

Population by Ethnic groups in
Pakbuak area

Scale 1: 100,000

LAND USE MAP (of XiengXian-Xiengleu zone)

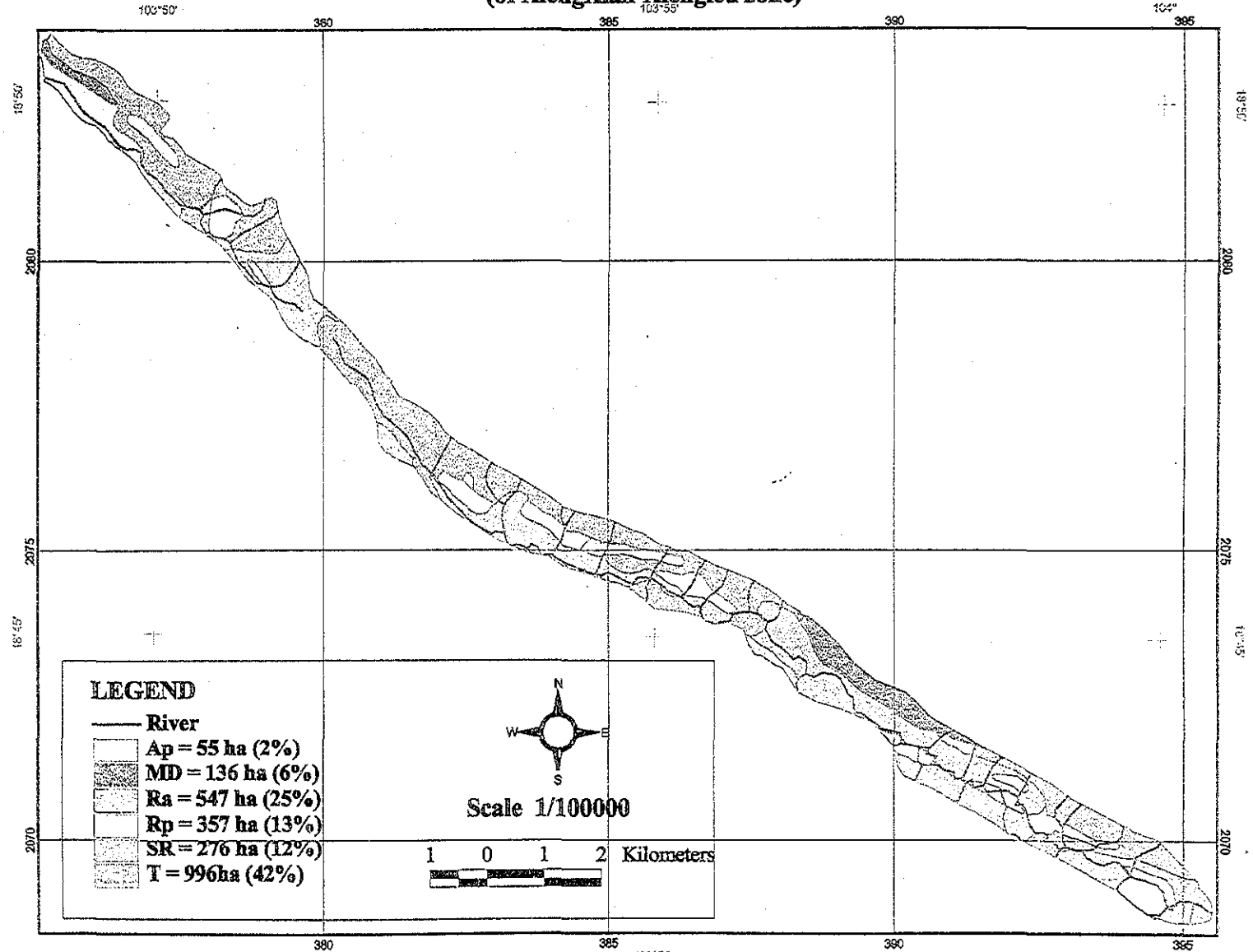


Figure : L01

SOIL MAP
(of Xieng Xian-Xiengleu zone)

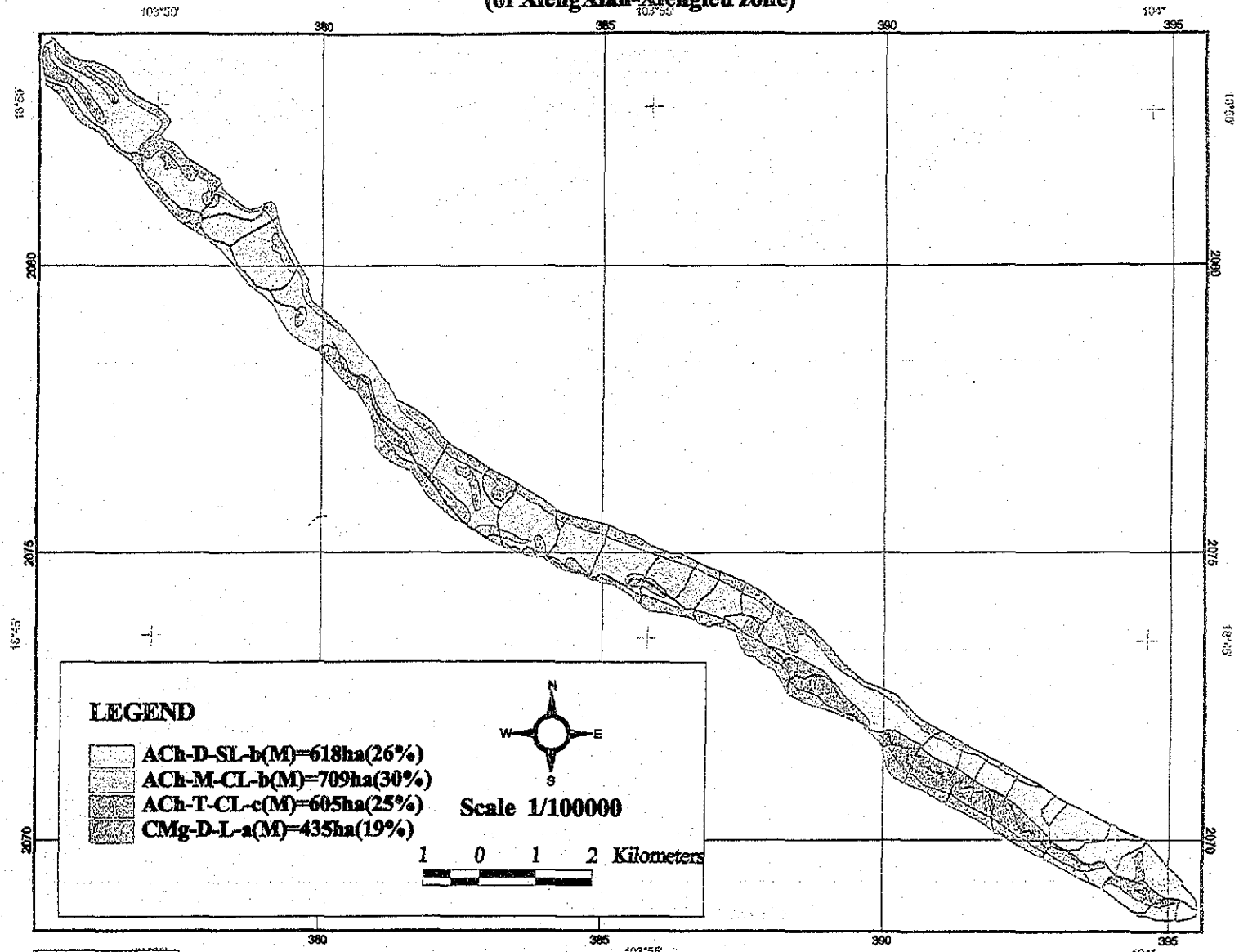


Figure : L02

LAND SUITABILITY MAP (of Xieng Xian-Xiengleu zone)

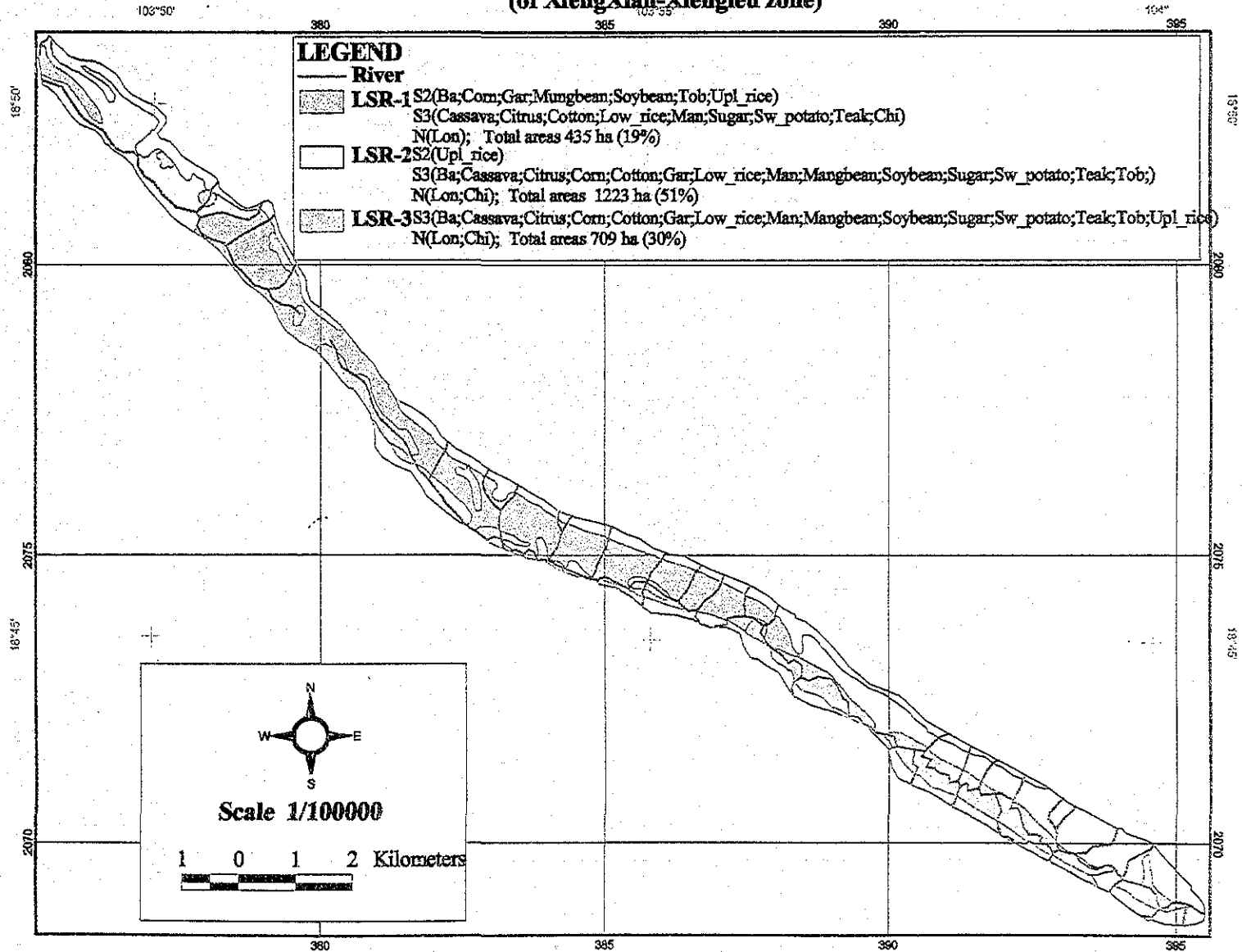
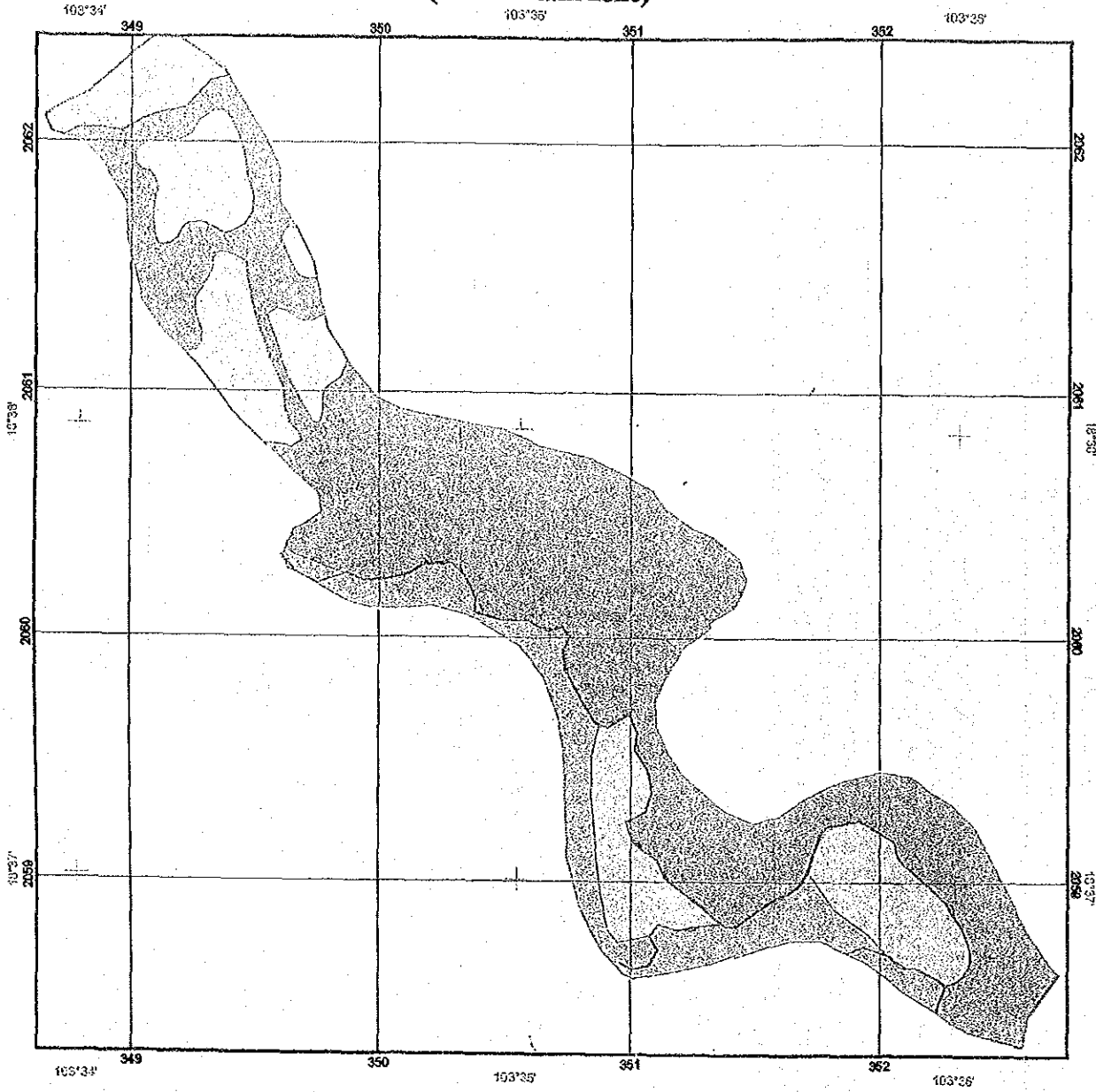


Figure : L03

LAND USE MAP (of Hatkham zone)



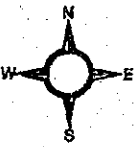







LEGEND		Scale 1/25000	
	River		
	Ap = 14 ha (4%)		
	Ra = 45 ha (12%)		
	Rp = 43 ha (11%)		
	SR = 47 ha (12%)		
	T = 236 ha (61%)		

Figure : L04

SOIL MAP (of Hatkham zone)

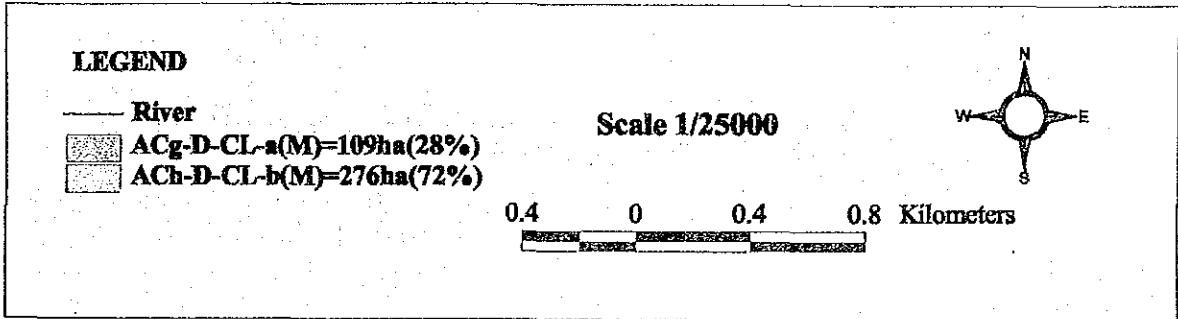
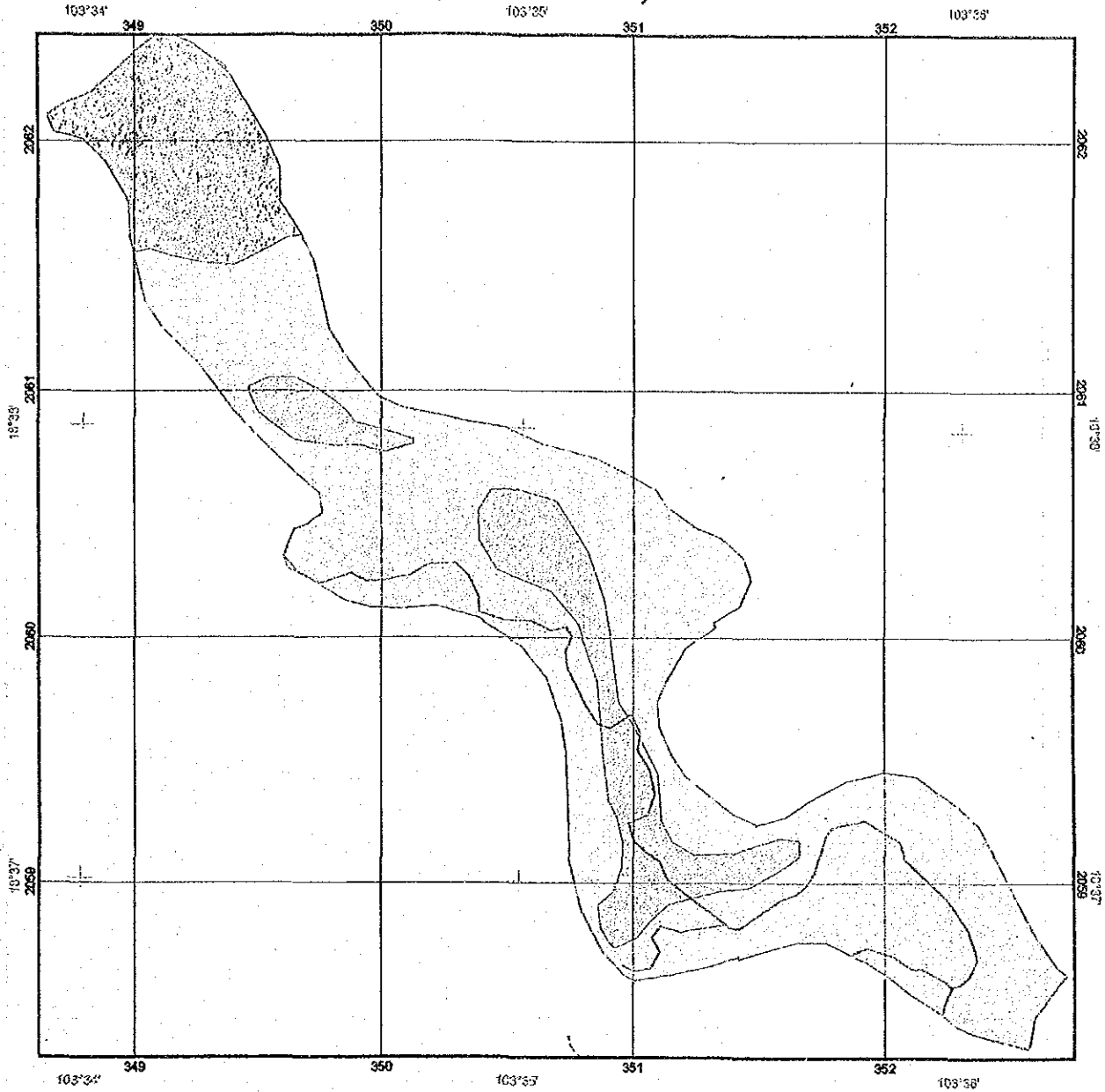


Figure : L05

LAND SUITABILITY MAP (of Hatkham zone)

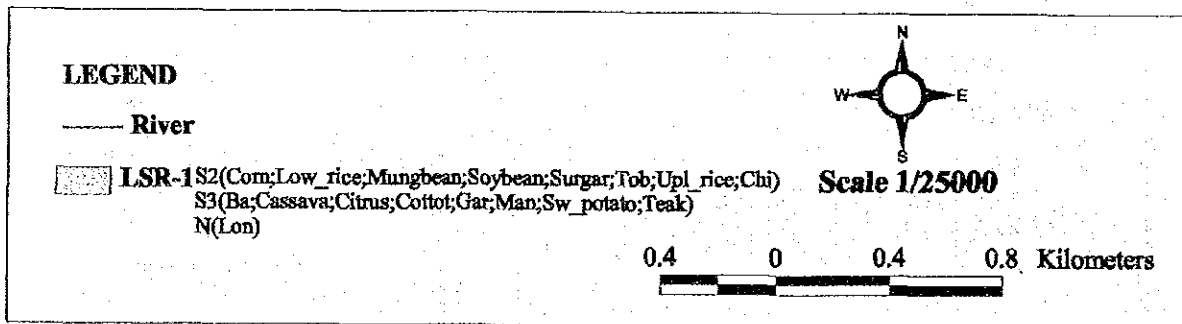
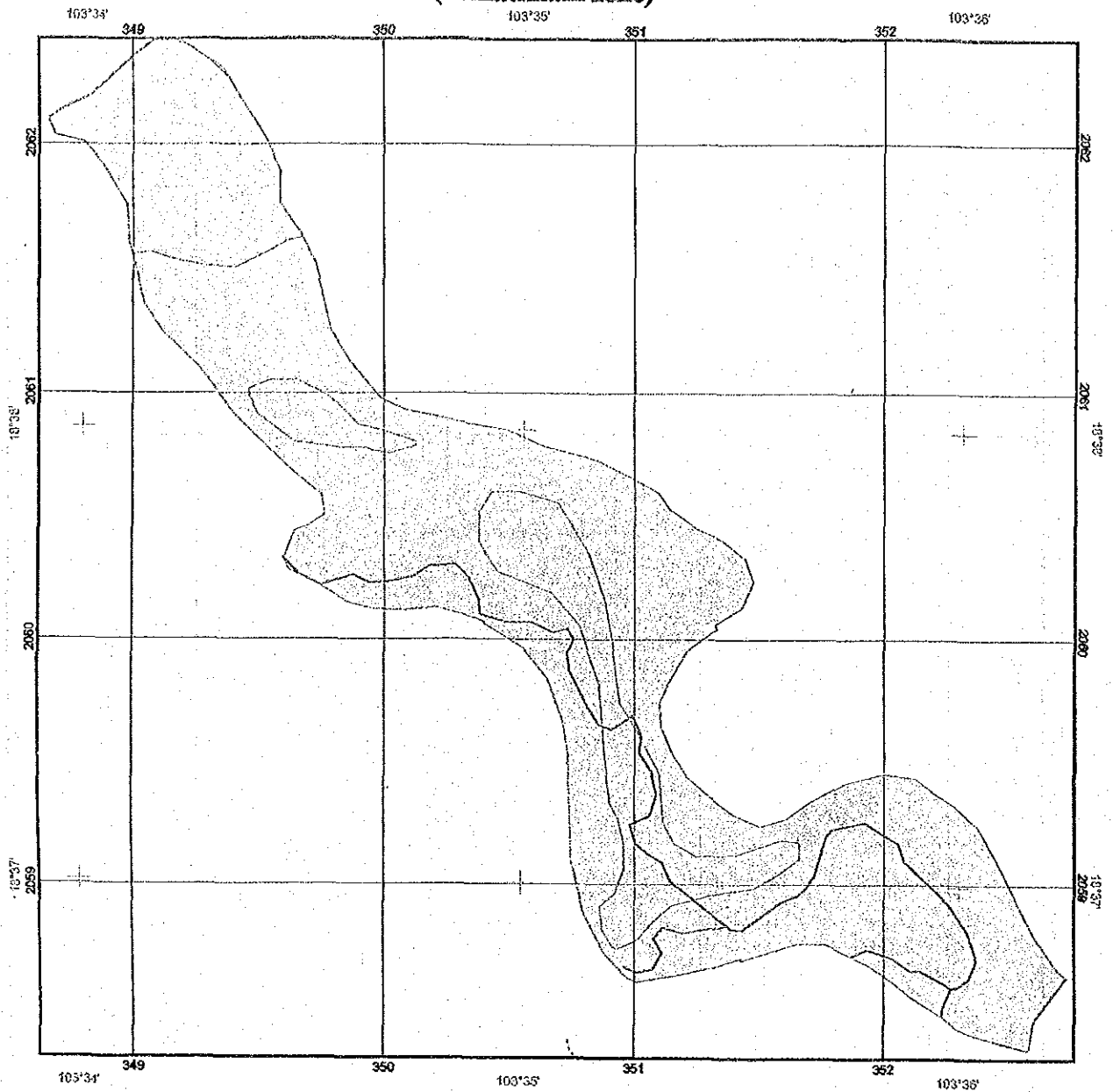


Figure : L06

LAND USE MAP (of Phakbuak zone)

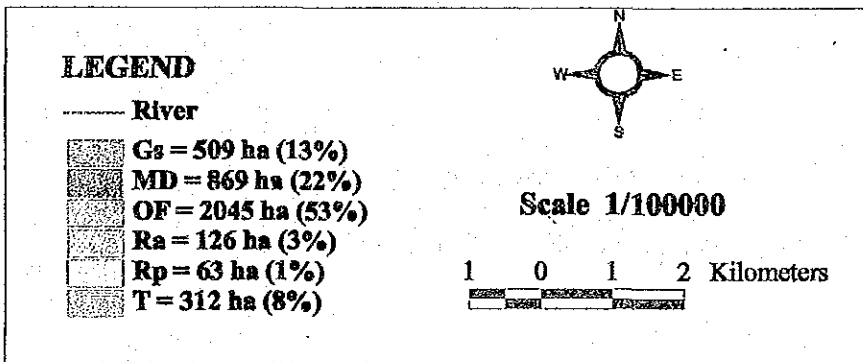
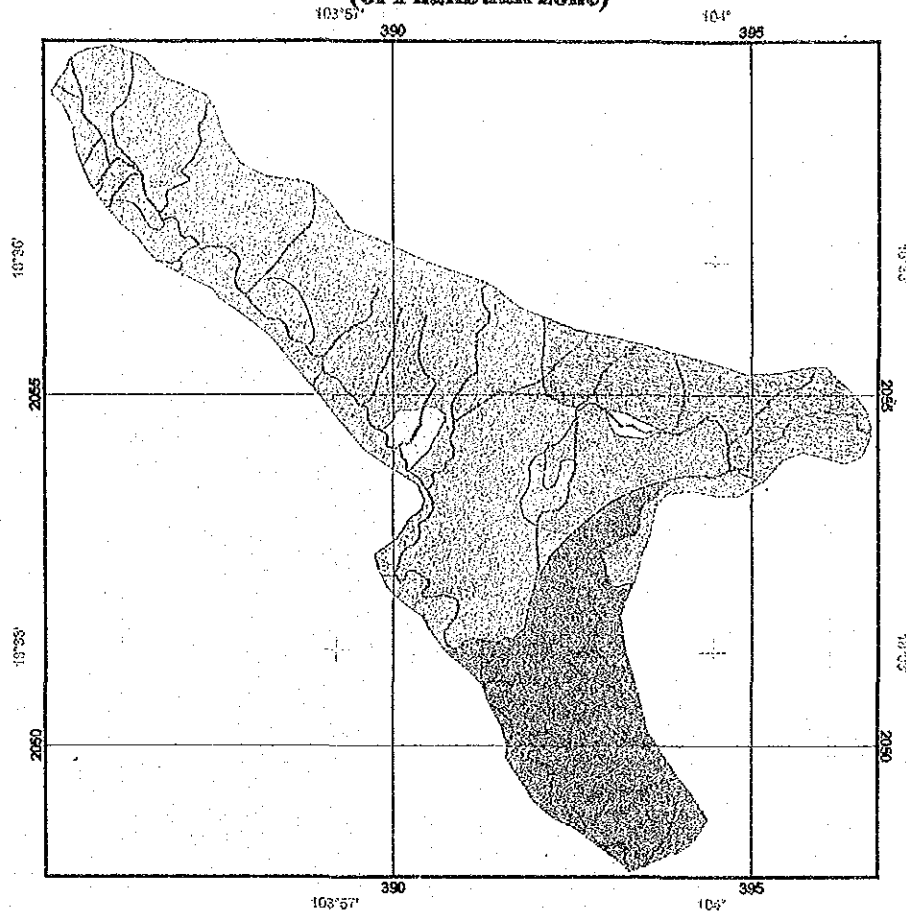


Figure : L07

SOIL MAP (of Phakbuak zone)

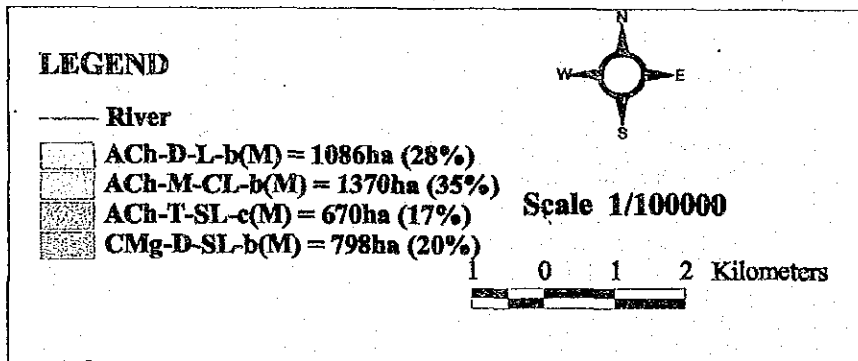
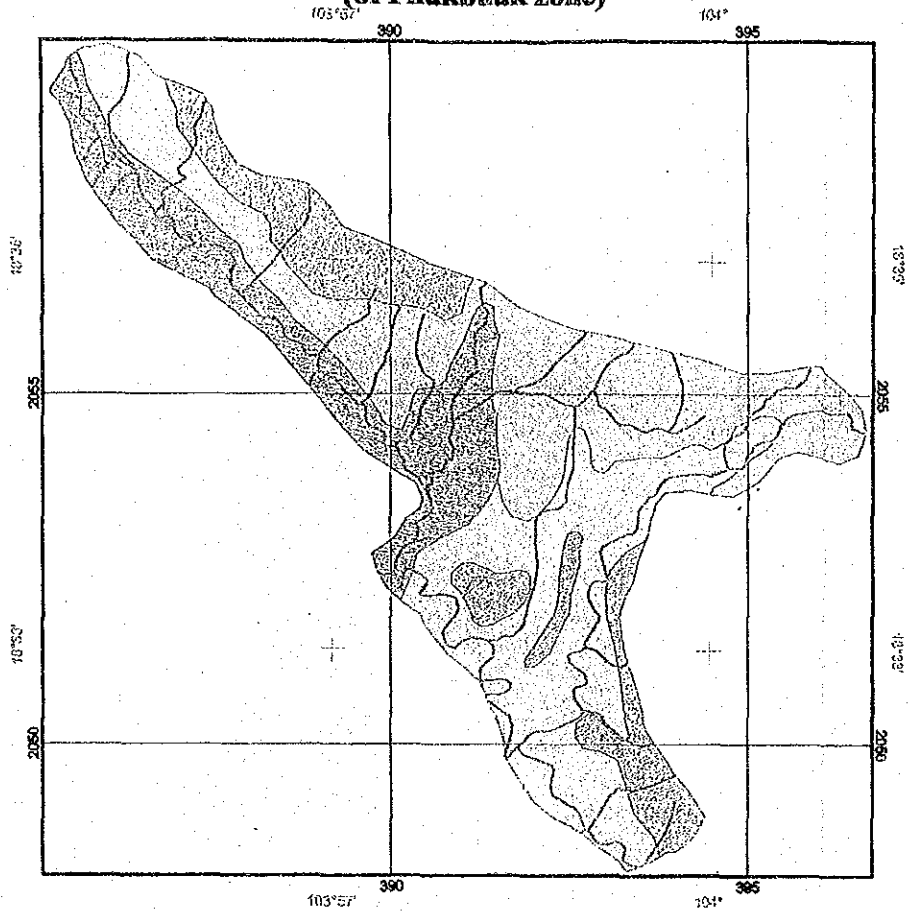
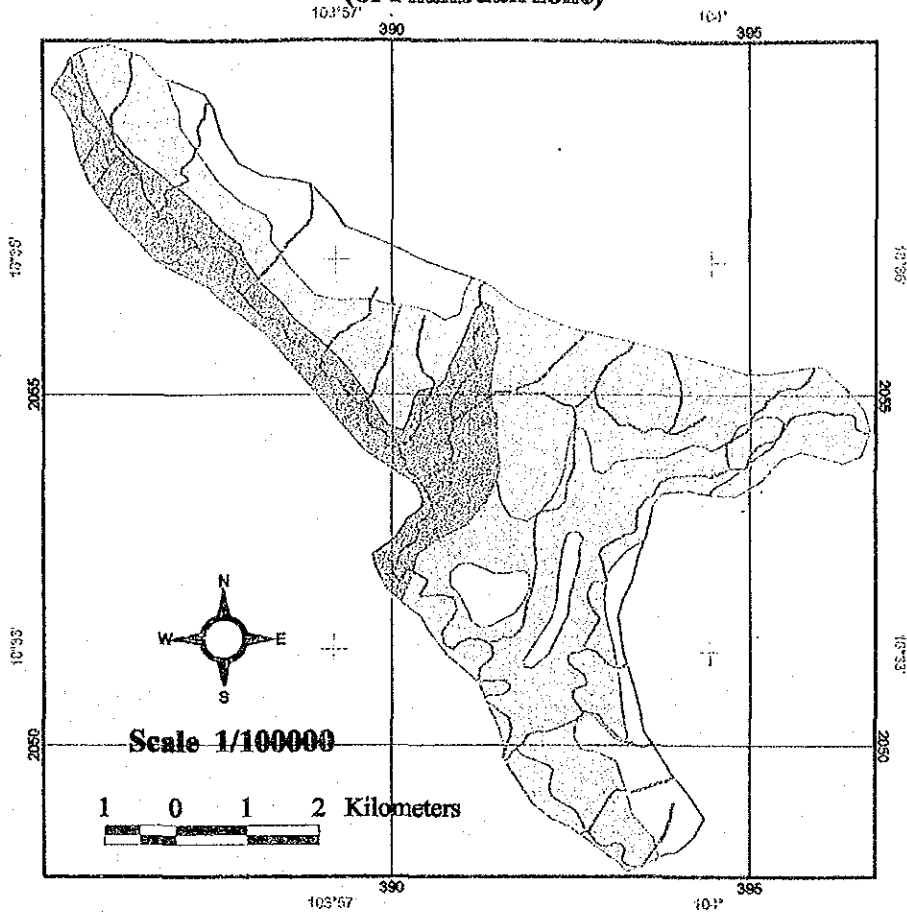


Figure : L08

LAND SUITABILITY MAP (of Phakbuak zone)



LEGEND	
	River
	LSR-1 S2(Ba;Citrus;Com;Cotton;Gar;Mungbean;Soybean;Sugar;Tob;Upl_rice;Chi) S3(Cassava;Low_rice;Man;Sw_potato;Teak) N(Lon); Total areas 1086 ha (28%)
	LSR-2 S2(Com;Cotton;Gar;Mungbean;Soybean;Sugar;Tob;Upl_rice) S3(Ba;Cassava;Citrus;Low_rice;Man;Sw_potato;Teak;Chi) N(Lon); Total areas 670 ha (17%)
	LSR-3 S3(Ba;Cassava;Citrus;Cotton;Gar;Low_rice;Man; Mungbean;Soybean;Sugar;Sw_potato;Teak;Tob;Upl_rice;Chi) N(Lon); Total areas 1370 ha (35%)
	LSR-4 S3(Ba;Cassava;Citrus;Cotton;Gar;Low_rice;Man;Mungbean;Soybean; Sugar;Sw_potato;Teak;Tob;Upl_rice) N(Lon;Chi); Total areas 796 ha (20%)

Figure : L09

**Photo:
Of
Field survey of Potential
Resettlement areas**

- Xiengxiane-XiengLeu**
- Hatkham**
- Pakbuak areas**

Water sources in the resettlement of Xiengxiane-XiengLeu areas



Photo: 01
Nam Mang Project

Catchment Area
173.5 km²
Mean flow 8.17 m³/s
Max flow >20 m³/s
Min flow = <2 m³/s
Installed capacity
4,800 Kw
Able to irrigated:
600 ha (dry season)
8,000 ha (wet season)
Water for irrigated
1ha = 2.4 l/s
Location: B. Thasi

Photo:02

**Houay Mo
irrigation
Project**

Able to irrigated
150 ha
Location:
B.NaKun



Photo:03

**Houay Mouang
irrigation
Project**

Able to irrigated
200 ha
Location:
B.Vha

Resettlement of Xiengxiane-XiengLeu area

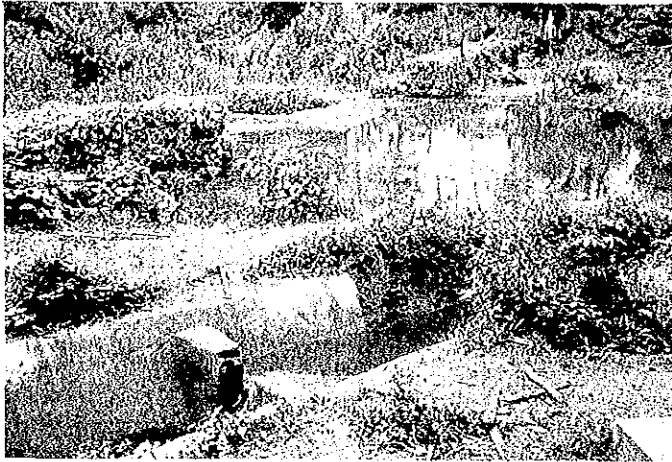


Photo: 04

**Houay Keun
irrigation**

Responsible:
30 ha (wet season)

Location:
B. Xiengxiane

Photo: 05

**Access road
(road No. 1D)**
from Thasi village
to Xiengxian-
XiengLeu area
used in the dry
season only



Photo: 06

**Proposed
potential
resettlement area**

Location :
Near B. Vha
B. Xiengxiane

Land for Agricultural area at Xiengxiane-XiengLeu area



Photo: 07

Flat area in the
Resettlement
sites along
Nam Lat valley

Photo: 08

Soil survey
in the
resettlement
site



Photo: 09

**Xiengxian
village**

Location:

N 18°43.17'

E 103°59.76'

Pop. 238 pers.

LaoTheung

Hatkham area (Upland rice field in the Houay Soup Valley)

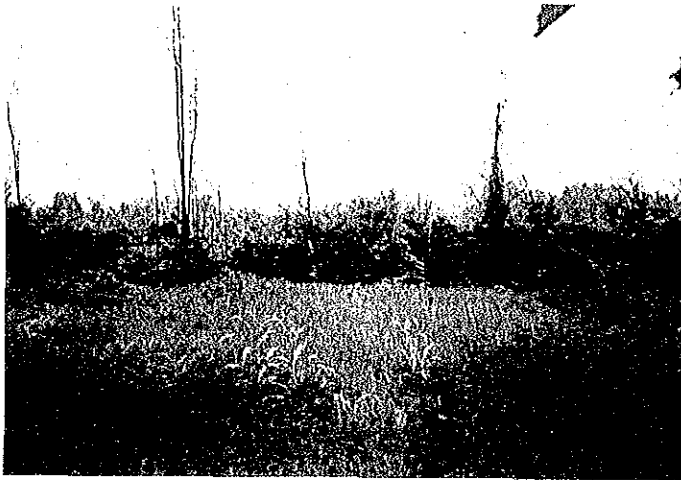


Photo: 10

Houay Soup valley

Able to irrigated:

60 ha (dry season)

100 ha (wet season)

Location:

B. Hatkham

Photo:11

Upland rice field

In the Houay
Soup Valley

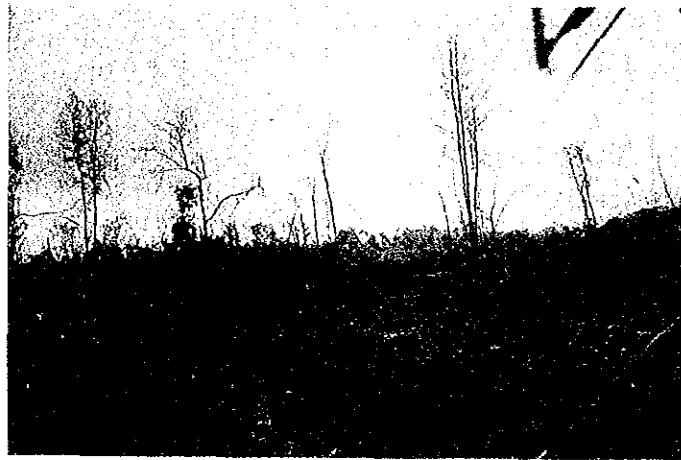


Photo:12

**Small river
and spring**

used for
irrigated in the
wet season

Pakbuak , Potential resettlement area



Photo: 01

Upland rice field

Location:

B. Pakbuak

Photo: 02

The Forest in
the Pakbuak
area



Photo: 03

Access road
from Pakbuak
to Viengthong
district

Infrastructure at Pakbuak Resettlement Area



Photo: 04

New
construction
Dispensary
Location:
B. Pakbuak

Photo: 05

Secondary School
Size 4 m x 36 m
Location:
B. Pakbuak

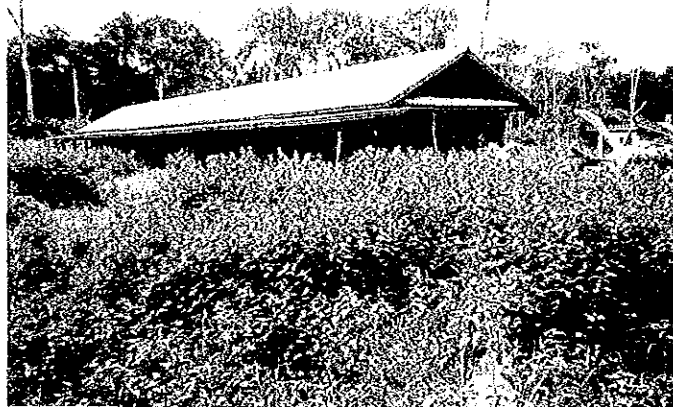


Photo: 06

Dam Site
for irrigation project
area = 3,000 ha

Location:
Nam Sun(Gnai)

Land use for agriculture in the Pakbuak Resettlement area

Photo:07

**Upland rice field
And Forest status
on
Nam Poy (right ank)**



Photo:08

**Upland Rice field
And Forest status
on
Nam Poy (Left
bank)**

Photo:09

Forest status

**Location:
B. Pakpoy**



**Appendix.1: CHARACTERISTICS OF REPRESENTATIVE SOIL UNITS IN
XiengXian-XiengLeu zone**

Profile N^o: NK.P 01

1. SOIL CLASSIFICATION: Gleyic CAMBISOLS (CMg):

Location: Navha village, Bolikhanh district, Bolikhamxay province

2. GENERAL INFORMATION OF SITE SURVEYED:

Parent material: Old alluvium Annual rainfall: 2,942mm
 Topography: Almost flat Annual evaporation: No data
 Landform: Valley Flooding depth: 10-15cm
 Land element: Valley Flooding duration: 25-30days/year
 Position: Lower slope Ground water depth: None observable
 Slope: 1-2% Drainage: Moderately well drained
 Elevation: 210m (+ MSL) Vegetation and land use: Grasses and scrub forest
 Mean annual temperature: 23.7°C Surface characteristics: Slightly hard surface crust
 M. Summer minus winter temp.: 15.3°C

3. BIEEF DESCRIPTION AND DIAGNOSTIC FEATURES:

- Brief description: Moderately well drained soil, Deep, soils (derived from : Old alluvium) with dark grayish brown loamy topsoil over strong brown to reddish yellow ,clay loam top soil texture ,Cambic B-horizon.
- Diagnostic horizon/ properties: Ochric A horizon, cambic B-horizon, gleyicic property.

4. LAB. ANALYTICAL DATA:

Profile No.	Soil unit	Soil horizon		% Sand	% Silt	% Clay	Soil text	% C	% OM	ppm P_avail	K ₂ O_mg /100g K_avail	pH	
		Symbol	Depth (cm)									H ₂ O	KCl
01	CMg	A	0-20	65.88	13.28	20.84	LL	0.52	0.90	9.10	21.60	5.5	5.0
		AB	20-35	64.88	13.28	21.84	LL					5.4	4.2
		Bwg1	35-50	58.88	13.28	27.84	CL					5.3	4.1
		Bwg2	50-80	54.88	13.28	31.84	CL					5.3	4.1

Profile No.	Soil unit	Soil horizon		Cation Exchange Capacity (CEC) me/100g soil							CEC/clay (me/100g clay)	% BS_t
		Symbol	Depth (cm)	extr_ac	Ca ⁺⁺	Mg ⁺⁺	K ⁺	Na ⁺	Bases	CECt		
01	CMg	A	0-20	4.05	0.70	0.60	0.47	0.18	1.95	6.00	43.35	32.50
		AB	20-35	3.60	0.50	0.30	0.41	0.16	1.37	4.97	22.76	27.57
		Bwg1	35-50	3.75	0.50	0.50	0.37	0.18	1.55	5.30	19.04	29.25
		Bwg2	50-80	3.15	0.00	0.60	0.31	0.18	1.09	4.24	13.32	25.71

Profile N^o: NK. P 02

1. SOIL CLASSIFICATION: Haplic ACRISOLS (ACh)

Location: Xieng xian village, Bolikhanh district, Bolikhamxay province

2. GENERAL INFORMATION OF SITE SURVEYED

Parent material: Old alluvium Annual rainfall: 2,942mm
 Topography: Undulating Annual evaporation: No data
 Landform: Upland Flooding depth: 5-10cm
 Land element: Terrace Flooding duration: 8-15days/y
 Position: Intermediate part Ground water depth: None observable
 Slope: 3-4% Drainage: Somewhat well drained
 Elevation: 220m (+ MSL) Vegetation and land use: Temporarily unstocked forest
 Mean annual temperature: 23.7°C Surface characteristics: Slightly gully erosion.
 M. Summer minus winter temp.: 15.3°C

3. BIEEF DESCRIPTION AND DIAGNOSTIC FEATURES:

- Brief description: Deep, somewhat well drained, sandy loam soils texture (derived from siltstone) with brownish yellow topsoil over yellowish brown to brown, structural developed B-horizon.
- Diagnostic horizon/ properties: Ochric A horizon, argic B-horizon, haplic property.

4. LAB. ANALYTICAL DATA:

Profile No.	Soil unit	Soil horizon		% Sand	% Silt	% Clay	Soil text	% C	% OM	ppm P_avail	K ₂ O_mg /100g K_avail	pH	
		Symbol	Depth (cm)									H ₂ O	KCl
02	ACh	A	0-18	74.00	16.00	10.00	SL	1.17	2.01	1.80	30.00	5.0	4.2
		Bt1	18-35	52.00	28.00	20.00	SL					5.4	4.3
		Bt2	35-50	28.00	34.00	38.00	LL					5.3	4.2
		Bt3	50-100	22.68	38.00	39.32	CL					5.1	4.1

Profile No.	Soil unit	Soil horizon		Cation Exchange Capacity (CEC) me/100g soil							CEC/clay (me/100g clay)	% BS_t
		Symbol	Depth (cm)	extr_ac	Ca ⁺⁺	Mg ⁺⁺	K ⁺	Na ⁺	Bases	CECt		
02	ACh	A	0-18	11.08	2.40	1.77	0.25	0.04	4.46	15.54	38.85	28.70
		Bt1	18-35	5.61	6.25	4.48	0.16	1.10	11.99	17.60	35.20	38.13
		Bt2	35-50	3.07	5.25	4.73	0.11	2.04	12.13	15.20	40.00	79.80
		Bt3	50-100	0.00	7.25	3.25	0.12	2.50	13.12	13.12	33.37	100.00

**CHARACTERISTICS OF REPRESENTATIVE SOIL UNITS IN
Hatkham zone**

Profile N^o: HK.P 01

1. SOIL CLASSIFICATION: Haplic ACRISOLS(ACh)

Location: Hatkham village, Bolikhanh district, Bolikhamxay province

2. GENERAL INFORMATION OF SITE SURVEYED:

Parent material: Old alluvium	Annual rainfall: 2,942mm
Topography: Undulating	Annual evaporation: No data
Landform: Upland	Flooding depth: none
Land element: Terrace	Flooding duration: none
Position: Intermediate part	Ground water depth: None observable
Slope: 4-5%	Drainage: Moderately well drained
Elevation: 180m (+ MSL)	Vegetation and land use: Temporarily unstocked forest
Mean annual temperature: 23.7°C	Surface characteristics: Slightly gully erosion.
M. Summer minus winter temp.: 15.3°C	

3. BIEF DESCRIPTION AND DIAGNOSTIC FEATURES:

- Brief description: Deep, moderately well drained soils (derived from old alluvium) with grayish brown loam topsoil over very pale brown clay loam B-horizon that has moderate medium angular blocky structure.
- Diagnostic horizon/ properties: Ochric A horizon, argic B-horizon and Haplic property.

4. LAB. ANALYTICAL DATA:

Profile No.	Soil unit	Soil horizon		% Sand	% Silt	% Clay	Soil text	% C	% OM	ppm P _{avail}	K ₂ O _{mg} /100g K _{avail}	pH	
		Symbol	Depth (cm)									H ₂ O	KCl
01	ACh	A	0-12	49.20	30.40	20.40	L	0.57	0.98	12.60	6.40	5.7	4.5
		AB	12-40	34.30	26.50	39.20	CL	0.47	0.81	13.70	8.80	4.9	4.1
		Bt1	40-75	19.00	44.00	37.00	CL	0.33	0.57	13.70	8.00	4.8	4.1
		Bt2	75-140	22.20	41.60	36.20	CL	0.24	0.41	8.60	7.60	4.8	4.2

Profile No.	Soil unit	Soil horizon		Cation Exchange Capacity (CEC) me/100g soil							CEC/clay (me/100g clay)	% BS _t
		Symbol	Depth (cm)	extr _{ac}	Ca ⁺⁺	Mg ⁺⁺	K ⁺	Na ⁺	Bases	CECt		
01	ACh	A	0-12	3.60	1.30	0.80	0.11	0.62	2.83	6.43	31.52	44.01
		AB	12-40	1.50	3.60	6.90	0.24	2.87	13.61	15.11	38.55	90.07
		Bt1	40-75	0.75	4.40	8.00	0.28	6.39	19.07	19.82	53.57	96.22
		Bt2	75-140	0.60	4.40	9.50	0.27	8.69	22.86	23.46	64.81	97.44

**CHARACTERISTICS OF REPRESENTATIVE SOIL UNITS IN
Phakbuak zone**

Profile N^o: PB.P 06

1. SOIL CLASSIFICATION: Gleyic CAMBISOLS (CMg)

Location: Phakbuak village, Bolkhanh district, Bolikhamxay province

2. GENERAL INFORMATION OF SITE SURVEYED:

Parent material: Old alluvium	Annual rainfall: 2,942mm
Topography: Flat or almost flat	Annual evaporation: No data
Landform: Plain	Flooding depth: none
Land element: Terrace	Flooding duration: none
Position: Low part	Ground water depth: None observable
Slope: 1-2%	Drainage: Somewhat excessively drained
Elevation: 175m (+ MSL)	Vegetation and land use: Single rice
Mean annual temperature: 23.7°C	Surface characteristics: No any evidence
M. Summer minus winter temp.: 15.3°C	

3. BIEEF DESCRIPTION AND DIAGNOSTIC FEATURES:

- Brief description: Deep, somewhat excessively drained soils (derived from Old alluvium) with yellowish brown clay loam topsoil over strong brown to dark brown clay B-horizon.
- Diagnostic horizon/ properties: Ochric A horizon, cambic B-horizon and gleyic property

4. LAB. ANALYTICAL DATA:

Profile No.	Soil unit	Soil horizon		% Sand	% Silt	% Clay	Soil text.	% C	% OM	ppm P _{avai} l	K ₂ O _{mg} /100g	pH	
		Symbol	Depth (cm)									H ₂ O	KCl
06	CMg	A	0-15	30.10	30.20	39.70	CL	2.16	3.72	16.00	16.00	5.0	4.0
		Bw	15-55	29.20	30.00	40.80	C	1.02	1.76	14.90	15.20	5.0	4.2
		Bwg1	55-90	25.90	33.70	41.00	C	0.80	1.38	13.70	4.00	6.0	4.8
		Bwg2	90-125	22.90	35.80	41.30	C	0.63	1.10	11.40	4.00	6.2	5.3

Profile No.	Soil unit	Soil horizon		Cation Exchange Capacity (CEC) me/100g soil							CEC/clay (me/100g clay)	% BS _t
		Symbol	Depth (cm)	extr _{ac}	Ca ⁺⁺	Mg ⁺⁺	K ⁺	Na ⁺	Bases	CECt		
06	CMg	A	0-15	4.03	8.35	2.80	0.25	0.12	11.52	15.55	39.17	74.08
		Bw	15-55	2.92	5.00	2.70	0.10	0.12	7.92	10.84	26.57	73.06
		Bwg1	55-90	2.92	5.40	4.45	0.10	0.15	10.10	13.02	31.76	77.57
		Bwg2	90-125	3.06	4.60	3.10	0.10	0.24	8.04	11.10	26.88	72.43

Profile N^o: PB.P 02

1. SOIL CLASSIFICATION: Haplic ACRISOLS (ACh)

Location: Phakbuak village, bolikhanh district, Bolikhamxay province

2. GENERAL INFORMATION OF SITE SURVEYED:

Parent material: Sandstone Annual rainfall: 2,942mm
 Topography: Rolling Annual evaporation: No data
 Landform: Upland Flooding depth: none
 Land element: Terrace Flooding duration: none
 Position: Intermediate part Ground water depth: None observable
 Slope: 8-10% Drainage: Somewhat well drained
 Elevation: 220m (+ MSL) Vegetation and land use: Ray/shifting cultivation
 Mean annual temperature: 23.7°C Surface characteristics: Slightly gully erosion.
 M. Summer minus winter temp.: 15.3°C

3. BIEEF DESCRIPTION AND DIAGNOSTIC FEATURES:

- Brief description: Thin, somewhat well drained soils (derived from sandstone) with grayish brown sandy loam topsoil over very pale brown clay loam B-horizon that has moderate medium angular blocky structure.
- Diagnostic horizon/ properties: Ochric A horizon, argic B-horizon and Haplic property.

4. LAB. ANALYTICAL DATA:

Profile No.	Soil unit	Soil horizon		% Sand	% Silt	% Clay	Soil text	% C	%	ppm P.vail	K ₂ Omg /100g	pH	
		Symbol	Dpth (cm)									H ₂ O	KCl
02	ACh	A	0-10	61.44	27.64	10.92	SL	1.60	2.76	6.90	5.60	4.9	4.1
		Bt	10-25	55.44	23.64	20.92	L					5.0	4.3
		Btc	25-45	43.44	23.64	32.92	CL					50	4.2

Profile No.	Soil unit	Soil horizon		Cation Exchange Capacity (CEC) me/100g soil							CEC/clay (me/100g clay)	% BS_t
		Symbol	Depth (cm)	extr_ac	Ca ⁺⁺	Mg ⁺⁺	K ⁺	Na ⁺	Bases	CECt		
02	ACh	A	0-10	5.95	3.62	1.23	0.12	0.21	5.18	11.13	36.00	46.54
		Bt	10-25	6.65	3.74	3.47	0.12	0.50	7.83	14.48	43.99	54.07
		Btc	25-45	6.65	3.74	3.47	0.12	0.50	7.83	14.48	43.99	54.07

Profile N^o: PB.P 03

1. SOIL CLASSIFICATION: Haplic ACRISOLS (ACh)

Location: Phakbuak village, bolikhanh district, Bolikhamxay province

2. GENERAL INFORMATION OF SITE SURVEYED:

Parent material: Old alluvium Annual rainfall: 2,942mm
 Topography: Undulating Annual evaporation: No data
 Landform: Upland Flooding depth: 5-10cm
 Land element: Terrace Flooding duration: 8-15days/y
 Position: Intermediate part Ground water depth: None observable
 Slope: 3-4% Drainage: Somewhat well drained
 Elevation: 180m (+ MSL) Vegetation and land use: Temporarily unstocked forest
 Mean annual temperature: 23.7°C Surface characteristics: Slightly gully erosion.
 M. Summer minus winter temp.: 15.3°C

3. BRIEF DESCRIPTION AND DIAGNOSTIC FEATURES:

- Brief description: Medium soil deep, somewhat excessively drained soils (derived from old alluvium) with yellowish brown clay loam topsoil over strong brown to dark brown clay B-horizon.
- Diagnostic horizon/ properties: Ochric A horizon, argic B-horizon and haplicproperty.

4. LAB. ANALYTICAL DATA:

Profile No.	Soil unit	Soil horizon		% Sand	% Silt	% Clay	Soil text	% C	% OM	ppm	K ₂ O_mg /100g K avail	pH	
		Symbol	Depth (cm)									H ₂ O	K
03	ACh	Ap	0-16	30.38	54.34	15.28	L	5.78	9.96	12.25	15.20	4.8	4.
		AB	16-39	30.38	46.34	23.28	L	2.87	4.95	9.25	6.00	5.1	4.
		Bt1	39-64	10.38	50.34	29.28	CL	1.23	2.12	8.75	7.60	5.4	4.
		Bt2	64-95	10.38	40.34	33.28	CL	0.82	1.41	4.00	6.00	5.1	4.

Profile No.	Soil unit	Soil horizon		Cation Exchange Capacity (CEC) me/100g soil							CEC/clay (me/100g clay)	% BS_t
		Symbol	Depth (cm)	extr_ac	Ca ⁺⁺	Mg ⁺⁺	K ⁺	Na ⁺	Bases	CECt		
03	ACh	Ap	0-16	11.70	0.70	0.90	0.16	0.11	1.87	13.57	434.94	13.78
		AB	16-39	6.90	0.40	0.60	0.05	0.09	1.14	8.04	88.16	14.18
		Bt1	39-64	3.15	0.30	0.30	0.06	0.10	0.76	3.91	42.87	19.44
		Bt2	64-95	2.40	0.30	0.70	0.04	0.11	1.15	3.55	49.86	32.39

Profile N^o: PB.P-01

1. SOIL CLASSIFICATION: Haplic ACRISOLS (ACh)

Location: Phakbuak village, bolikhanh district, Bolikhamxay province

2. GENERAL INFORMATION OF SITE SURVEYED:

Pa Parent material: Sandstone	Annual rainfall: 2,942mm
Topography: Undulating	Annual evaporation: No data
Landform: Upland	Flooding depth: 5-10cm
Land element: Low Terrace	Flooding duration: 25-30days/y
Position: Valley	Ground water depth: None observable
Slope: 3-4%	Drainage: Somewhat well drained
Elevation: 180m (+ MSL)	Vegetation and land use: Single rice
Mean annual temperature: 23.7°C	Surface characteristics: No any evidence.
M. Summer minus winter temp.: 15.3°C	

3. BIEEF DESCRIPTION AND DIAGNOSTIC FEATURES:

- Brief description: Deep , well drained soils (derived from overlaying sandstone) with pink loam topsoil and pale brown clay loam B-horizon that has, in the lower part (60-72cm from the soil surface), common fine to medium yellowish red (5YR 5/8) mottles.
- Diagnostic horizon/ properties: Ochric A horizon, argic B-horizon, haplic property.

4. LAB. ANALYTICAL DATA:

Profile No.	Soil unit	Soil horizon		%	%	%	Soil text	%	%	ppm	K ₂ O_m g /100g K avail	pH	
		Symbol	Depth (cm)									Sand	Silt
01	ACh	Ap	0-10	74.16	21.28	4.56	SL	0.45	0.78	4.25	4.80	4.6	4.0
		B	10-35	50.16	21.28	28.56	CL	0.45	0.78	0.50	6.40	4.8	4.1
		Bt	35-60	42.16	21.28	36.56	CL	0.41	0.71	0.50	7.60	4.9	4.2
		Btc	60-72	62.16	25.28	12.56	SL	0.16	0.28	20.75	6.00	4.8	4.2

Profile No.	Soil unit	Soil horizon		Cation Exchange Capacity (CEC) me/100g soil							CECt/clay (me/100g clay)	% BS_t
		Symbol	Depth (cm)	extr_ac	Ca++	Mg++	K+	Na+	Bases	CECt		
01	ACh	Ap	0-10	1.80	0.90	0.10	0.03	0.09	1.12	2.92	64.04	38.36
		B	10-35	4.80	4.80	1.80	0.13	0.28	7.01	11.81	41.35	59.36
		Bt	35-60	4.30	7.60	4.40	0.12	0.53	12.65	16.95	46.36	74.63
		Btc	60-72	2.55	8.00	5.00	0.07	0.54	13.61	16.16	128.66	84.22

Appendix-2: Land factor classes and land qualities.

This appendix gives details of how the field and laboratory data collected during the survey were classed according to the diagnostic factors. For the purpose of land suitability evaluation the land factors were grouped into 12 land qualities as follows:

N/N	Land quality	Diagnostic factor
1	Temperature regime (t)	Mean temperature in growing period ; °C
2	Moisture availability (m)	Annual rainfall /water requirement in growing period ;mm
3	Oxygen availability (o)	Soil drainage class
4	Nutrient availability (s)	%N, P-ppm , K ₂ O-mg/ 100gsoil, %OM ,Nutrient status class ,Reaction .
5	Nutrient retention (n)	CEC- total ; %BS.
6	Rooting condition(r)	Effective soil depth cm ; water table depth cm ; Root penetration class.
7	Flood hazard (f)	Frequency of hazard ;yrs/time
8	Excess of salts (x)	EC- of saturation ; mmho/cm
9	Soil toxicities (z)	Depth of jarosite ;cm
10	Soil workability (k)	Workability class
11	Potential for mechanization (w)	Slope class, Rockoutcrop class, Stoniness class.
12	Erosion hazard (e)	Slope class, soil loss ; ton /ha /yr

.Oxygen availability (o):

The soil drainage classes specified in the Soil Survey Manual are used for rating oxygen availability .

- 1 - Very poorly drained.
- 2 - Poorly drained.
- 3 - Somewhat poorly drained .
- 4 - Moderately well drained .
- 5 - Well drained
- 6 - Excessively drained

.Nutrient availability (s):

The rating are based on the organic matter (%OM), %N -total , P-ppm , and K₂O mg/ 100g soils as follows:

N/N	Rating	%OM	%N-total	P-ppm	K ₂ O mg/100gsoils
1	Very low	<0.5	<0.10	<3.0	<2.0
2	Low	0.6-2.0	0.11-0.15	3.1-10.00	2.1-4.0
3	Medium	2.1-4.0	0.16- 0.25	10.1-25.0	4.1-12.0
4	High	>4.0	0.26-0.30	25.1-45.0	12.1-18.0
5	Very high	-	>0.30	>45.0	>18.0

Nutrient retention (n):

The rating are based on the soil exchangeable properties : CEC-total ; meq /100g soil , and %Base saturation as follows :

N/N	Rating	CEC-total ; meq /100g soil	%BS
1	Very low	<5	<25
2	Low	6-10	26-50
3	Medium	11-20	51-75
4	High	21-40	>75
5	Very high	>40	

Rooting Condition (r):

- Effective soil depth is used to assess rooting space as follow :

N/N	Descriptive class	Effective soil depth (cm)
1	Rockoutcrop	<25 cm
2	Shallow	26-50 cm
3	Thin	51-75 cm
4	Moderate	76-100 cm
5	Deep	101-150 cm
6	Very Deep	>150 cm

Flood hazard (f) :

- The rating are based on frequency of flood hazard as follow :

N/N	Rating	Frequency (yrs/time)
4	Frequent	1-2 yrs/ 1 time
3	Moderate	3-5 yrs/ 1 time
2	Slight	6-9 yrs/ 1 time
1	None to slight	>10 yrs/ 1 time

. Soil workability (k) :

- The rating are based on soil consistence, soil structure, soil texture and others as follow:

Description	Soil Workability class					
	1.	2		3		4
	Easy	Moderate		Difficult		Very difficult
Soil Consistence	Friable, very friable, loose	Firm	Very firm	Very firm	Extremely firm	Extremely Firm
Soil structure	Any	Any	Mod. or strong, Med. or fine bloky, any class of granular or crumb	Coarse or very coarse bloky, any prismatic columnar or platy, massive	Any	Coarse or very coarse bloky, prismatic or columnar, massive
Soil texture	Sand, Loamy sand, Loam, Sandy clay, Clay, where largely Kaolinite and sesquioxides	Rang from Sandy loams to clays		Mostly clays and Sandy clays, some Sandy clay loams		Clay, Heavy clay
Others				Profile as a whole hard to dig when dry		Plastic very stiff and very sticky when wet, very hard when dry

. Potential for mechanization (w) :

- The rating are based on the slope class, Rockoutcrop class and Stoniness class follow :

Description	Rating				
	1	2	3	4	5
% slope	8	16	35	55	>55
% Rockoutcrop	1	4	10	25	>25
% Stoniness	1	5	15	40	>40

. Erosion hazard (e):

- The rating are based on the slope class, and soil loss as follow :

Description	Rating					
	1	2	3	4	5	6
Slope class (% slope)	A (0-2%)	B (2-8%)	C (8-16%)	D (16-30%)	E (30-55%)	F (>55%)
Soil loss (ton/ha/yr)	<12.5		12.5-25.0	25.0-75.0	>75.0	

Photo S01: Soil classification at Xiengxiane-XiengLeu



Soil
classification:
Gleyic
CAMBISOLS
(CMg)

**Profile No.
NK.P 01**

**Location:
B.Vha**



Photo S02: Soil classification at Xiengxiane-XiengLeu



Soil
classification:
Haplic
ACRISOLS
(ACh)

**Profile No.
NK.P 02**

Location:
B.Xiengxian
e

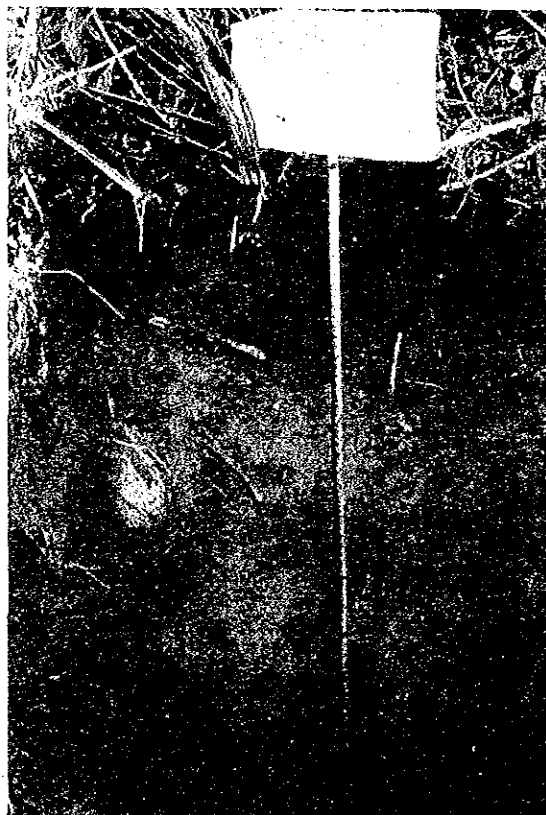


Photo S03: Soil classification at Hatkham area



Soil
classification:
Haplic
ACRISOLS
(ACh)

Profile No.
NK.P 01
Location:
B.Xiengxian
e

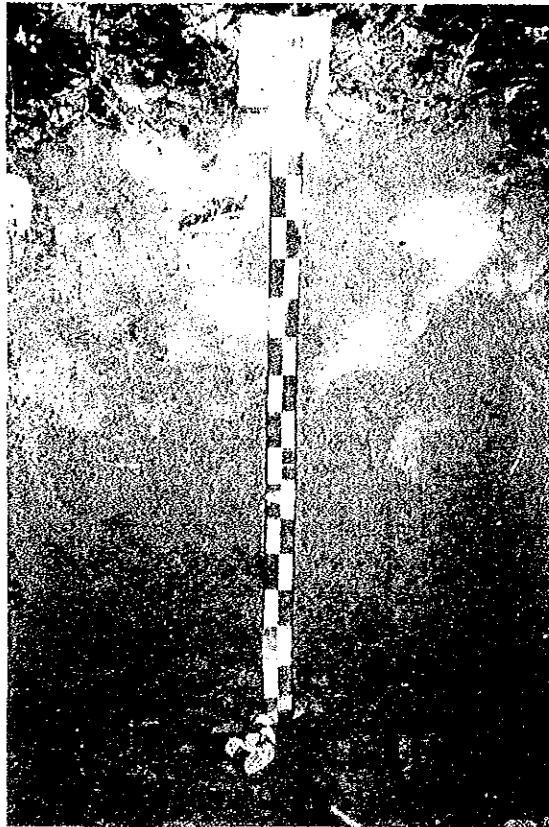


Photo S04: Soil classification at Pakbuak area



Soil
classification:
Gleyic
ACRISOLS
(ACh)

Profile No.
PB.P 06
Location:
B.Pakbuak



Photo S05: Soil classification at Pakbuak area



Soil
classification:
Haplic
ACRISOLS
(Ach)



Profile No.
PB.P 02
Location:
B.Pakbuak

Photo S06: Soil classification at Pakbuak area



Soil
classification:
Haplic
ACRISOLS
(ACh)

Profile No.
PB.P 01
Location:
B.Pakbuak

