropepts there were soils with complete truncation in all horizons. These lands cover an aggregate area of 183,055 ha.

### **Rendolls**

Rendolls are the Mollisols of humid regions that were formed mainly under forest from highly calcareous parent materials such as chalk and composed mainly of limestone. They have mollic epipedon that rest on the calcareous parent material or cambic horizon that is rich in carbonates. These soils are shallow and often stony black granular soils. They exhibit many calcium carbonates and the soil moisture regime is mostly Udic. These lands constitute an area of 144,436 ha.

### **Rhodustalfs**

The Rhodustalfs are fine textured soils moderately well-to-well drained soils, occurring from sea level to 1000 meters elevation. They are moderately to strongly weathered soils, deep to very deep dark red matrix soil colour to very dark reddish brown and reddish brown topsoil. Subsoils exhibit reddish brown to dark reddish brown matrix soil colour with clay texture. Rhodustalfs are distinct to other soils due to their bright hues. Rhodustalfs represent the most advanced stage of weathering found in East Timor. Although the landscapes they occur are younger than most land surface in East Timor, they are more resistant to erosion. This soil is identified in Fatumaca area and the physiography of the land is level to gently sloping with slope ranges from 2-6 percent. Bohemite and Kaolinite are the major clay constituents of Rhodustalfs probably formed in situ. This is a marked contrast with most other soils found in East Timor where montmorillonite dominate the clay mineralogy. Rhodustalfs soils represent a small area in East Timor with total land area of 5,812 ha.

### **Haplustalfs**

These soils represent the smallest land coverage in East Timor. It has an aggregate area of 3,778 hectares of land. The Haplustalfs soils have brown to reddish brown topsoils; they have deep to very deep subsoils, with clayey texture. B-horizon is a reddish brown, yellowish red and reddish yellow colour. These soils have heavy textured subsoils with high clay content and strongly leached. They are formed on gently sloping fan terraces. Some areas of these lands were used for the cultivation of upland rain fed rice crops and others were utilized for coconut plantation. The Haplustalfs belong to Ustic soil moisture regime; the sediments were derived from basalt, shale, sandstone and quartzite. These lands cover an aggregate area of 3,778 hectares.

### **Tropudults**

Tropudults occupies a fairly small portion in East Timor with an aggregate land area of 9,688 hectares. The central concept of Tropudults is fixed on freely drained soils that are deep to moderately deep to hard rock, have a thick loamy or clayey argillic horizon that does not have deep wide cracks in most years. They exhibit yellowish brown or olive brown in the upper part of the soil with reddish mottles and redder hue in some depth. These soils have an Udic soil moisture regime. These lands represent an aggregate area of 9,686 hectares.

### **Haplustults**

These are soils that have thin to moderately thick argillic horizon. Most of these soils



formed in sediments. Their vegetation is mostly savannah grass with some deciduous forest. They are well-drained soils that are deep to moderately deep over hard rocks. The surface soils are mostly brownish colour and redder hue as depth increases. Surface textures are clay loam to clay and subsoils does not have the evidence of clay eluviation. These soils belong to Ustic moisture regime. They constitute an aggregate area of 21,000 hectares.

### **E-3. Land Use**

The existing agricultural crops of East Timor are distributed in the lowland, upland and high plain area. Lowland distribution in 13 districts covers: 24,587 ha while the upland rice covers an area of 3,962 ha. Maize considered as the staple food in East Timor covers of 82,571 ha. The diversified crops such as peanuts, green peas, soybeans, cucumbers, carrots, kidney beans, tomato, eggplant, squash, spinach and other plants are cultivated in the lowland, upland and high plains with a combined area of 180,233 ha (see Table E-3).

The plantation land-use by district such as coconut, hybrid coconut, coffee, clove cashew, vanilla, tamarind covers an area of 84,385 ha. The inland fishery by district such as brackish water pond, fresh water pond and mina paddy covers a total area of 327 ha (see Table E-5).

The forest protected area in 13 districts such as protected and recreation forest, jungle forest, forest stable product, forest limit product and forest converted product covers a total area of 971,739 ha (see Table E-6). The lake covers the district of Viqueque, Lospalos and Baucau with an area of 2,211 ha. Furthermore, the urban area of 13 districts covers an aggregated area of 222,044 ha. The agriculture crops, plantation including fishery, forest protected area and lakes covers a total area of 1,460,938 ha (see Table E-2).

#### **1 Land use vegetative coverage in the 13 Districts of East Timor.**

Listed hereunder are seven categories of land use identified through Landsat Imagery base on the map provided by ETTA- DAA – GIS Section. The details of land use vegetative cover by district are shown as follows.

- a. Forested land use
- b. Non – Productive dry land
- c. Agricultural Lands
- d. Rural Settlements
- e. Urban Settlements
- f. Water Bodies

#### **2 Forest Land Use**

The Land use on Forest Vegetative cover was interpreted through Satellite Imagery along with a degree of vegetative coverage density. The density has been defined as an area with aerial cover of the tree canopy of more than 75% or sparse (i.e. the aerial cover of the tree canopy

between 30 and 75% (Please refer to the Land use mapping of 1994). Tree canopy less than 30% would not be considered forest. In general it is not possible to interpret from aerial photos whether or not a particular forest area is homogeneous; whether one species occupies more than 75% of the area. The lowland forest is situated below 1000 meters above mean sea level. These includes moist lowland forest which is moist and dense, lowland forest which is moist and sparse and dry land forest either single species or mixed species composition. The high land forest could be found between elevations 1000 – 2000 meters above mean sea level. The interpretation and assessment for highland forest is possible but it is very difficult to identify moist mixed and single species forest; field verification and investigation is necessary to identify the species grown in highland forest. The montane forest, which is found at levels greater than 2000 meters above mean sea level, could be delineated on the map with the aid of contour data overlayed on the satellite image; or it could be identified on aerial photographs and topographic maps. The coastal forest and coastal mangroves forest can be identified through the use of aerial photographs but it is difficult to identify the composition of the tree species canopy. These areas should be protected for human intervention in order to protect the food chain of marine ecosystem.

### **3 Non-Productive Dry Land**

The non-productive dry land indicate that the land is actually used for forage pasture by livestock animals such as cattle, goats, sheep and water buffalo. These lands are savannah, grassland and bare land. The savannah are usually vegetated by mixed shrubs, grassland and some few scattered trees; while grassland it refers to open areas which are predominantly covered with grasses with some isolated small extent cultivated to paddy rice. Bare lands are areas devoid with any vegetative cover.

### **4 Non – Productive Wetland**

Shrubs grasses and reeds vegetatively cover these lands. The land could not be used for the cultivation of agricultural crops mainly due to the presence of stones and rock outcrops on the surface soils accompanied by the shallow soil depth.

### **5 Agricultural Lands**

These lands include wetland, dry land, shifting cultivation, grazing land and agro-forestry. Wetland agriculture is areas with paddy dikes with or without irrigation. Dry land agriculture or food crops include crops with short growing life cycle. This land use category includes all forms of crops, which do not rely on irrigation water supply. Tree crops are also included such as candlenut, coconut plantation, coffee plantation and other tree crops adopted in the locality. Included are commercial agriculture with smallholder and large holder estate plantations. These commercial crops produced are coffee shaded by trees in the highland.

### **6 Rural Settlements/Village Settlements**

These are the lands where the community lives in the countryside of East Timor. The Village settlements include built up areas where residential houses are located. The Rural settlements are usually associated with small home gardens. They cultivate short growing crops

for their consumption needs. They also plant fruit crops like jackfruit, banana, mango etc.

## **7 Urban Settlements**

These are large towns or Cities where residential houses are situated. Included in these lands are built up areas where commercial establishments such as shopping centres, Banks, schools, markets, churches, hospitals, Drug stores, hard wares, Auto supply are located. In the city and big towns of East Timor Industrial seaport and Air fields and military detachments are also one of the integral part in urban settlements.

## **E-4. Development Potentials**

### **1 Land Resources**

The proposed Agricultural Land use potential for Agricultural Development in East Timor are the vast area that are not yet developed in the northern and southern coastal part and the high plain of Lospalos.

Three Land Use Categories were identified:

- a. Dry land arable crops
- b. Wet land arable
- c. High plains of Lospalos (grass land vegetation)

### **Dry Land Arable Food Crops**

These are crops with short duration of growing cycle. These crops are cultivated in non-bonded fields and planted at different slopes that range from less than 3 percent up to 15 percent slopes. This category included all forms of cropping which receive water mainly from rainfall. Some of this water enters the soil through infiltration and some water in the soil move downward through percolation and some water in soil is use by crops. The surface, run off water will finds its way to streams/rivers and finds its way out to the seashore.

Field auger observation on the morphological properties of soils indicate that the suitable area for dry land farming are the Alluvial soils situated on the coastal plain; districts of Covalima, Ainaro, Aileu, Manufahi, Manatuto, Viqueque and Lautem. The surface soils texture consists of silt loam, loam, fine sandy loam, silty clay loam, clay loam and clay. They are generally well drained, moderately well, imperfectly and to some extent the low-laying areas exhibit poorly drained internal soil drainage. There are pockets of unsuitable soils along the coastal plain that cannot be mapped that belong to five (5) Great Soil Groups Ustipsamments. This land could be utilized for grazing. The average yearly rainfall at Covalima and Ainaro ranges from 1250-1500 mm; while in Betano sub-district of Manufahi, Manatuto, Viqueque and Iliomar, Lore sub-districts of Lautem the average yearly rainfall ranges from 1250- 2000 mm.

Dry land farmers growing maize under shifting cultivation slash burn practice are not expected to put-up inputs on fertilizing the local maize. This is the reason of low crop production not only maize but all other crops because farmers could not purchased unsubsidised fertilizer to the local market.

In order to uplift the living condition of farmers the government must subsidized Agricultural inputs such as good quality seeds for dry land farming, fertilizers farm implements and practice pest control managements.

### **Wetland Arable Land**

Wetland Agriculture includes areas with paddy or bonded fields, with or without irrigation. The area suitable for irrigation development from the northern part is Manatuto and Baucau. In Manatuto area the alluvial plain are situated at Lacle and Laleia rivers. These two rivers has dendritic drainage patterns and presently there are some irrigable lands but in small extent. This could be attributed to low discharge of water and meandering of river flow at Lacle and Laleia. Lands outside the irrigation service area were also cultivated to paddy rice at the onset of rainy season. The average yield production per hectare is 1.8 to 2 tons.

In Baucau, the river that dissects the lowland plain are Vemasse, Seiçal and Nemui river. The three rivers and their watershed area irrigate alluvial plain of Baucau but not in large extent. The soils in these two districts consist of Tropaquepts and Tropofluvents with surface texture of clay loam, clay, and silty clay loam to silt loam. Bonded fields that are not reached by irrigation water were cultivated at the start of rainy season from November to April. In order to increased rice crop yield, reorients farmers towards the utilization of certified high yielding rice varieties, practices the use of organic and inorganic fertilizers, proper farm management practices such control of pest and diseases and practice crop rotation.

In the south coastal area there are four (4) rivers that dissects Covalima district these are Tafara, Raiquita, Loumea and Mola, their drainage patterns are dendritic to parallel. The watershed of these rivers is moderately dense and no major siltation problem was observed during the field trip observation. This area has potential for irrigation development if the government of East Timor consider the possibility of improving the Agricultural Resources of Covalima district.

### **Ainaro District**

The south coastal district of Ainaro, two (2) major rivers were identified the Belulic and Carau-Ulun. Extensive Hydrology Investigation should be made in order to assess the area for possible irrigation potentials. The area has the possibility of establishing small-scale irrigation project. Other areas could be utilized for upland rice cultivation and other foods crops that are climatically adopted in the locality.

### **Manufahi, Manatuto and Viqueque Districts**

The Manufahi, Manatuto and Viqueque districts, the Agricultural lands have vast

potential for irrigation development due to numerous rivers dissecting the south coastal plain of East Timor. The rivers that dissect Manufahi are Carau-Ulun, Laelo do Sul, Clere and watershed area are still moderately forested including the areas of Manatuto and Viqueque. The Manatuto area is dissected by the rivers of Sahen, Dilor while Viqueque Rivers by Luca, Wetuai, Cuha, Bebui and Irabere. These numerous rivers have good potential for irrigation development.

Rice is usually cultivated month of June and July at the southern coastal areas. The main reason of late planting is to avoid the threat of flash flooding that will destroy the rice crop. The farmers usually planted rice at the peak of monsoon period, the potential for second crop is limited if there is no available irrigation water. Only the western southern coast with yearly rainfall precipitation of 1500 – 2000 mm will benefit. Just after harvesting they plant mungbeans and cowpea or other diversified crops to avail for the remaining moisture in the soil.

Preliminary project identification should be done on areas that have potential for irrigation development composite Team of Technical personnel should investigate the land for Technical Assessment such as Watershed Expert, Hydrologist, Planning Engineer, Irrigation Engineer, Geologist, Agriculturist, Soils Expert and Economist. After field investigation final recommendation shall be submitted to the government authority for final decision. When the project appraisal is done and found out that the project is economically feasible and viable for irrigation development than the project shall be pushed for development.

#### **High Land Plain-Lospalos (Lautem District)**

Lospalos high land plain has no potentials for irrigation development because there is no major river that dissects the vast agricultural lands. The only possibility is to undertake Hydro-geological Seismic investigation for underground aquifer reservoir in order to determine the volume of water in the soil. Another option to developed the plains of Lospalos, study the possibilities of planting tree crops especially *Mangifera* sp. (Mango) Cashew tree nuts at the same time it would serve as grazing for animals, such cattle, water buffalo, sheep and goat. This is the only alternative for the development of Lospalos plains.

**Table E-1. Major Distribution of Soils in East Timor by USDA Order,  
Sub-Order and Great Soil groups.**

CODE NO.	ORDER	SUB ORDER	GREAT SOIL GROUPS	AREA (Ha)	PERCENT (%)
1	ENTISOLS	ORIHENTS FLUVENTS	1a USTORHENTS	157,225	10.76%
			1b TROPOFLUVENTS	19,180	
			1c USTIFLUVENTS	108,840	
				29,205	
2	INCEPTISOLS	AQUEPTS TROPEPTS	2a TROPAQUEPTS	935,946	64.06%
			2b DYSTROPEPTS	102,075	
			2c EUTROPEPTS	581,489	
			2d USTROPEPTS	81,760	
			2e HUMITROPEPTS	161,226	
				9,396	
3	MOLLISOLS	USTOLLS RENDOLLS	3a CALCIUSTOLLS	327,491	22.42%
			3b RENDOLLS	183,055	
				144,436	
4	ALFISOLS	USTALFS	4a RHODUSTALFS	9,590	0.66%
			4b HAPLUSTALFS	5,812	
				3,778	
5	ULTISOLS	UDULTS USTULTS	5a TROPUDULTS	30,686	2.10%
			5b HAPLUSTULTS	9,686	
				21,000	
TOTAL				1,460,938	100.00%

Table E-2. Summary of Agricultural crops, Inland Fishery , Forest, Lake and Urban Areas by District in East Timor

District	Crops	Plantation	Inland Fishery	Forest	Lake	Urban	TOTAL
Covalima	19,796	2,987	6	80,356	-	18,134	121,278
Ainaro	7,682	5,767	20	59,802	-	15,320	88,591
Manufahi	10,055	9,533	20	88,990	-	20,202	128,800
Viqueque	22,736	1,913	18	161,164	6	16,675	202,512
Lautem	10,101	5,568	12	109,170	2,189	6,670	133,709
Baucau	17,892	4,516	43	68,184	17	11,974	102,625
Manatuto	6,423	1,455	8	174,954	-	13,685	196,525
Dili	2,914	66	2	11,542	-	25,689	40,212
Aileu	10,863	1,106	118	41,897	-	10,553	64,537
Liquica	7,221	7,293	10	19,158	-	10,140	43,823
Ermera	7,533	36,683	23	16,728	-	22,255	83,221
Bobonaro	44,588	7,110	28	85,602	-	24,215	161,541
Oecussi	12,431	389	19	54,192	-	26,533	93,564
<b>TOTAL</b>	<b>180,233</b>	<b>84,385</b>	<b>327</b>	<b>971,739</b>	<b>2,211</b>	<b>222,044</b>	<b>1,460,938</b>
<b>PERCENTAGE</b>	<b>12.34</b>	<b>5.78</b>	<b>0.02</b>	<b>66.51</b>	<b>0.15</b>	<b>15.20</b>	<b>100.00</b>

Data Source : East Timor in Figure, BPS, Central Board of Statistic of East Timor, 1997

Table E-3. Hectareage Distribution of Various Agricultural Crops by District - East Timor

District	Rice	Maize	Green peas	Peanuts	Soy bean	Cassava	S.Potato	Onion	Garlic	Red pepper	Potato	Cabbage
Covalima	902	7,442	2,643	611	612	665	195	46	33	33	9	10
Ainaro	315	1,839	36	626	267	138	849	25	25	-	426	51
Manufahi	446	1,755	329	562	224	964	528	49	25	51	94	761
Viqueque	3,825	5,257	402	758	31	1,474	758	14	1	117	10	6
Lautem	683	3,494	419	168	149	628	462	24	10	16	3	3
Baucau	2,223	5,873	-	1,929	-	511	534	40	30	31	7	7
Manatuto	882	1,674	-	335	302	340	267	3	7	7	-	-
Dili	46	797	10	98	-	352	197	4	-	19	-	3
Aileu	315	3,981	-	66	176	771	460	45	45	43	135	30
Liquica	112	2,821	-	373	-	623	215	3	-	13	6	-
Ermera	639	2,569	25	159	167	286	474	13	16	22	114	33
Bobonaro	2,645	11,560	1,651	1,386	311	3,064	1,433	91	72	67	30	70
Oecussi	1,166	4,366	16	1,093	-	502	471	14	96	3	9	-
<b>TOTAL</b>	<b>14,198</b>	<b>53,429</b>	<b>5,532</b>	<b>8,162</b>	<b>2,239</b>	<b>10,319</b>	<b>6,565</b>	<b>369</b>	<b>361</b>	<b>421</b>	<b>845</b>	<b>975</b>

District	Mustard	Beans	Cucumber	Carrot	Kidneybeans	Tomato	Eggplant	Squash	Spinach	Other Plants	TOTAL	Per Cent
Covalima	42	-	19	3	60	21	18	-	-	2,153	15,518	11.0
Ainaro	19	3	3	14	1,404	1	4	13	-	-	6,058	4.3
Manufahi	36	559	16	25	-	24	30	-	31	14,534	21,043	5.6
Viqueque	18	6	-	-	-	73	9	-	4	6,460	19,223	12.6
Lautem	16	-	-	-	19	13	3	-	10	4,845	10,964	5.6
Baucau	22	-	3	9	6	30	10	25	18	8,074	19,382	9.9
Manatuto	10	10	3	7	-	9	-	-	3	6,460	10,321	3.6
Dili	52	4	3	-	-	38	6	-	13	9,689	11,332	1.6
Aileu	102	78	9	73	170	46	36	13	94	538	7,225	6.0
Liquica	4	-	-	-	-	19	9	-	6	-	4,205	4.0
Ermera	36	118	31	-	93	27	13	14	7	1,615	6,471	4.2
Bobonaro	60	13	19	6	6,292	36	30	18	28	9,689	38,571	24.7
Oecussi	6	-	-	-	6	14	3	3	-	2,153	9,921	6.9
<b>TOTAL</b>	<b>424</b>	<b>791</b>	<b>106</b>	<b>138</b>	<b>8,050</b>	<b>350</b>	<b>173</b>	<b>84</b>	<b>215</b>	<b>66,210</b>	<b>180,233</b>	<b>100.0</b>

Data Source : East Timor in Figure, BPS, Central Board of Statistic of East Timor, 1997

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Table E-4. Hectarage Distribution of Plantation by District in East Timor (Estate Crops)

District	Coconut	Hybrid Co	Coffee	Clove	Cashew	Vanilla	Tamarinds	TOTAL	Per Cent
Covalima	674	-	351	-	1,961	-	-	2,987	3.5
Ainaro	81	-	5,680	-	6	-	-	5,767	6.8
Manufahi	608	117	7,908	16	839	-	46	9,533	11.3
Viqueque	1,463	-	373	-	42	-	35	1,913	2.3
Lautem	5,529	9	21	-	9	-	-	5,568	6.6
Baucau	4,295	13	172	2	7	-	27	4,516	5.4
Manatuto	313	1	285	-	68	-	789	1,455	1.7
Dili	27	-	31	-	7	-	-	66	0.1
Aileu	7	17	1,030	2	50	-	-	1,106	1.3
Liquica	204	-	7,057	-	-	31	-	7,293	8.6
Ermera	17	-	36,595	10	11	47	2	36,683	43.5
Bobonaro	1,336	58	2,716	11	2,692	-	296	7,110	8.4
Oecussi	378	-	6	-	4	-	-	389	0.5
<b>TOTAL</b>	<b>14,932</b>	<b>215</b>	<b>62,225</b>	<b>42</b>	<b>5,697</b>	<b>78</b>	<b>1,195</b>	<b>84,385</b>	<b>100.0</b>

Data Source : East Timor in Figure, BPS, Central Board of Statistic of East Timor, 1997

Table E-5. Hectarage Distribution of Inland Fishery by District in East Timor (Inland Aquaculture) 1997

District	Brackish	Freshwater	Mina Padi	TOTAL	Per Cent
Covalima	2	2	2	6	1.9
Ainaro	-	20	-	20	6.1
Manufahi	-	19	2	20	6.2
Viqueque	-	13	6	18	5.6
Lautem	-	11	1	12	3.7
Baucau	-	22	21	43	13.1
Manatuto	-	8	-	8	2.6
Dili	2	-	-	2	0.5
Aileu	-	30	88	118	36.1
Liquica	10	-	-	10	3.2
Ermera	-	11	11	23	7.0
Bobonaro	1	-	26	28	8.4
Oecussi	14	5	-	19	5.7
<b>TOTAL</b>	29	142	156	327	100.0

Data Source : East Timor in Figure, BPS, Central Board of Statistic of East Timor, 1997

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Table E-6 Hectarage Distribution of Forest Cover by District in East Timor

District	P&RF	Jungle	FSP	FLP	FCP	TOTAL	Per Cent
Covalima	16,836	23,603	27,248	3,753	8,916	80,356	8.3
Ainaro	2,630	53,230	1,882	2,059	-	59,802	6.2
Manufahi	3,946	65,341	7,295	12,408	-	88,990	9.2
Viqueque	-	50,615	91,013	19,536	-	161,164	16.6
Lautem	47,354	13,002	16,342	32,473	-	109,170	11.2
Baucau	-	50,710	1,989	15,484	-	68,184	7.0
Manatuto	19,730	118,996	2,380	33,848	-	174,954	18.0
Dili	1,059	7,416	-	3,067	-	11,542	1.2
Aileu	-	30,431	-	11,466	-	41,897	4.3
Liquica	5,261	12,048	-	1,849	-	19,158	2.0
Ermera	-	7,131	-	9,596	-	16,728	1.7
Bobonaro	-	73,690	11,912	-	-	85,602	8.8
Oecussi	-	44,596	-	9,596	-	54,192	5.6
<b>TOTAL</b>	96,815	550,810	160,062	155,136	8,916	971,739	100.0

Data Source : East Timor in Figure, BPS, Central Board of Statistic of East Timor, 1997

Table E-7 Summary Distribution of Land Use Data in East Timor

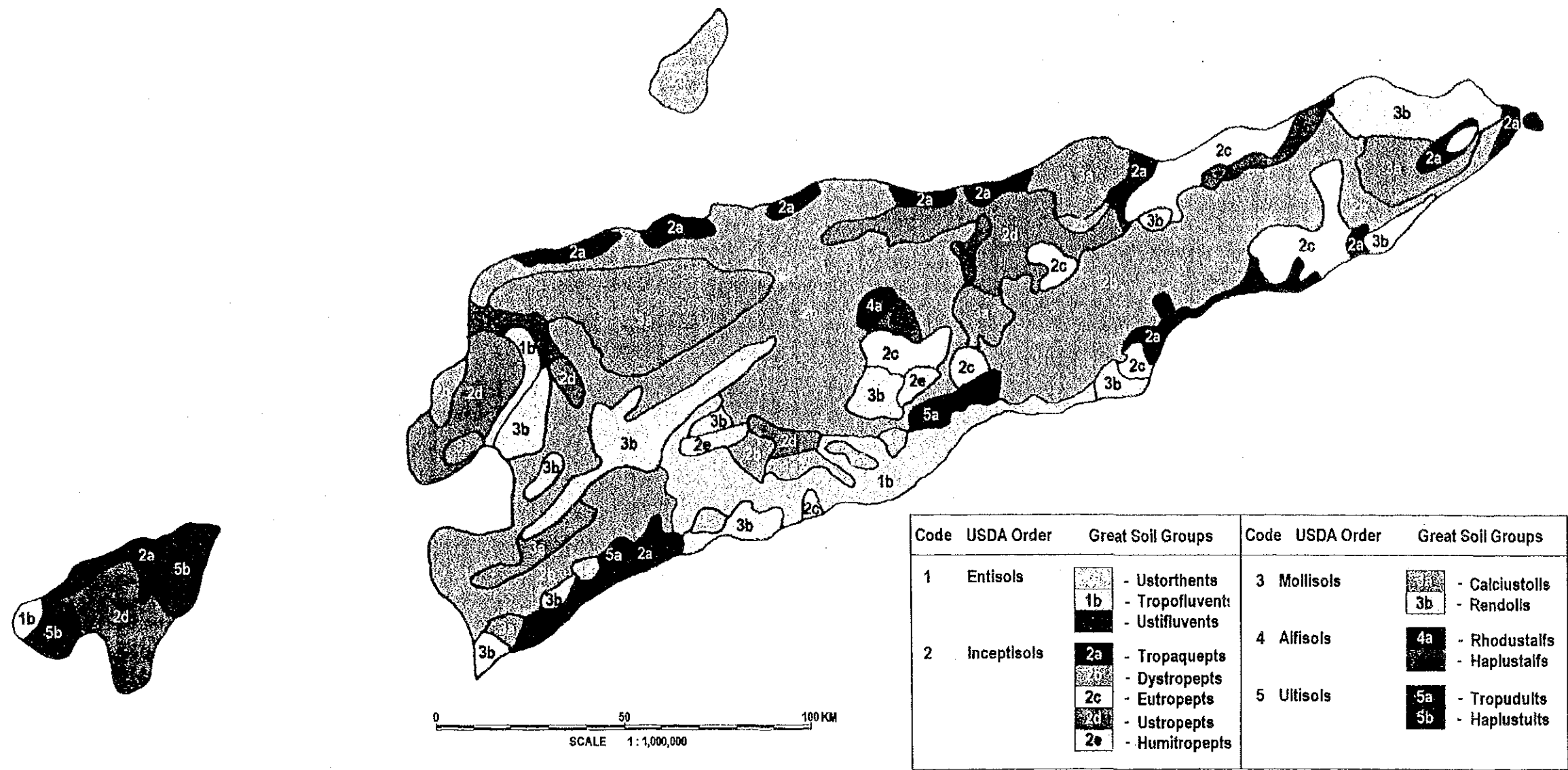
Summary							
District	Crops	Plantation	Fishery	Forest	Lake	Urban	TOTAL
Covalima	-	-	-	-	-	17,400	17,400
Ainaro	-	-	-	-	-	14,700	14,700
Manufahi	-	-	-	-	-	19,385	19,385
Viqueque	-	-	-	-	5	16,000	16,005
Lautem	-	-	-	-	2,100	6,400	8,500
Baucau	-	-	-	-	16	11,490	11,506
Manatuto	-	-	-	-	-	13,131	13,131
Dili	-	-	-	-	-	24,650	24,650
Aileu	-	-	-	-	-	10,126	10,126
Liquica	-	-	-	-	-	9,730	9,730
Ermera	-	-	-	-	-	21,355	21,355
Bobonaro	-	-	-	-	-	23,235	23,235
Oecussi	-	-	-	-	-	25,460	25,460
TOTAL	-	-	-	-	2,121	213,062	215,183

District	Crops	Plantation	Fishery	Forest	Lake	Urban	TOTAL
Covalima	-	-	-	-	-	8,086	8,086
Ainaro	-	-	-	-	-	6,831	6,831
Manufahi	-	-	-	-	-	9,009	9,009
Viqueque	-	-	-	-	0.003	7,436	7,438
Lautem	-	-	-	-	0.976	2,974	3,950
Baucau	-	-	-	-	0.007	5,340	5,347
Manatuto	-	-	-	-	-	6,102	6,102
Dili	-	-	-	-	-	11,455	11,455
Aileu	-	-	-	-	-	4,706	4,706
Liquica	-	-	-	-	-	4,522	4,522
Ermera	-	-	-	-	-	9,924	9,924
Bobonaro	-	-	-	-	-	10,798	10,798
Oecussi	-	-	-	-	-	11,832	11,832
TOTAL	-	-	-	-	0.986	99,014	100,000

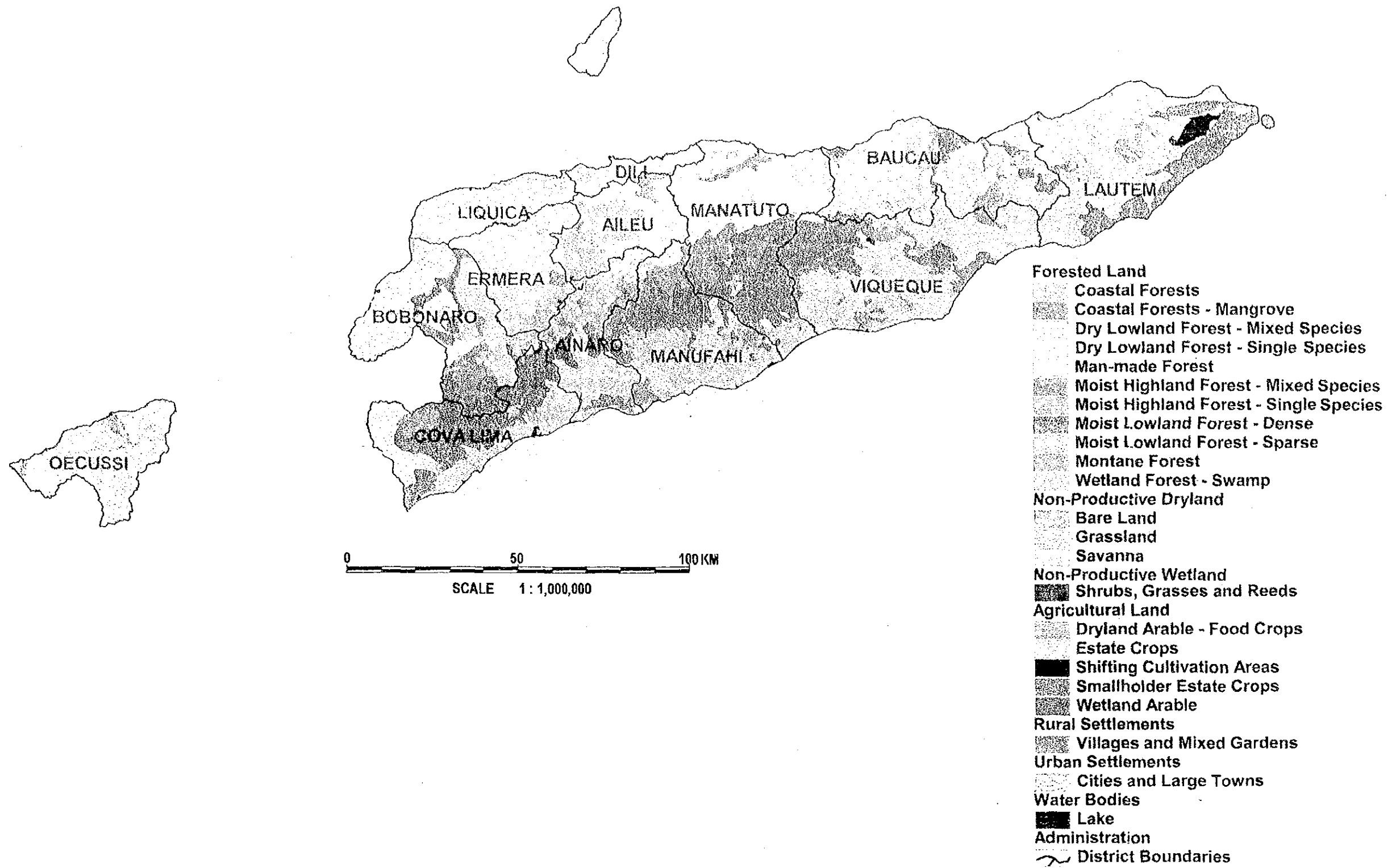
Land Use Area							
District	Crops	Plantation	Fishery	Forest	Lake	Urban	TOTAL
Covalima	-	-	-	-	-	118,133	118,133.2
Ainaro	-	-	-	-	-	99,802	99,802.2
Manufahi	-	-	-	-	-	131,610	131,609.9
Viqueque	-	-	-	-	37	108,628	108,664.9
Lautem	-	-	-	-	14,257	43,451	57,708.8
Baucau	-	-	-	-	109	78,009	78,117.3
Manatuto	-	-	-	-	-	89,150	89,149.9
Dili	-	-	-	-	-	167,355	167,355.4
Aileu	-	-	-	-	-	68,748	68,748.1
Liquica	-	-	-	-	-	66,060	66,059.6
Ermera	-	-	-	-	-	144,985	144,984.8
Bobonaro	-	-	-	-	-	157,749	157,748.6
Oecussi	-	-	-	-	-	172,855	172,854.7
TOTAL	-	-	-	-	14,403	1,446,535	1,460,937.5

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Data Source : East Timor in Figure, BPS, Central Board of Statistic of East Timor, 1997



**Figure E-1 Soil Map of East Timor**



**Figure E-2 Land Use Map of East Timor**