Figures

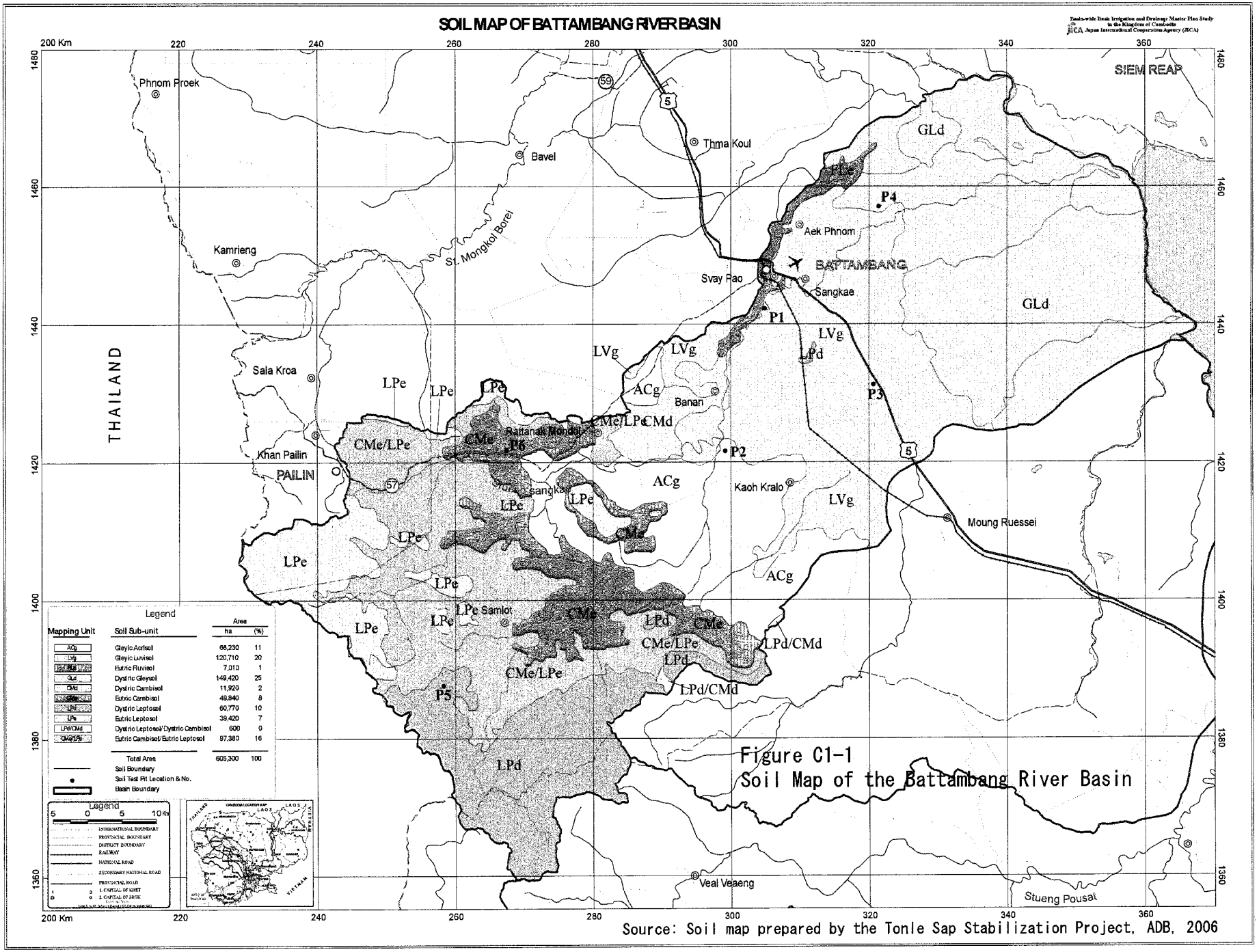

Figure C1-1
Soil Map of the Battambang River Basin

Source: Soil map prepared by the Tonle Sap Stabilization Project, ADB, 2006

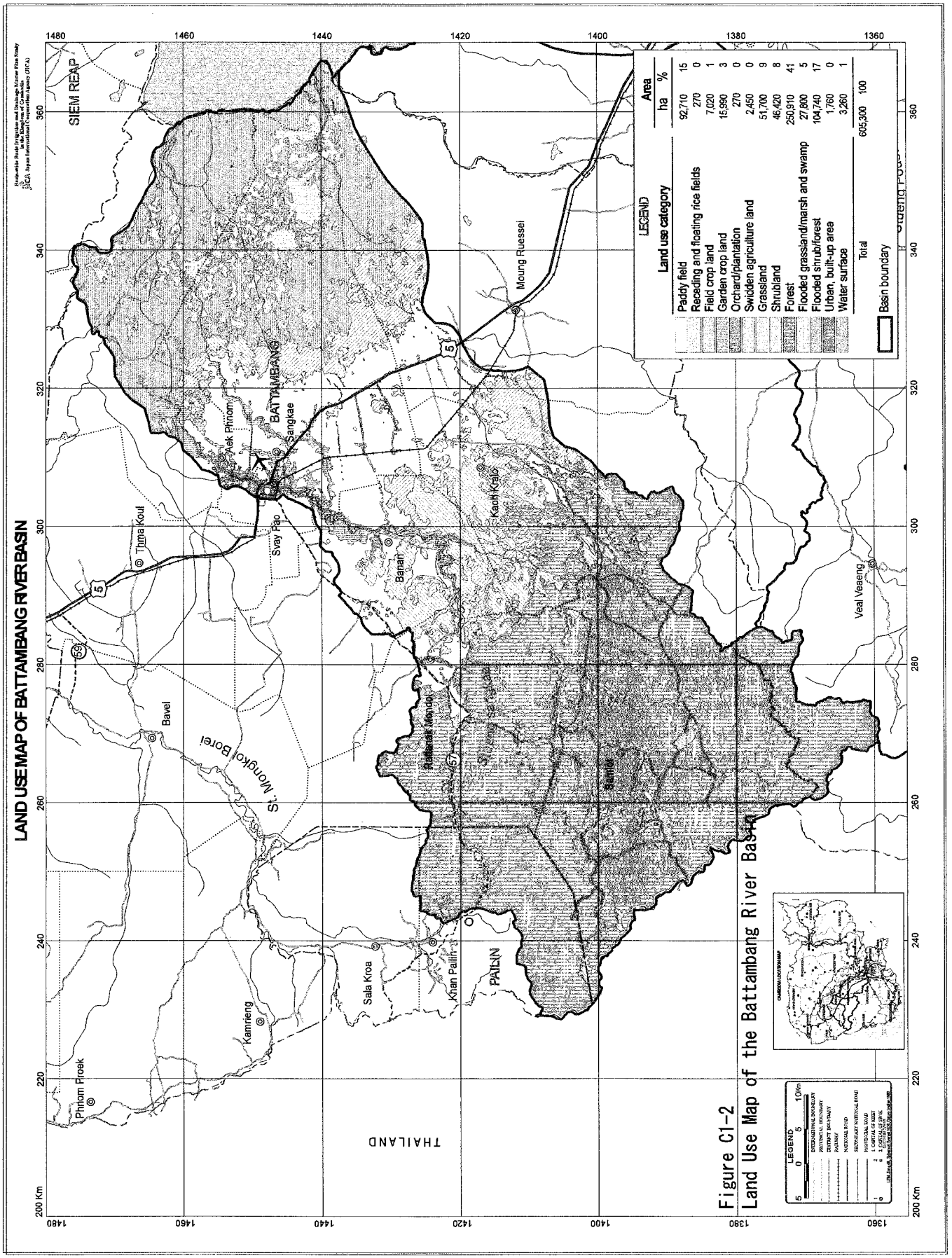
LAND USE MAP OF BATTAMBANG RIVER BASIN
LEGEND
Land use category
Area
ha
%
Paddy field 92,710 15
Receding and floating rice fields 270 0
Field crop land 7,020 1
Garden crop land 15,990 3
Orchard/plantation 270 0
Swidden agriculture land 2,450 0
Grassland 51,700 9
Shrubland 46,420 8
Forest 250,910 41
Flooded grassland/marsh and swamp 27,800 5
Flooded shrub/forest 104,740 17
Urban, built-up area 1,760 0
Water surface 3,260 1
Total 605,300 100
Basin boundary
SIEM REAP
BATTAMBANG
Moung Ruessei
Aek Phnom
Sangkae
Thma Koul
Svay Pao
Bavel
Banan
Kaoh Krala
Veal Veaeng
Ratanak Mondol
Sangke
Mongkol Borei
Kamrieng
Sala Kroa
Khan Pailin
PAILIN
Phnom Proek
THAILAND
Figure C1-2
Land Use Map of the Battambang River Basin

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Figure C1-3
Organization Structure of
Provincial Department of Agriculture, Battambang

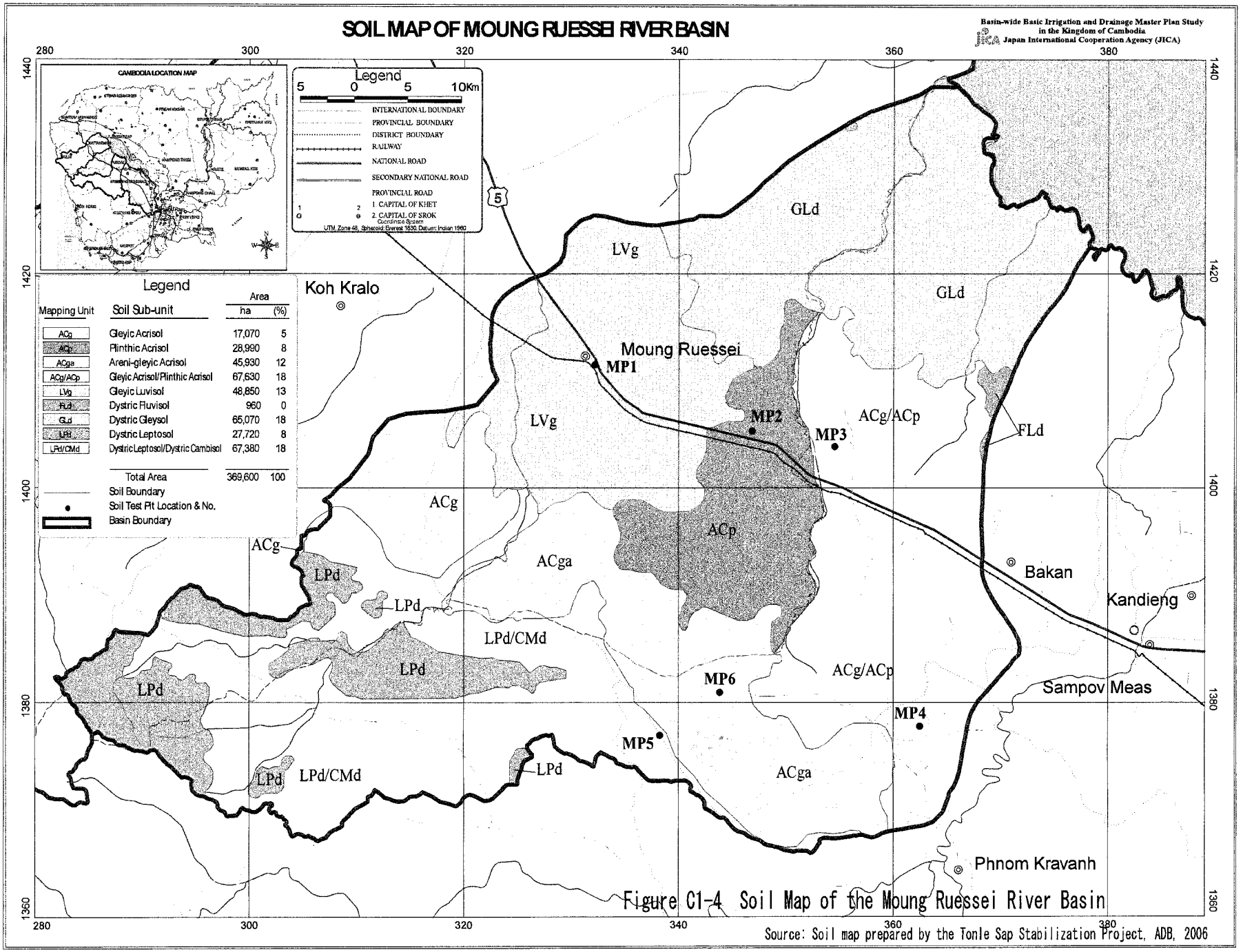

Figure C1-4 Soil Map of the Moung Ruessei River Basin

Source: Soil map prepared by the Tonle Sap Stabilization Project, ADB, 2006

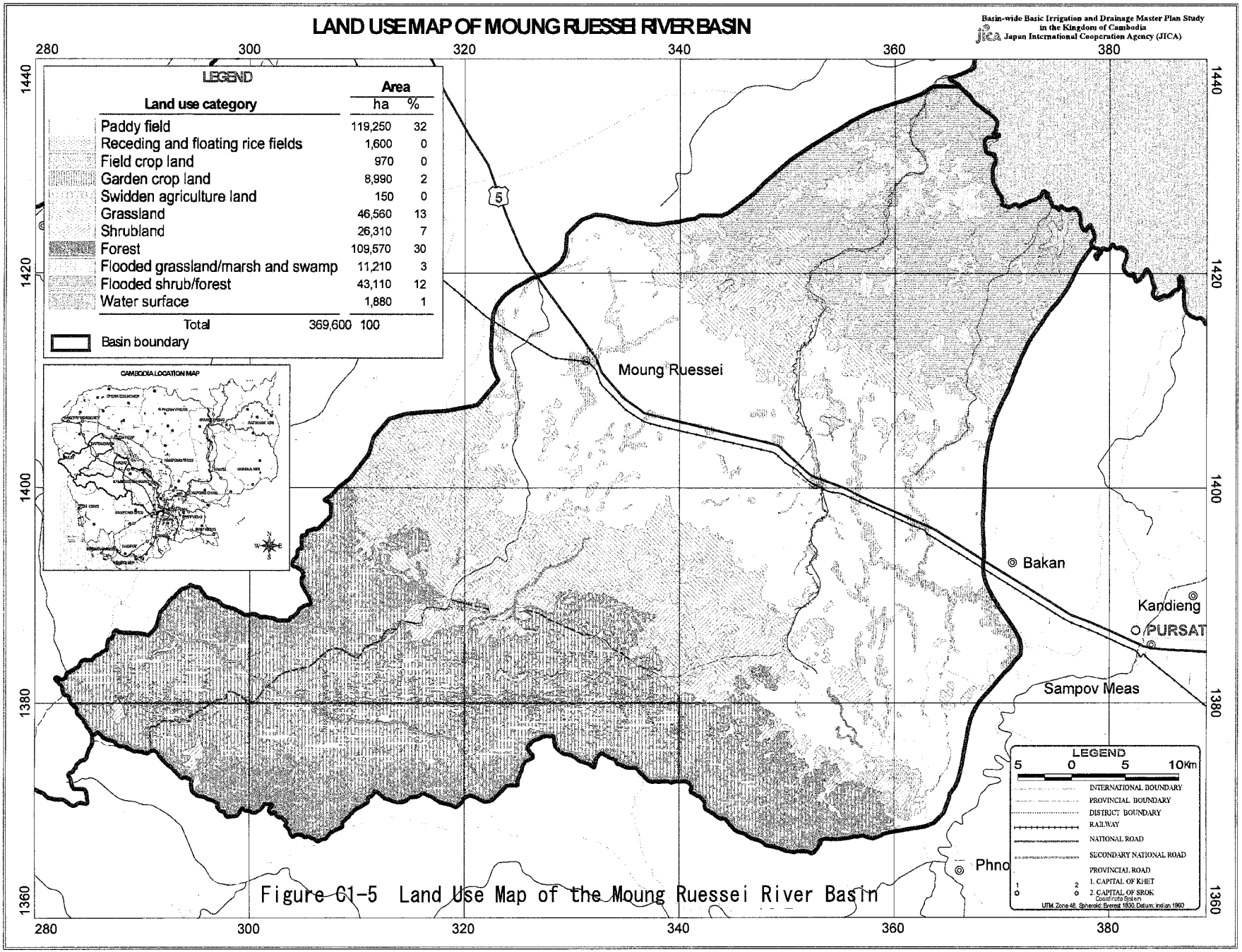

Figure C1-5 Land Use Map of the Moung Ruessei River Basin

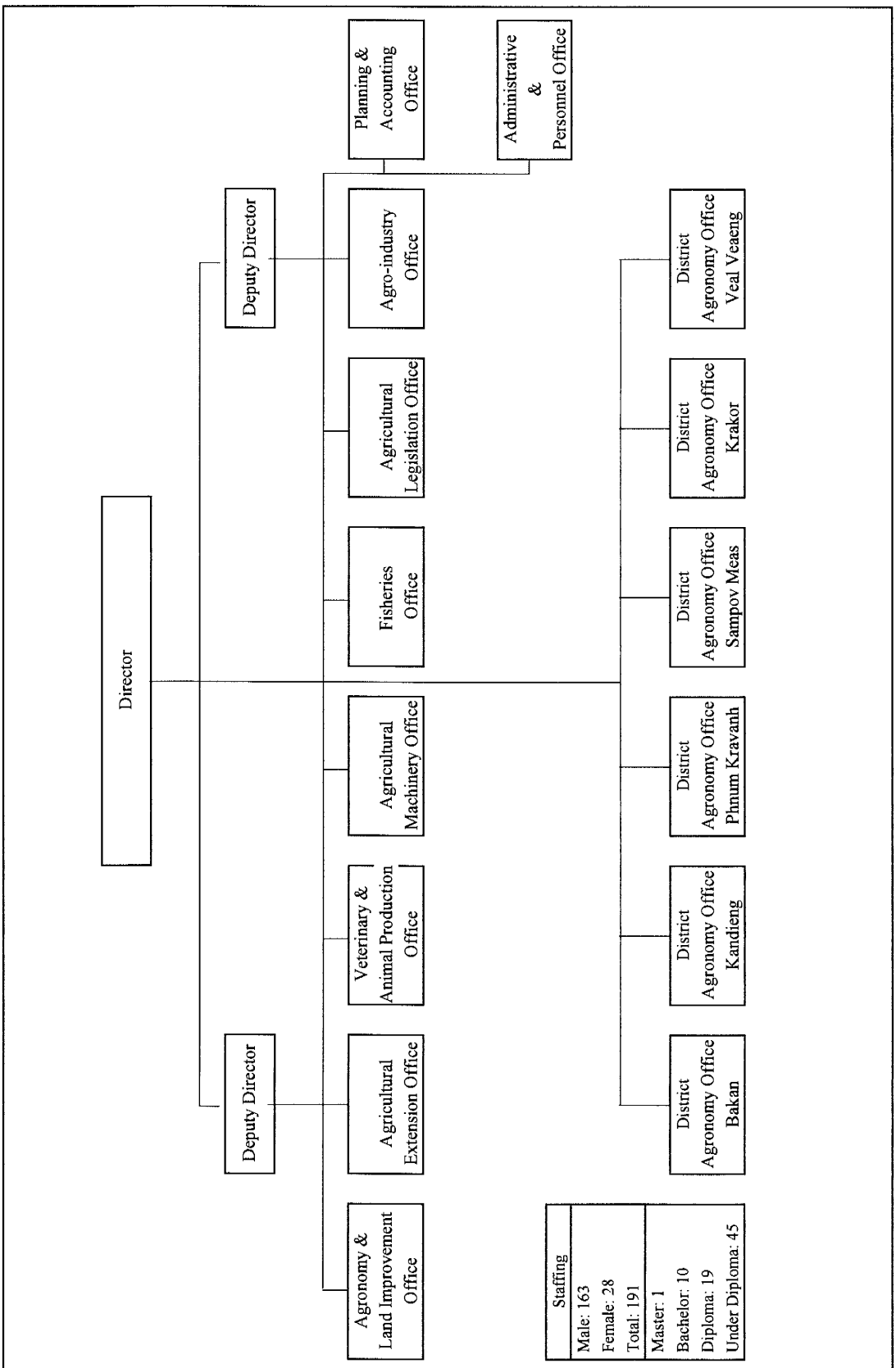

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Figure C1-6
Organization Structure of
Provincial Department of Agriculture, Pursat

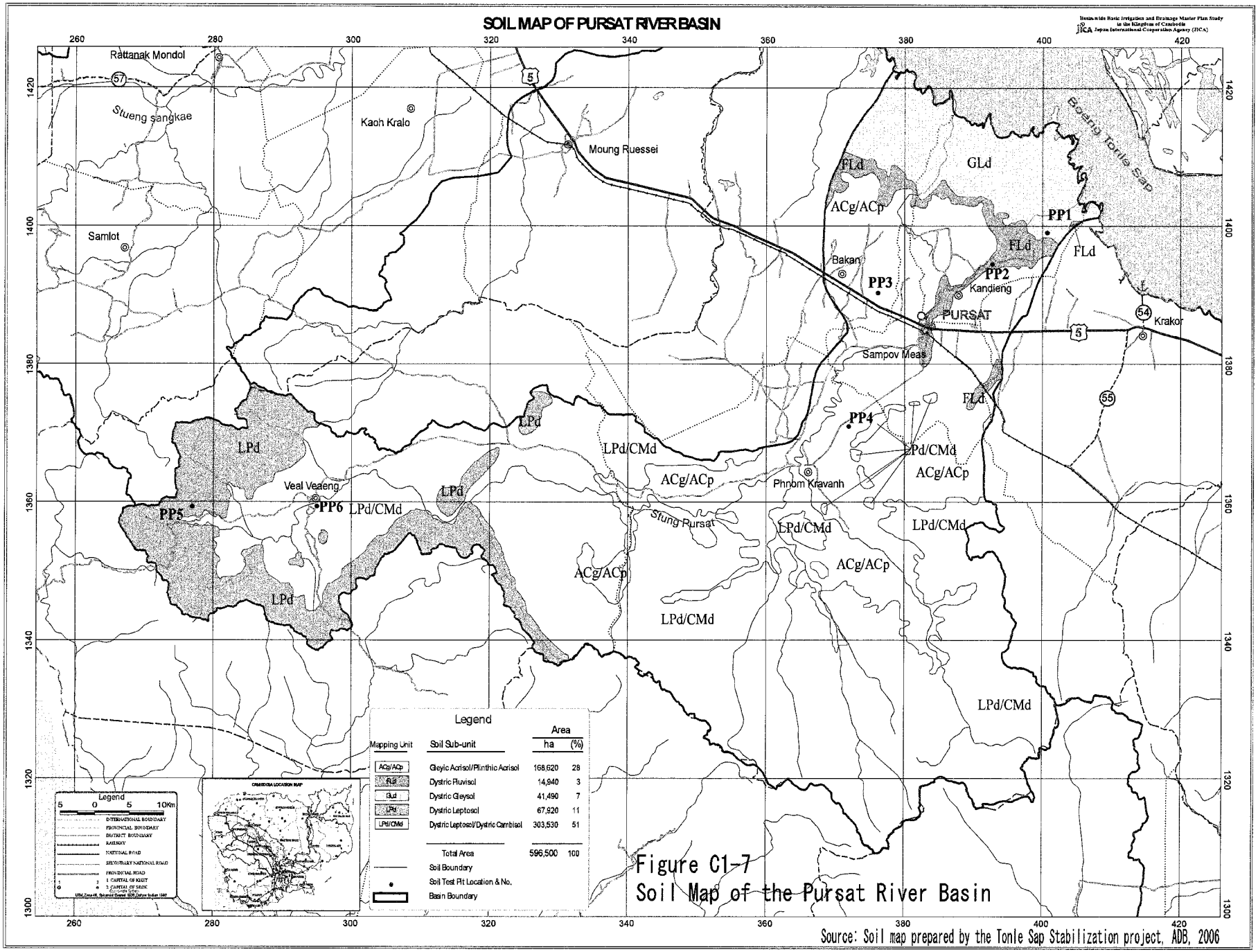

Figure C1-7
Soil Map of the Pursat River Basin

Source: Soil map prepared by the Tonle Sap Stabilization project, ADB, 2006

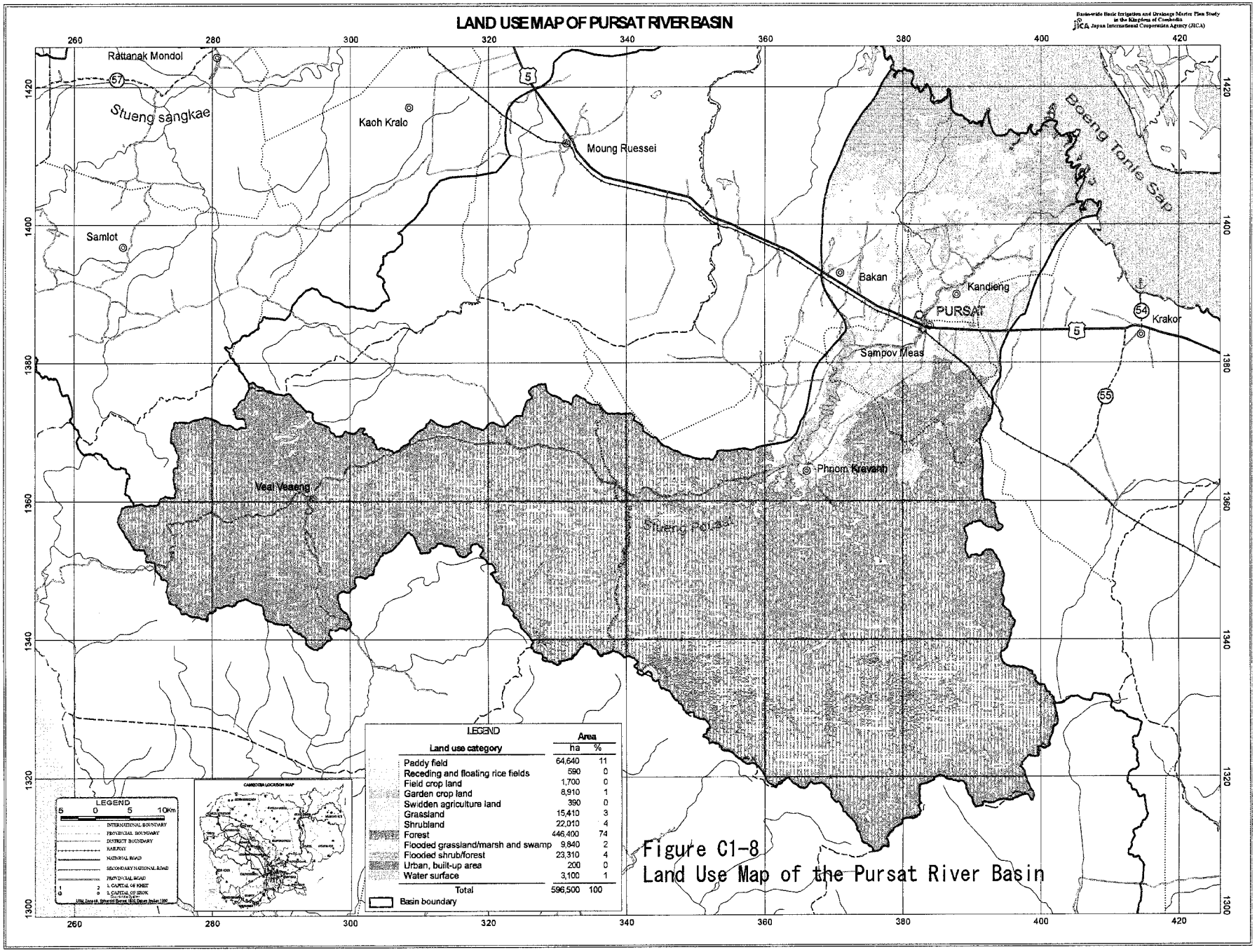

Figure C1-8
Land Use Map of the Pursat River Basin

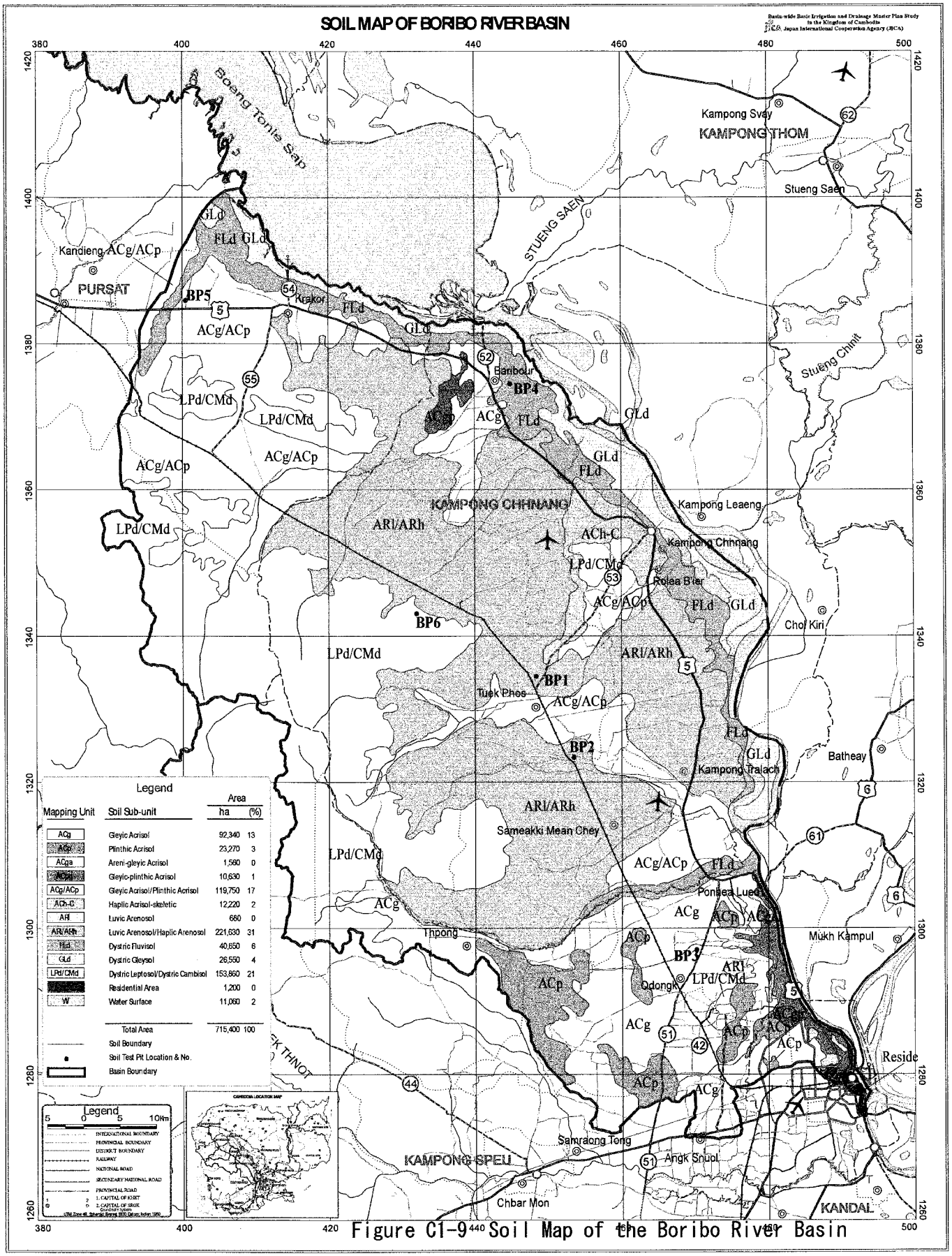

Figure C1-9 Soil Map of the Boribo River Basin

Source: Soil map prepared by the Tonle Sap Stabilization Project, ADB, 2006

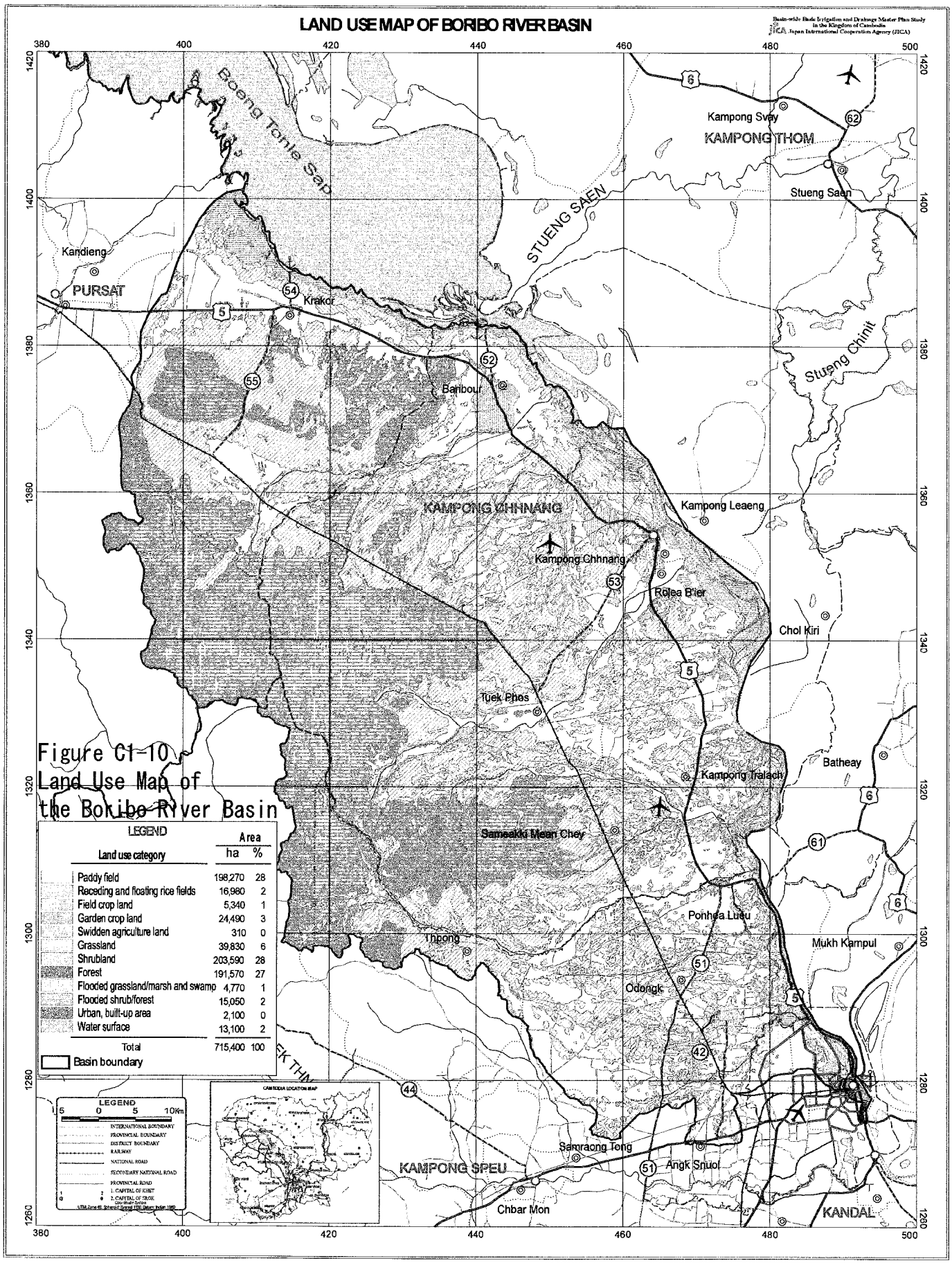

Figure C1-10
Land Use Map of
the Boribo River Basin

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Figure C1-11
Organization Structure of
Provincial Department of Agriculture, Kampong Chhnang

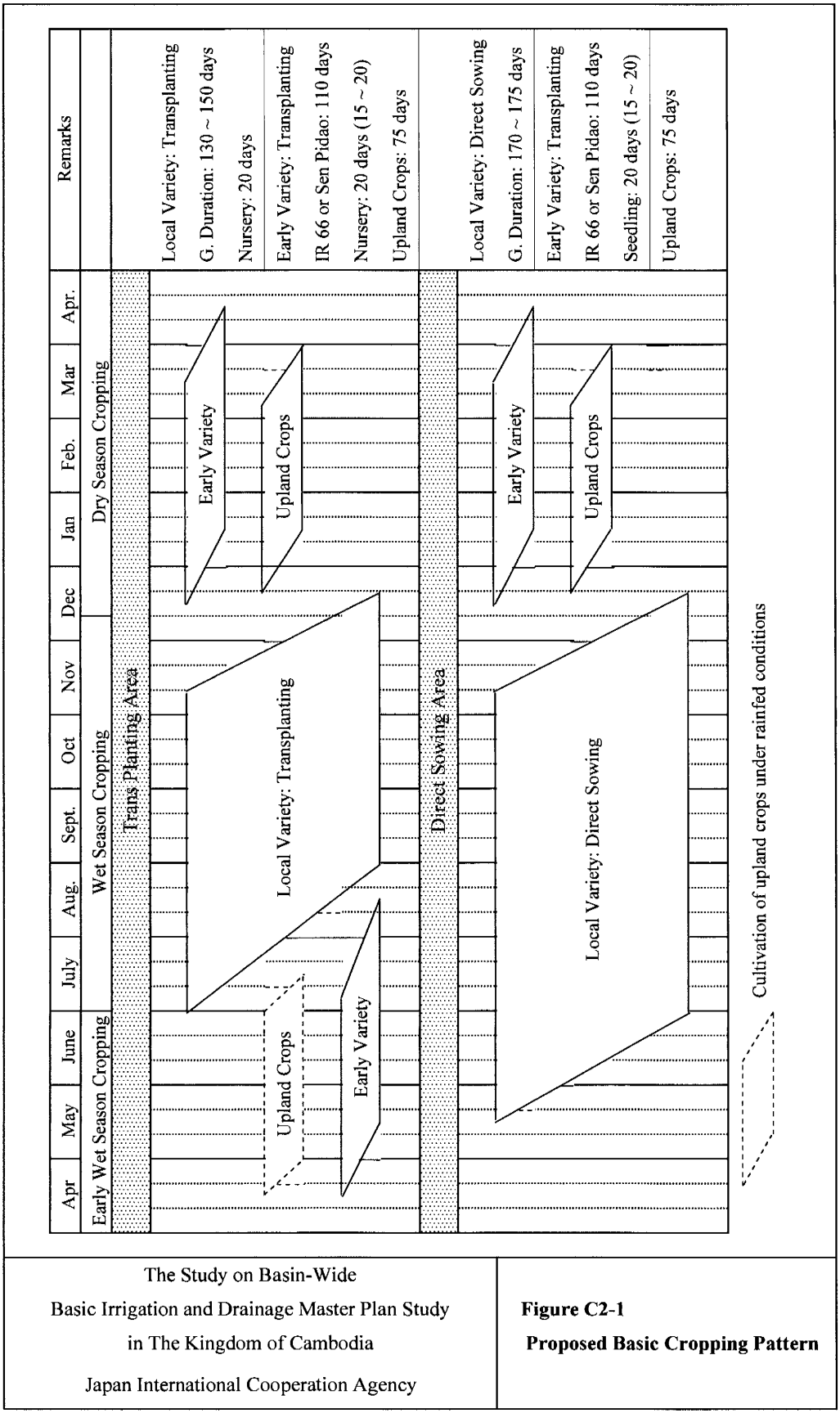

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Figure C2-1
Proposed Basic Cropping Pattern

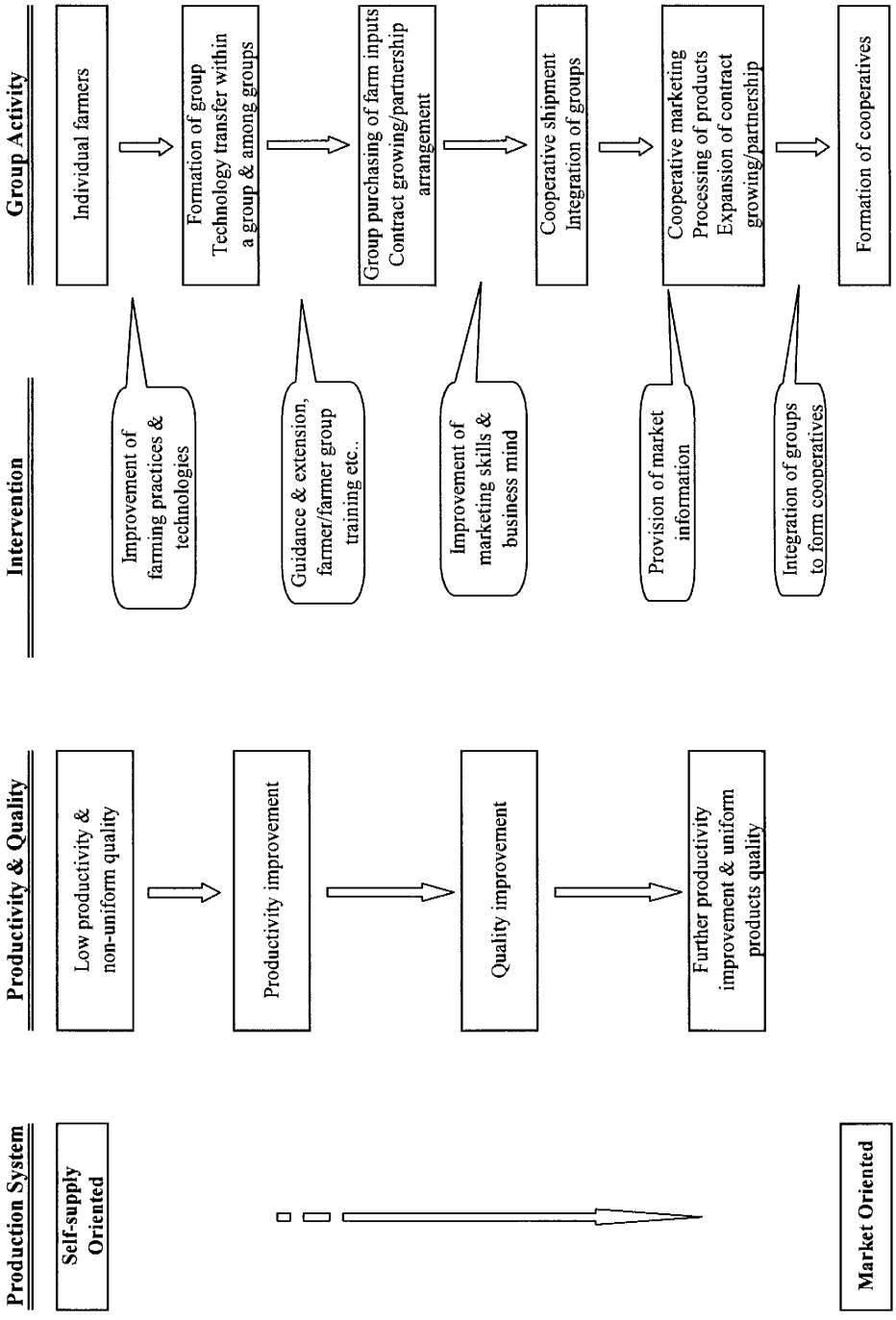

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Figure C2-2
Proposed Approaches for Group Marketing

Attachment

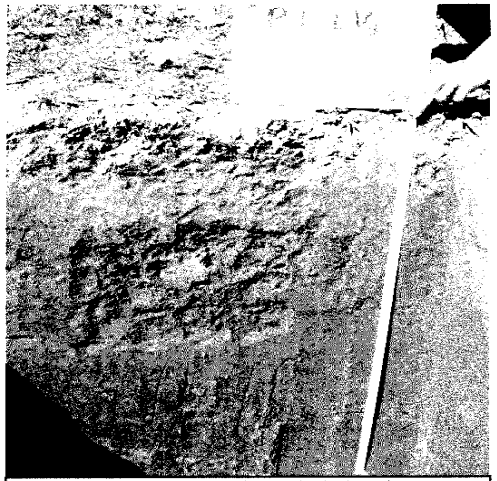
Attachment C-1. Description of Typical Soil Profile: Battambang River Basin (1/6)

Soil Sub-unit: Gleyic Luvisols (LVg) Distribution: 120,710 ha (20%) **Land Suitability Class: Rice:S2tc Upland crops: S3t**

Typical Soil Profile

Location	Kampong Chlong, Voat Ta Muem Commune, Sangkae District, Battambang Province		
Pit Number	P 1	Parent materials	Quaternary deltaic deposits
Topography	Flat	Land Use	Irrigated rice field (pumping); mungbeans planted
Groundwater	> 1.0 m	Elevation	18 m
Agronomic Information	Cropping calendar: sowing July; transplanting: Aug.; harvesting: Dec./Jan. Rice variety & yield: Phka Khney, Phka Rumduol, CAR 6, CAR 13; yield: 2.5 ~ 3.0 t/ha Agronomic constraints: water shortage, extension services limited, no flooding Mungbeans growth were very poor due to wet injury & disease		
Date of Survey	June 19, 2007		

Soil Depth	Description
0 - 13 (sampled)	dull yellowish brown (10YR 5/3), many medium sized distinct mottles (bright brown 7.5YR 5/8), light clay (LiC), strong medium sized blocky structure, very sticky & plastic when wet, very firm when moist, extremely hard when dry, many roots gradual wavy boundary
13 - 27 (sampled)	dull yellowish brown (10YR 5/3) + grayish brown (10YR 5/2), medium sized faint mottles common (bright brown 7.5YR 5/8), clay (C), moderate medium sized blocky structure, very sticky & plastic (wet), light clay (LiC), moderate medium sized blocky structure, very sticky & plastic, very firm when moist, extremely hard when dry, few roots gradual wavy boundary
27 - 55 (sampled)	dull yellowish brown (10YR 5/3) + grayish brown (10YR 5/2), medium sized faint mottles few (dark brown 7.5YR 3/4), clay (C), medium sized moderate blocky structure few, very sticky & plastic (wet), heavy clay (HC), weak medium sized blocky structure, very sticky & plastic, very firm when moist, extremely hard when dry, no roots gradual wavy boundary
55 - 100	grayish brown (10YR 5/2), no mottles, clay (C), massive, very sticky & plastic when wet, (dark brown 7.5YR 3/4), heavy clay (HC), massive, very sticky & plastic when wet, very firm when moist extremely hard when dry, no roots



Profile: P1 Gleyic Luvisols (LVg)

Test pit site & surrounding rice fields

Attachment C-1. Description of Typical Soil Profile: Battambang River Basin (2/6)

Soil Sub-unit: Gleyic Acrisols (ACg) Distribution: 68,230 ha (11%) **Land Suitability Class: Rice:S3c Upland crops: S3c/S3tc**

Typical Soil Profile

Location	Svay Prey, Kantueu Muoy Commune, Banan District, Battambang Province		
Pit Number	P 2	Parent materials	Quarternary pediments
Topography	Flat	Land Use	Rainfed rice field
Groundwater	> 1.0 m	Elevation	23 m
Agronomic Information	Cropping calendar: sowing May; harvesting: Oct./Nov. (direct sowing) Rice variety & yield: Phka Khney, Phka Mulis, Neang Meng; yield: 2.0 t/ha Agronomic constraints: water shortage, pest, rat, no flooding Mungbeans growth were very poor due to wet injury & disease		
Date of Survey	June 19, 2007		

Soil Depth	Description
0 - 12 (sampled)	yellowish brown (10YR 5/6), medium sized distinct mottles common (bright brown 7.5YR 5/6), light clay (LiC), weak medium sized blocky structure, sticky & plastic when wet, friable when moist, very hard when dry, roots distribution common gradual wavy boundary
12 - 25 (sampled)	dull yellowish brown (10YR 5/4), medium sized distinct mottles common (bright brown 7.5 YR 5/6), light clay (LiC), moderate medium sized blocky structure, sticky & plastic (wet), friable when moist, very hard when dry, few roots gradual wavy boundary
25 - 40 (sampled)	dull yellowish brown (10YR 5/3), medium sized distinct mottles many (dull brown 7.5 YR 5/4), heavy clay (HC), moderate medium sized blocky structure & weak small sub-angular structure, sticky & plastic when wet, firm when moist, very hard when dry, few roots clear wavy boundary
40 - 80	dull yellowish brown (10YR 5/4) + dull brown (7.5 YR 5/4), few faint mottles, heavy clay (HC), moderate medium sized blocky structure, sticky to very sticky when wet, plastic to very plastic when wet, firm when moist, very hard when dry, no roots gradual wavy boundary
80 - 100	yellowish brown (10YR 5/6), heavy clay (HC), massive, plinthite concretion (5mm) common, sticky to very sticky & plastic to very plastic when wet, firm when moist, very hard when dry

Profile: P2 Gleyic Acrisols (ACg)

Rice field at the test pit site

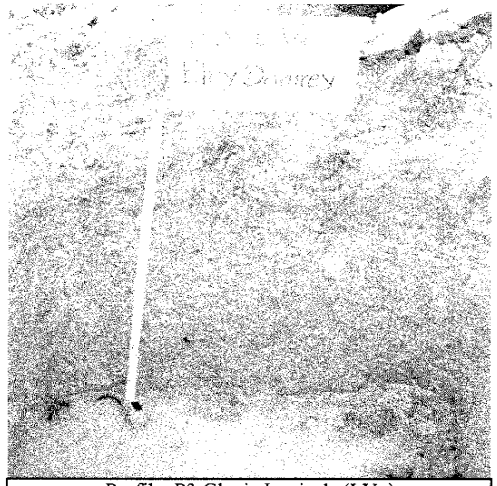
Attachment C-1. Description of Typical Soil Profile: Battambang River Basin (3/6)

Soil Sub-unit: Gleyic Luvisols (LVg) Distribution: 120,710 ha (20%) **Land Suitability Class: Rice:S2tc Upland crops: S3t**

Typical Soil Profile

Location	Prey Damrey, xxxx Commune, xxxx District, Battambang Province		
Pit Number	P 3	Parent materials	Quarternary deltaic deposits
Topography	Flat	Land Use	Rainfed rice field
Groundwater	60 cm	Elevation	10 m
Agronomic Information	Cropping calendar: sowing: June; transplanting: July (20days seedling); harvesting: Nov. Rice variety & yield: sticky rice; yield: 2.0 t/ha Agronomic constraints: water shortage, no flooding		
Date of Survey	June 21, 2007		

Soil Depth	Description
0 - 13 (sampled)	dull yellowish brown (10YR 5/3), medium sized distinct mottles many (bright brown 7.5YR 5/6), light clay (LiC), few small plinthite (2~5 m/m), weak medium sized blocky structure, sticky & plastic when wet, very firm when moist, extremely hard when dry, roots common clear wavy boundary
13 - 33 (sampled)	grayish yellow brown (10YR 5/2), medium sized distinct mottles common (dull brown 7.5YR 5/4), heavy clay (HC), few small plinthite (2~5 m/m), weak medium sized blocky structure, sticky & plastic when wet, very firm when moist, extremely hard when dry, roots common
33 - 80 (sampled)	grayish yellow brown (10YR 5/2), medium sized faint mottles few (dull brown 7.5YR 5/4), heavy clay (HC), few small plinthite (2~5 m/m), massive, sticky & plastic when wet, very firm when moist, extremely hard when dry, no roots gradual wavy boundary



Profile: P3 Gleyic Luvisols (LVg)

Rice field at the test pit site

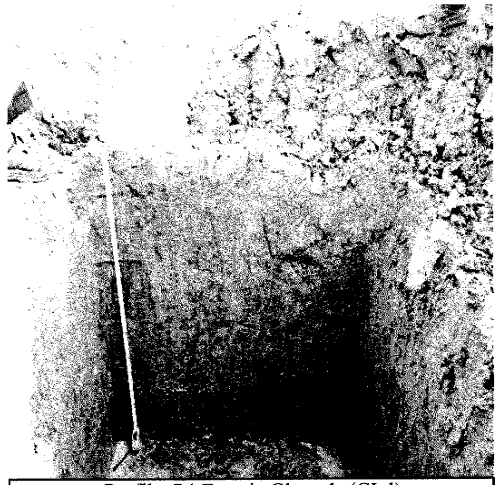
Attachment C-1. Description of Typical Soil Profile: Battambang River Basin (4/6)

Soil Sub-unit: Distric Gleysols (GLd) Distribution: 149,420 ha (25%) **Land Suitability Class: Rice:S2tc Upland crops: S3t**

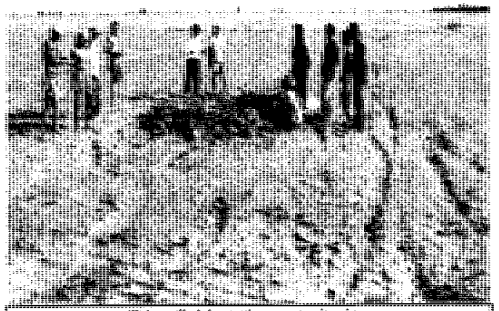
Typical Soil Profile

Location	Boeng Tuem, Ta Pon Commune, Sangkae District, Battambang Province		
Pit Number	P 4	Parent materials	Quarternary deltaic deposits
Topography	Flat	Land Use	Rainfed rice field
Groundwater	> 1.0 m	Elevation	6 m
Agronomic Information	Cropping calendar: sowing early June; harvesting: Dec. (direct sowing) Rice variety & yield: white sticky rice; yield: 0.7 t/ha Agronomic constraints: seasonal floodin Aug. ~ Oct. (3 months), depth 80 cm Inundation depth was 1.5 m in 2000		
Date of Survey	June 20, 2007		

Soil Depth	Description
0 - 11 (sampled)	dull yellowish brown (10YR 5/3), medium sized distinct mottles common (dull brown 7.5YR 5/4), heavy clay (HC), weak medium sized blocky structure, sticky & plastic when wet, very firm when moist, extremely hard when dry, roots distribution common clear wavy boundary
11 - 32 (sampled)	dull yellowish brown (10YR 5/4), medium sized faint mottles common (dull brown 7.5 YR 5/4), heavy clay (HC), weak medium sized blocky structure, sticky & plastic (wet), very firm when moist, extremely hard when dry, roots distribution few gradual wavy boundary
32 - 75 (sampled)	dull yellowish brown (10YR 5/3), medium sized distinct mottles common (dull brown 7.5 YR 5/4), light clay (LiC), plinthite concretion (5 mm, brownish brown 7.5YR 3/2) common, massive, sticky & plastic when wet, very firm when moist, extremely hard when dry, no roots distribution diffused wavy boundary
75 - 100	dull yellowish brown (10YR 5/3), medium sized distinct mottles common (dull brown 7.5 YR 5/4), light clay (LiC), plinthite concretion (5 mm, brownish brown 7.5YR 3/2) common, massive, sticky & plastic when wet, very firm when moist, extremely hard when dry, no roots distribution



Profile: P4 Dystric Gleysols (GLd)



Rice field at the test pit site;
deep water rice field in the distance

Attachment C-1. Description of Typical Soil Profile: Battambang River Basin (5/6)

Soil Sub-unit: Dystric Leptosol (LPd) Distribution: 60,770 ha (10%)

Land Suitability Class:
Rice:S2tc/S3tc/N
Upland crops: S2cp/S3t/N

Typical Soil Profile

Location	Phum Chamcar Chek Leu Village, Sung Commune, Samlout District, Battambang Province		
Pit Number	P5	Parent materials	Formation of sandstone & microbreccia
Topography	Terrace (undulating)	Land Use	Upland field (soybeans)
Groundwater	> 1.0 m	Elevation	258m
Agronomic Information	Cropping calendar: sowing early June; harvesting: Dec. (direct sowing) Flat-sloping farm, soybean yield: 0.8 ~1.10 ton / ha Agronomic constraints: water shortage, infertile soil		
Date of Survey	July 23, 2007		

Soil Depth	Description
0 - 20 (sampled)	very dark grayish brown (7.5YR 3/1) to dark brown (7.5YR 3/2) when wet, many size distinct mottles common (very dark gray 7.5YR 3/1 to black 7.5 YR 2.5/1 & yellowish red 5YR 5/8 to red 5YR 5/8 or light reddish brown 2. 5YR 7/2), light clay (LiC), medium sized blocky and plastic structure, blocky and slightly sticky when wet, friable when moist, hard to very hard when dry, roots distributions common, gradual wavy boundary.
20 - 50 (sampled)	brown (7.5YR 5/6) to strong brown (7.5YR 5/8), few size common mottles (Reddish Yellow 5YR 8/2 to 5/8), heavy clay (HC), medium sized concrete blocky and plastic structure, slightly sticky when wet, firm when moist and very hard when dry, few roots, gradual wavy boundary.
50 - 100 (sampled)	yellowish brown (10YR 5/4), many medium sized distinct mottle (black color 7.5 YR 2.5/1 with yellowish red 5YR4/5 to olive brown 2.5 YR 4/3), light clay (LiC), blocky and plastic structure, friable when wet, firm when moist and extremely hard when dry.

Profile P5 Dystric Leptosol (LPd)

Test pit site (upland field)

Attachment C-1. Description of Typical Soil Profile: Battambang River Basin (6/6)

Soil Sub-unit: Eutric Cambisol (Cme) Distribution: 49,8400 ha (8%) **Land Suitability Class: Rice:S2tc Upland crops: S3t**

Typical Soil Profile

Location	Ou-Sleukrey Village, Traeng Commune, Rattanak Mondol Distric		
Pit Number	P6	Parent materials	Quarternary alluvial fan deposits
Topography	Terrace	Land Use	Upland field (soybeans)
Groundwater	> 1.0 m	Elevation	59m
Agronomic Information	Cropping calendar: sowing early June; harvesting: Dec. (direct sowing) Soybean yield: 1.0 ~ 1.2 ton/ha Agronomic constraints: water shortage; (fertile soil for crops production)		
Date of Survey	July 13, 2007		

Soil Depth	Description
0 - 25 (sampled)	very dark brown (10YR 2/2), medium sized distinct mottles common (dark yellowish brown 10YR 4/2), heavy clay (HC), common blocky & plastic structure, slightly plastic & slightly sticky when wet, firm when moist, hard when dry, many roots, gradual wavy boundary.
25 - 65 (sampled)	very dark grayish brown (10 YR 3/2), medium size distinct mottles common (light gray 10YR 7/1), heavy clay (HC), coarse blocky and plastic structure, slightly plastic & slightly sticky when wet, very firm when moist, slightly hard when dry, common distributions roots, gradual wavy boundary.
65 - > 100 (sampled)	dark brown (10YR 3/3), medium sized distinct mottles, (light gray 10YR 7/1), heavy clay (HC), medium sized blocky and plastic structure, very plastic & slightly sticky when wet, very firm when moist, extremely hard when dry, few roots distributions.

Profile P6 Eutric Cambisol (Cme)

Test pit site (upland field surrounded by sparse shrub)

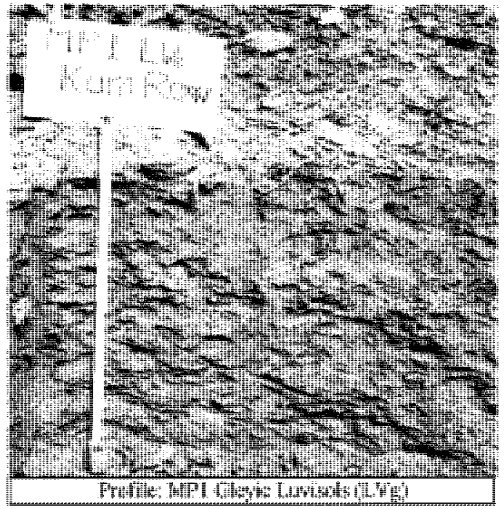
Attachment C-2. Description of Typical Soil Profile: Moung Ruessei River Basin (1/6)

Soil Sub-unit: Gleyic Luvisols (LVg) Distribution: 48,850 ha (13%) **Land Suitability Class: Rice:S2tc Upland crops: S3t**

Typical Soil Profile

Location	Kum Row, Moung Ruessei District, Battambang Province		
Pit Number	MP 1	Parent materials	Quarternary deltaic deposits
Topography	Flat	Land Use	Rainfed rice field
Groundwater	1.0 m	Elevation	11 m
Agronomic Information	Cropping calendar: sowing: end May; harvesting: Jan. (direct sowing) Rice variety & yield: fifty-six; yield: 3.0 ~ 3.5 t/ha Agronomic constraints: water shortage, no flooding		
Date of Survey	June 20, 2007		

Soil Depth	Description
0 - 12 (sampled)	grayish yellowish brown (10YR 5/2), medium sized distinct mottles common (brown 7.5YR 4/6), heavy clay (HC), moderate medium sized blocky structure, sticky & plastic when wet, very firm when moist, very hard when dry, roots distribution common clear disrupt boundary
12 - 22 (sampled)	dull yellowish brown (10YR 5/3), medium sized faint mottles common (dull yellowish brown 7.5 YR 5/3), heavy clay (HC), weak medium sized blocky structure, sticky & plastic when wet, very firm when moist extremely hard when dry, roots distribution few, gradual wavy boundary
22 - 50 (sampled)	dull yellowish brown (10YR 5/4), medium sized distinct mottles common (grayish yellow brown (7.5 YR 4/2 + dull yellowish brown 5/4), heavy clay (HC), weak medium sized sub-angular structure, sticky to very sticky when wet, plastic when wet, very firm when moist, extremely hard when dry, few roots distribution, gradual wavy boundary
50 - 80	dull yellowish brown (10YR 5/4), medium sized distinct mottles common (grayish yellow brown (7.5 YR 4/2 + dull yellowish brown 5/4), heavy clay (HC), weak medium sized sub-angular structure, sticky to very sticky when wet, plastic when wet, very firm when moist, extremely hard when dry, no roots distribution



Profile: MP1 (Gleyic Luvisols (LVg))

Rice field at the test pit site

Attachment C-2. Description of Typical Soil Profile: Moung Ruessei River Basin (2/6)

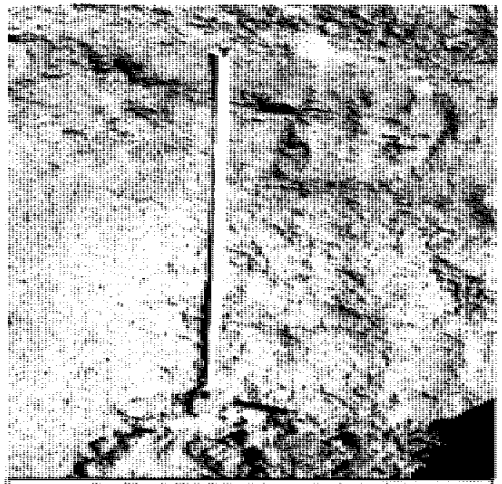
Soil Sub-unit: Plinthic Acrisols (ACp) Distribution: 28,990 ha (8%)

Land Suitability Class:
Rice:S3c Upland crops: S3c/S3tc

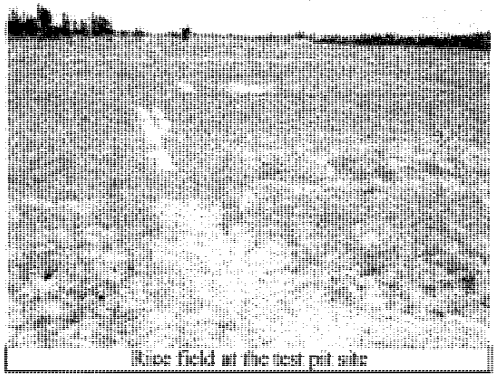
Typical Soil Profile

Location	Ampel Chhoung, Ruessei Krang Commune, Moung Ruessei District, Battambang Province		
Pit Number	MP 2	Parent materials	Quarternary lake bed deposits
Topography	Flat	Land Use	Rainfed rice field (Prek Chit potential area)
Groundwater	0.8 m	Elevation	8 m
Agronomic Information	Cropping calendar: sowing: early June; harvesting: Jan. (direct sowing) Rice variety & yield: Kantom; yield: 2.0 t/ha Agronomic constraints: water shortage, no flooding In 2006, inundation for a few days due to rain		
Date of Survey	June 20, 2007		

Soil Depth	Description
0 - 10 (sampled)	dull yellowish brown (10YR 5/3), medium sized faint mottles common (orange 7.5 YR 6/6), light clay (LiC), weak medium sized blocky structure, slightly sticky to sticky when wet, slightly plastic to plastic when wet, friable when moist, very hard when dry, roots distribution common, clear wavy boundary
10 - 24 (sampled)	dull yellowish brown (10YR 5/3), medium sized faint mottles common (bright brown 7.5 YR 5/8), light clay (LiC), weak medium sized blocky structure, slightly sticky to sticky when wet, slightly plastic to plastic when wet, friable when moist, very hard when dry, roots distribution few, clear wavy boundary
24 - 55 (sampled)	grayish yellow brown (10YR 6/2), medium sized distinct mottles common (dull brown 7.5YR 5/3), heavy clay (HC), small plinthite concretion (3 mm) common (many in upper portion), weak medium sized crumbly structure, slightly sticky to sticky when wet, slightly plastic to plastic (wet), very firm when moist, very hard when dry, few roots distribution, gradual wavy boundary
55 - 80	grayish yellow brown (10YR 6/2), no mottles, clay (C), massive, heavy clay (HC), massive, slightly sticky to sticky when wet, slightly plastic to plastic when wet, very firm when moist, extremely hard when dry, no roots distribution



Profile: MP2 Plinthic Acrisols (ACp)



Rice field at the test pit site

Attachment C-2. Description of Typical Soil Profile: Moung Ruessei River Basin (3/6)

Soil Sub-unit: Gleyic Acrisols (ACg) Distribution: 67,630 ha (18%)
(distributed in association of ACg/ACp)

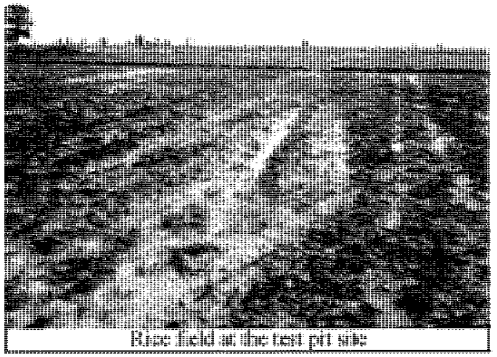
Land Suitability Class:
Rice:S3c Upland crops: S3c/S3tc

Typical Soil Profile

Location	Srah Mkak, Ou Ta Paong Commune, Bakan District, Pursat Province		
Pit Number	MP 3	Parent materials	Quarternary deltaic deposits
Topography	Flat	Land Use	Rainfed rice field
Groundwater	> 1.0 m	Elevation	6 m
Agronomic Information	Cropping calendar: transplanting: July (30 ~ 40 days seedling); harvesting: Dec. Rice variety & yield: Phka Rumduoul; yield: 3.5 t/ha Agronomic constraints: water shortage, no flooding		
Date of Survey	June 22, 2007		

Soil Depth	Description
0 - 12 (sampled)	dull yellowish brown (10YR 5/3), medium sized distinct mottles common (dull brown 7.5 YR 5/4), light clay (LiC), weak medium sized blocky structure, sticky when wet, plastic when wet, friable when moist, hard when dry, roots distribution common, gradual wavy boundary
12 - 22 (sampled)	dull yellowish brown (10YR 5/3), medium sized distinct mottles common (dull brown 7.5 YR 5/4), light clay (LiC), weak medium sized blocky structure, sticky when wet, plastic when wet, friable when moist, hard when dry, roots distribution few, gradual wavy boundary
22 - 47 (sampled)	grayish yellow brown (10YR 6/2), many medium sized distinct mottles (dull brown 7.5YR 5/3), light clay (LiC), massive, slightly sticky to sticky when wet, slightly plastic to plastic when wet, very firm when moist, very hard when dry, few roots distribution, gradual wavy boundary
47 - 100	grayish yellow brown (10YR 6/2), many medium sized distinct mottles (dull brown 7.5YR 5/3), light clay (LiC), massive, slightly sticky to sticky when wet, slightly plastic to plastic when wet, very firm when moist, very hard when dry, no roots distribution

Profile: MP3 Gleyic Acrisols (ACg)



Rice field at the test pit site

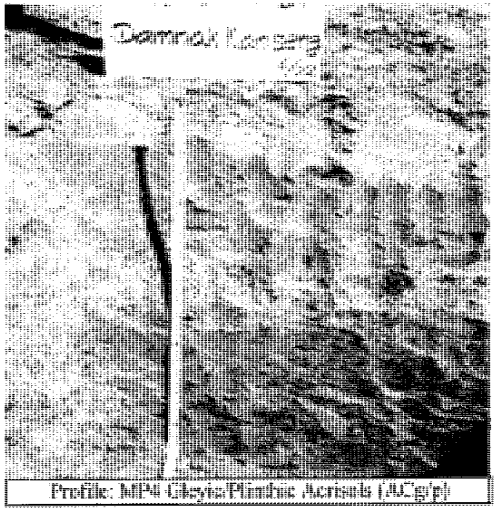
Attachment C-2. Description of Typical Soil Profile: Moung Ruessei River Basin (4/6)

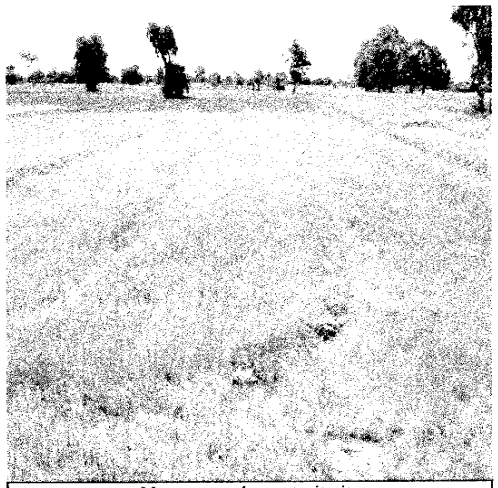
Soil Sub-unit: Plinthic Acrisols (ACp) **Distribution: 67,630 ha (18%)** **Land Suitability Class:**
(distributed in association of ACg/ACp) **Rice:S3c**
Upland crops: S3c/S3tc

Typical Soil Profile

Location	Damnak Kanseng, Phteah Rung Commune, Phnum Kravanh District, Pursat Province		
Pit Number	MP 4	Parent materials	Quarternary deltaic deposits
Topography	Flat	Land Use	Rainfed rice field
Groundwater	> 1.0 m	Elevation	16 m
Agronomic Information	Cropping calendar: transplanting: July (30 days seedling); harvesting: Nov. Rice variety & yield: Somali; yield: 2.5 t/ha Agronomic constraints: water shortage, pest, no flooding		
Date of Survey	June 22, 2007		

Soil Depth	Description
0 - 15 (sampled)	dull yellow orange (10YR 6/4), medium sized faint to distinct mottles common (orange 7.5 YR 6/6), sandy loam (SL), weak medium sized blocky structure, slightly sticky when wet, slightly plastic (wet), very friable when moist, slightly hard when dry, roots distribution common, clear wavy boundary
15 - 30 (sampled)	dull yellow orange (10YR 7/3), medium sized distinct mottles common (orange 7.5 YR 6/6), sandy loam (SL), massive, slightly sticky when wet, slightly plastic when wet, very friable when moist, slightly hard when dry, few roots distribution, gradual wavy boundary
30 - 45	dull yellow orange (10YR 6/3), many medium sized distinct mottles (yellowish brown 7.5 YR 5/8), sandy loam (SL), plinthite concretion (2 ~ 5 mm) common, massive, slightly sticky when wet, slightly plastic when wet, very friable when moist, slightly hard when dry, no roots distribution, clear wavy boundary
45 - 100 (sampled)	dull yellow orange (10YR 7/3), medium sized distinct mottles common (orange 7.5 YR 6/6), heavy clay (HC), massive, sticky when wet, plastic when wet, very firm when moist, very hard when dry, no roots distribution,


Profile: MP4 Deyst Plinthic Acrisols (ACg/p)


Nursery at the test pit site

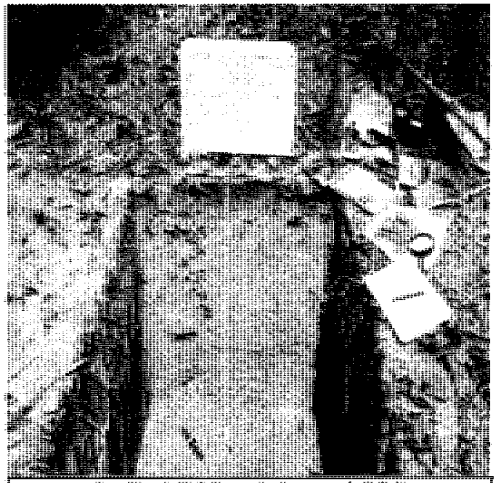
Attachment C-2. Description of Typical Soil Profile: Moung Ruessei River Basin (5/6)

Soil Sub-unit: Dystric Leptosol (LPd) **Distribution: 67,380 ha (18%)** **Land Suitability Class:**
(distributed in association of LPd/CMd) **Rice:S2tc/S3t/N**
Upland crops: S2cp/S3t/N

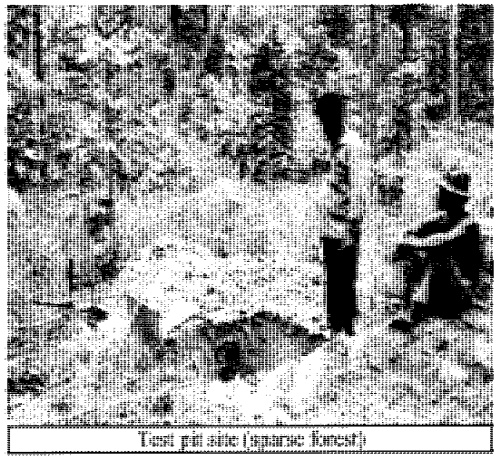
Typical Soil Profile

Location	Prahal Village, Talou Commune, Bakan Distric, Pursat Province		
Pit Number	MP 5	Parent materials	Crataceous sandstone
Topography	Terrace	Land Use	Sparse forest
Groundwater	> 1.0 m	Elevation	53 m
Agronomic Information	Agronomic constraints: water shortage, moderate soil property		
Date of Survey	July 16, 2007		

Soil Depth	Description
0 - 12 (sampled)	dark gray (7.5YR 4/1) to brown (7.5YR 4/2) when wet, medium sized distinct mottles (Red to light red 2.5YR 5/6 to 6/6), loamy sand (LS), medium sized non-clear blocky structure, friable when moist & hard when dry, many roots, gradual wavy boundary.
12 - 60 (sampled)	light gray (7.5YR 6/4), many medium sized distinct mottles common (Pinkish white to Yellowish Red 5YR 8/2 to 5/8), loamy sand (LS), medium sized moderate block structure, non-sticky & non-plastic when wet, friable when moist, slightly hard when dry, many roots, gradual wavy boundary.
60 - 75	reddish yellow (7.5 YR 7/6), many medium sized mottles (yellowish red 5YR 5/8), clay loam (CL), medium sized blocky structure, very sticky & plastic when wet, firm when moist, extremely hard when dry, few roots distributions, gradual wavy boundary.
75 - >100 (sampled)	light gray (7.5YR 6/4), massive common size distinct mottles (dark yellowish brown 10YR 3/6 to reddish yellow 7.5 YR 6/8), sandy clay (SC), medium sized moderate block structure, slightly sticky & slightly plastic when wet, friable when moist, slightly hard when dry, few roots distributions



Profile: MP5 Dystric Leptosol (LPd)



Test pit site (sparse forest)

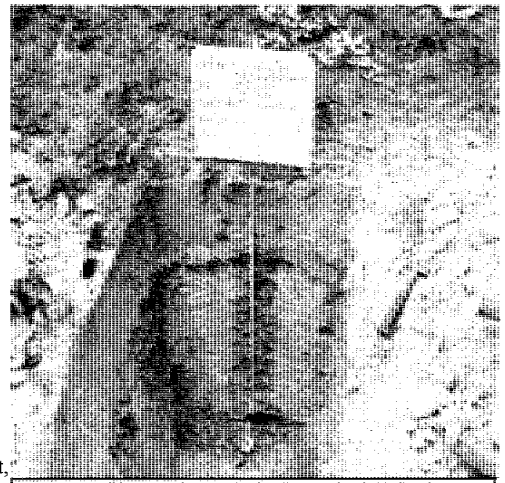
Attachment C-2. Description of Typical Soil Profile: Moung Ruessei River Basin (6/6)

Soil Sub-unit: Areni-gleyic Acrisol (ACga) Distribution: 45,930 ha (12%) **Land Suitability Class: Rice: S3c Upland crops: S3c**

Typical Soil Profile

Location	Prahal Village, Talou Commune, Bakan District, Pursat Province		
Pit Number	MP 6	Parent materials	Cretaceous sandstone
Topography	Terrace	Land Use	Upland field
Groundwater	> 1.0 m	Elevation	27 m
Agronomic Information	Agronomic constraints: water shortage, poor soil property		
Date of Survey	June 15, 2007		

Soil Depth	Description
0 - 12 (sampled)	brown (7.5YR 5/4) to light brown (7.5YR 6/4), distinct mottles common (olive yellow 2.5 YR 6/8), loamy sand (LS), medium sized blocky structure, slightly sticky & non-plastic when wet, friable when moist, slightly hard when dry, common roots distributions, gradual wavy boundary.
12 - 30 (sampled)	pink (7.5 YR 7/4), distinct mottles common (olive 2.5 YR 6/8), sandy loam (SL), weak blocky structure, non-plastic & slightly sticky when wet, friable when moist, slightly hard when dry, few roots, gradual wavy boundary.
30 - 35	pinkish gray (7.5YR 6/2), medium sized distinct mottles (dark brown 10YR3/4 to black 10YR2.5/1), sandy loam (SL), weak medium sized crumb structure, plastic & slightly sticky when wet, very firm when moist, extremely hard when dry, few distributions roots, gradual wavy boundary.
35 - 70 (sampled)	pinkish gray (7.5YR 7/4), medium sized distinct mottles (black 7.5YR 2.5/1), sandy loam (SL), crumb structure, very sticky & very plastic when wet, extremely firm when moist, extremely hard when dry, few distributions roots, gradual wavy boundary.
70 - >100	pole yellow (2.5YR 3/3) to brown (7.5YR7/4), few distinct mottles (light gray 10YR 7/1), clay (C), weak blocky & plastic structure, plastic & slightly sticky when wet, very firm when moist, extremely hard when dry, few roots distributions.



Profile: MP6 Areni-gleyic Acrisol (ACga)

Test pit site (upland field)

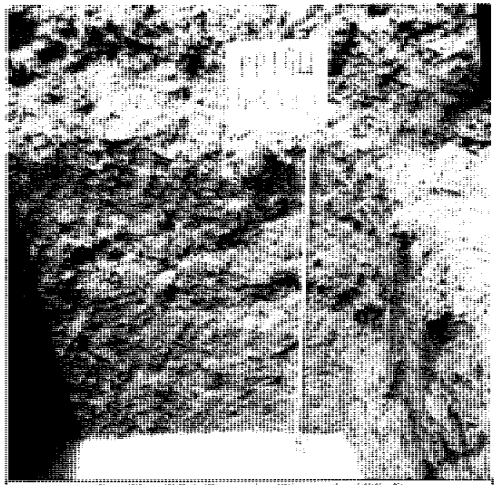
Attachment C-3. Description of Typical Soil Profile: Pursat River Basin (1/6)

Soil Sub-unit: Dystric Gleysols (GLd) Distribution: 41,490 ha (7%) **Land Suitability Class: Rice: S2tc Upland crops: S3t**

Typical Soil Profile

Location	Prek Trabek, Kanchor Commune, Kandieng District, Pursat Province		
Pit Number	PP 1	Parent materials	Alluvial deposit
Topography	Flat	Land Use	Rainfed rice field
Groundwater	> 0.8 m	Elevation	7 m
Agronomic Information	Cropping calendar: deep water rice; sowing: April; harvesting: Dec. (direct sowing) Rice variety & yield: sticky rice; yield: 2.0 t/ha Agronomic constraints: water shortage, flooding from the Pursat River (late Sep. to early Oct.)		
Date of Survey	June 21, 2007		

Soil Depth	Description
0 - 10 (sampled)	dull yellowish brown (10YR 5/3), many medium sized distinct mottles (bright brown 7.5 YR 5/6), silty clay (SiC), weak medium sized blocky structure, sticky when wet, plastic when wet, very firm when moist, extremely hard when dry, roots distribution common, gradual wavy boundary
10 - 20 (sampled)	dull yellowish brown (10YR 5/3), many medium sized faint to distinct mottles (bright brown 7.5 YR 5/6), silty clay (SiC), weak medium sized blocky structure, sticky when wet, plastic when wet, very firm when moist, extremely hard when dry, few to common roots distribution, clear wavy boundary
20 - 40 (sampled)	grayish yellow brown (10YR 5/2), many medium sized distinct mottles (brown 7.5 YR 4/6), silty clay (SiC), plinthite concretion (3 mm) common, massive, sticky when wet, plastic when wet, very firm when moist, extremely hard when dry, few roots distribution, clear wavy boundary
40 - > 80	grayish yellow brown (10YR 4/2), medium sized distinct mottles common (grayish brown 7.5 YR 4/2), silty clay (SiC), plinthite concretion (2 mm) few to common, massive, sticky when wet, plastic when wet, very firm when moist, extremely hard when dry, no roots distribution,



Profile: PP1 Dystric Gleysols (GLd)

Rice field at the test pit site (deep water rice)

Attachment C-3. Description of Typical Soil Profile: Pursat River Basin (2/6)

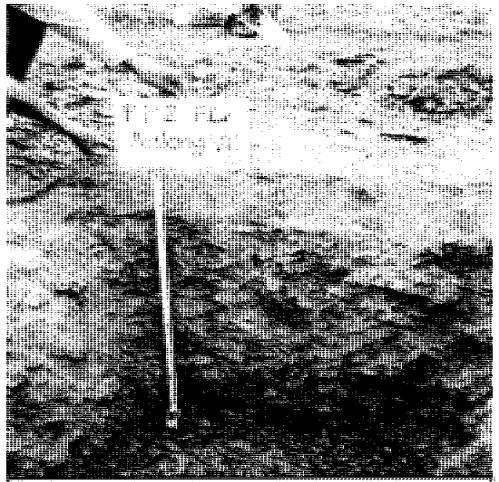
Soil Sub-unit: Dystric Fluvisols (FLd) Distribution: 14,940 ha (3%)

Land Suitability Class:
Rice: S2c/S2tc
Upland crops: S2tcp/S3t

Typical Soil Profile

Location	Anlong Vil, Sya Commune, Kandieng District, Pursat Province		
Pit Number	PP 2	Parent materials	Alluvial deposit
Topography	Flat	Land Use	Rainfed rice field
Groundwater	± 1.0 m	Elevation	12 m
Agronomic Information	Cropping calendar: deep water rice; transplanting: July (40 days seedling); harvesting: Nov. Rice variety & yield: Reang Chey (improved medium variety); yield: 3.0 t/ha Agronomic constraints: water shortage, no flooding		
Date of Survey	June 21, 2007		

Soil Depth	Description
0 - 15 (sampled)	dull yellow orange (10YR 6/3), many medium sized distinct mottles (dull orange 7.5 YR 6/4 + orange 7.5 YR 6/6), loam (L), moderate medium sized blocky structure, slightly sticky when wet, plastic when wet, firm when moist, very hard when dry, roots distribution common, clear wavy boundary
15 - 35 (sampled)	grayish yellowish brown (10YR 5/2), many coarse distinct mottles (dull brown 7.5 YR 5/4 + grayish brown 7.5YR 4/2), light clay (LiC), weak medium sized blocky structure, sticky when wet, plastic when dry, very firm when moist, extremely hard when dry, roots distribution common, gradual wavy boundary
35 - 50 (sampled)	dull yellowish brown (10YR 5/3), coarse distinct mottles common (dull brown 7.5 YR 5/4 + bright brown 7.5YR 5/6), clay loam (CL), massive, sticky when wet, plastic when dry, very firm when moist, very hard when dry, few roots distribution, gradual wavy boundary
50 - 80	dull yellow orange (10YR 6/3), coarse distinct mottles common (dull brown 7.5 YR 5/4 + bright brown 7.5 YR 5/8), sand clay (SC), massive, sticky when wet, plastic when dry, very firm when moist, very hard when dry, few root distribution



Profile: PP2 Dystric Fluvisols (FLd)

Test pit site & rice fields

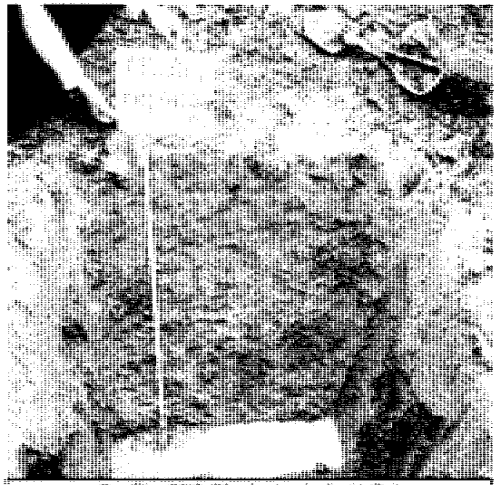
Attachment C-3. Description of Typical Soil Profile: Pursat River Basin (3/6)

Soil Sub-unit: Gleyic Acrisols (ACg) Distribution: 168,620 ha (28%) **Land Suitability Class:**
(distributed in association of ACg/ACp) **Rice: S3c Upland crops: S3c/S3tc**

Typical Soil Profile

Location	Krapeu Rour, Snam Preah Commune, Bakan District, Pursat Province		
Pit Number	PP 3	Parent materials	Alluvial deposit
Topography	Flat	Land Use	Rainfed rice field
Groundwater	± 0.9 m	Elevation	10 m
Agronomic Information	Cropping calendar: deep water rice; transplanting: June (30 days seedling); harvesting: late Oct. Rice variety & yield: Phka Rumduol (improved medium variety); yield: 2.5 t/ha Agronomic constraints: water shortage, no flooding		
Date of Survey	June 22, 2007		

Soil Depth	Description
0 - 10 (sampled)	dull yellowish brown (10YR 5/3), medium sized distinct mottles common (dull brown 7.5 YR 5/3) sand loam (SL), weak medium sized blocky structure, slightly stick when moist, slightly plastic when wet, friable when moist, hard when dry, roots distribution common, gradual wavy boundary
10 - 25 (sampled)	dull yellow orange (10YR 6/3), many medium sized distinct mottles (bright reddish brown 5 YR 5/8 + dull brown 7.5YR 5/4), sandy loam (SL), weak medium sized blocky structure, slightly sticky (wet), slightly plastic when wet, friable when moist, hard when dry, few roots distribution, gradual wavy boundary
25 - 45	dull yellow orange (10YR 6/3), many medium sized distinct mottles (orange 7.5YR 6/6), sandy loam (SL), massive, slightly sticky when wet, slightly plastic when wet, friable when moist, hard when dry, few roots distribution, clear wavy boundary
45 - 90 (sampled)	grayish yellow brown (10YR 6/2), many medium sized distinct mottles (orange 7.5 YR 6/6), light clay (LiC) ~ sandy clay loam (SCL), plinthite concretion common to many (depth 70cm), massive, sticky & plastic when wet, firm when moist, very hard when dry, no roots distribution



Profile: PP3 Gleyic Acrisols (ACg)

Test pit site & rice fields

Attachment C-3. Description of Typical Soil Profile: Pursat River Basin (4/6)

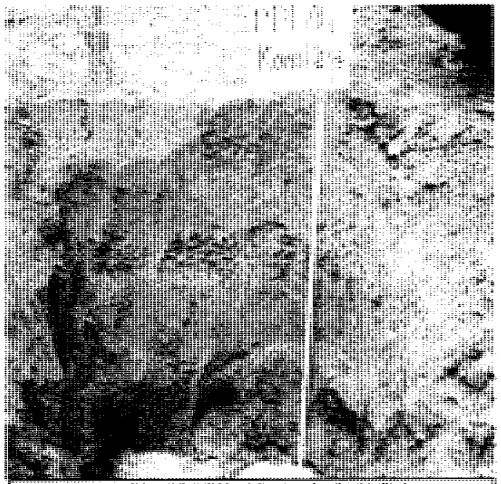
Soil Sub-unit: Plinthic Acrisols (ACp) Distribution: 168,620 ha (28%)
(distributed in association of ACg/ACp)

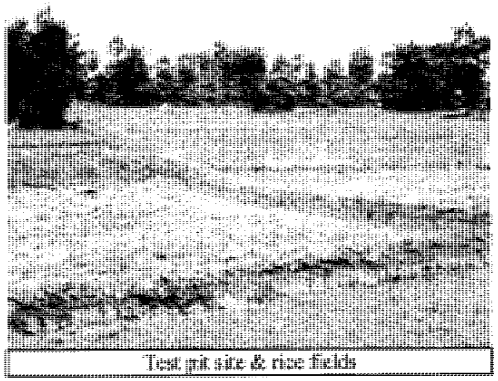
Land Suitability Class:
Rice: S3c Upland crops: S3c/S3tc

Typical Soil Profile

Location	Kam Peng, Snam Prongil Commune, Phnum Kravanh District, Pursat Province		
Pit Number	PP 4	Parent materials	Alluvial deposit
Topography	Flat	Land Use	Rainfed rice field (developed 3 years ago)
Groundwater	± 1.0 m	Elevation	23 m
Agronomic Information	Cropping calendar: deep water rice; transplanting: late July (30 days seedling); harvesting: Dec. Rice variety & yield: medium variety; yield: 2.4 t/ha Agronomic constraints: water shortage, no flooding		
Date of Survey	June 22, 2007		

Soil Depth	Description
0 - 10 (sampled)	dull yellowish brown (10YR 5/3), medium sized distinct mottles common (dull brown 7.5 YR 5/4), sand loam (SL), weak medium sized blocky structure, slightly stick when moist, slightly plastic when wet, friable when moist, hard when dry, roots distribution common, gradual wavy boundary
10 - 30 (sampled)	grayish yellow brown (10YR 5/2), many medium sized distinct mottles (bright brown 7.5YR 5/6), sand loam (SL), massive, slightly stick when moist, slightly plastic when wet, friable when moist, hard when dry, few roots distribution, clear wavy boundary
30 - 40	dull yellow orange (10YR 6/4), many medium sized distinct mottles (bright brown 7.5YR 5/8), sandy loam (SL) ~ sandy clay loam (SCL), plinthite concretion (2 ~ 5mm, 7.5YR 3/2), massive, slightly sticky to sticky when wet, slightly plastic to plastic when wet, firm when moist, hard when dry, no roots distribution, clear wavy boundary
40 - 60 (sampled)	dull yellow orange (10YR 6/3), medium sized faint to distinct mottles (dull orange 7.5 YR 6/4), sandy clay loam (SCL), massive, non sticky & non plastic when wet, loose when moist, loose when dry, no roots distribution, clear wavy boundary


Profile: PP4 Plinthic Acrisols (ACp)


Test pit site & rice fields

Attachment C-3. Description of Typical Soil Profile: Pursat River Basin (5/6)

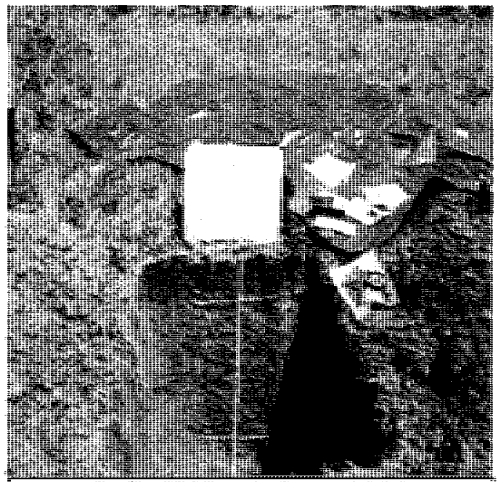
Soil Sub-unit: Dystric Leptosol (LPd) Distribution: 303,530 ha (51%)
(distributed in association of LPd/CMd)

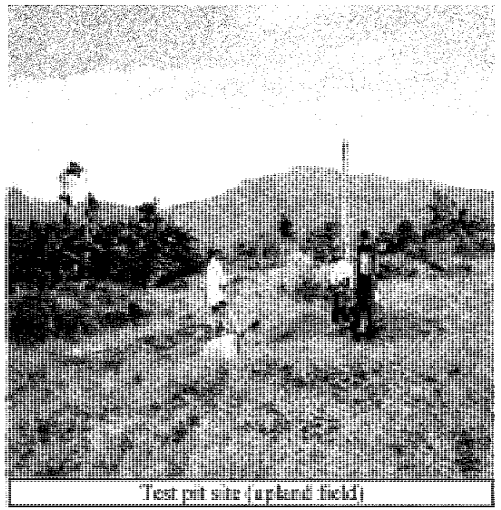
Land Suitability Class:
Rice: S2tc/S3t/N
Upland crops: S2ep/S3t/N

Typical Soil Profile

Location	Phum Dey Krahaom village, Anlong Reab commune, Veal Veng District, Pursat Province		
Pit Number	PP 5	Parent materials	Crataceous sandstone
Topography	Terrace (undulating)	Land Use	Upland field
Groundwater	> 1.0 m	Elevation	318 m
Agronomic Information	Soybean yield: 1.0 ~ 1.1 ton/ha. Rice variety & yield: medium variety; yield: 2.4 t/ha Agronomic constraints: water shortage		
Date of Survey	July 19, 2007		

Soil Depth	Description
0 - 18 (sampled)	dark grayish brown (10YR 3/2) to strong brown (7.5 YR 4/6) at wet condition, few distinct mottles common (yellowish red 5YR 5/8 to yellowish red 5YR 4/4 & & light reddish gray 2.5 YR 7/1), many medium sized organic material made from biologicaly activities, loam (L), medium sized weak blocky and plastic structure, plastic & sticky when wet , firm when moist, hard when dried, many roots, gradual wavy boundary
18 - 86 (sampled)	dark red (2.5 YR 3/6) with wet condition, distinct mottles common (reddish yellow 5 YR 8/2 to 5/8), heavy clay (HC), medium sized blocky and plastic structure, (illuvial accumulation layer), slightly sticky when wet, firm when moist, slightly hard when dry, few roots distributions, gradual wavy boundary.
86 - >100 (sampled)	dark reddish brown (7.5 YR 3/4), medium sized mottle common (black color 7.5 YR 2.5/1) + yellowish red (5 YR 4/6), sandy loam (SL), moderate blocky and plastic structure, friable when wet, firm when moist, slightly hard when dry.


Profile: PP5 Dystric Leptosol (LPd)


Test pit site (upland field)

Attachment C-3. Description of Typical Soil Profile: Pursat River Basin (6/6)

Soil Sub-unit: Dystric Cambisol (CMd)
(distributed in association of LPd/CMd)

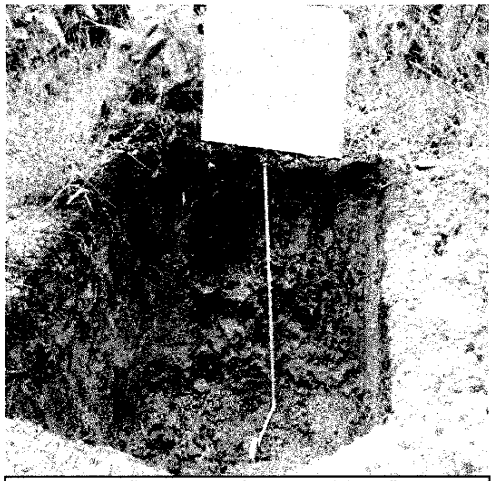
Distribution: 303,530 ha (51%)

Land Suitability Class:
Rice: S2tc/S3t
Upland crops: S3t

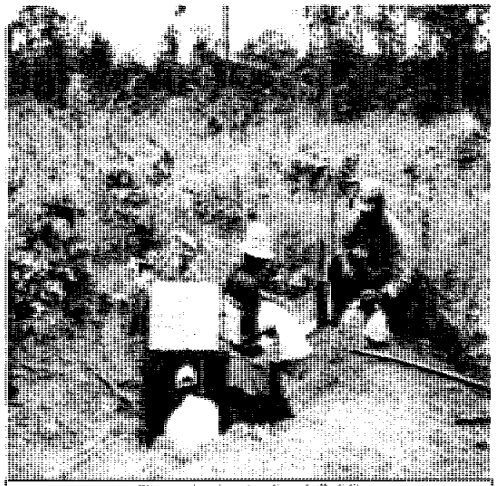
Typical Soil Profile

Location	Phum Promoy Village, Promoy Commune, Veal Veng Distric, Pursat Province		
Pit Number	PP 6	Parent materials	Crataceous sandstone
Topography	Terrace (undulating)	Land Use	Sparse forest
Groundwater	> 1.0 m	Elevation	236 m
Agronomic Information	Soybean yield: 1.0 ~ 1.1 ton/ha. Agronomic constraints: water shortage		
Date of Survey	July 18, 2007		

Soil Depth	Description
0 - 5 (sampled)	very dark gray (7.5YR 3/1) when wet, medium sized distinct mottles (reddish brown 5YR 4/4), heavy clay (HC), medium sized blocky structure, sticky & plastic when wet, friable when moist and very hard when dry, many roots, gradual wavy boundary.
5 - 20 (sampled)	gray (7.5YR 6/1) to light brown (7.5 YR 6/3), few medium sized faint mottles (organic matter accumulation, very dark gray to black 7.5 YR 3/1 to 2.5/1), heavy clay (HC), weak blocky structure, slightly sticky when wet, hard when moist, extremely hard when dry, many roots, difusion wavy boundary.
20 - 45 (sampled)	light brown (7.5 YR 6/3), medium sized phinthite mottles common (rock very dark gray 10 YR 4/1 to yellowish red 5YR 4/6 and light gray 5 YR 7/1), sandy clay (SC), blocky structure, slightly sticky when wet, extremely firm when moist, extremely hard when dry, difusion wavy boundary.
45 - 80 (sampled)	light brown (7.5 YR 6/3), medium sized phinthite mottles common (very dark gray 10 YR 4/1 to yellowish red 5YR 4/6 and light grey 5 YR 7/1), sandy loam (SL), blocky structure, slightly sticky when wet, extremely firm when moist, extremely hard when dry.



Profile: PP Dystrice Camsol (CMd)



Test pit site (upland field)

Attachment C-4. Description of Typical Soil Profile: Boribo River Basin (1/6)

Soil Sub-unit: Luvic Arenosols (ARl) Distribution: 221,630 ha (31%)
(distributed in association of ARl/ARh)

Land Suitability Class:
Rice: S4/N Upland crops: S4/N

Typical Soil Profile

Location	Sre Ta Chey, Akphivoadth Commune, Tuek Phos District, Kampung Chhnang Province		
Pit Number	BP I	Parent materials	Quaternary pediments
Topography	Flat	Land Use	Rainfed rice field
Groundwater	0.5 m	Elevation	48 m
Agronomic Information	Cropping calendar: Wet 1: transplanting: late June(15 days seedling); harvesting: Sep. Wet 2: transplanting: Sep (15 days seedling); harvesting: Jan. Rice variety & yield: IR 66; yield: 3.0 t/ha Agronomic constraints: poor soil (sandy); water shortage & excess (inundation)		
Date of Survey	June 26, 2007		

Soil Depth	Description
0 - 10 (sampled)	brown (7.5YR 4/3), medium sized faint ~ distinct mottles common (dull yellowish brown 5YR 4/3), sand (S), massive, non sticky & non plastic when wet, loose when moist & dry, roots distribution common, clear wavy boundary
10 - 30 (sampled)	dull orange (7.5YR 6/4), medium sized faint ~ distinct mottles (dull redish brown 5YR 5/4), sand (S), massive, non sticky & non plastic when wet, loose when moist & dry few roots distribution, gradual wavy boundary
30 - 55 (sampled)	dull orange (7.5YR 6/4), many coarse distinct mottles (dull brown 7.5YR 5/4), loamy sand (LS) ~ coarse loamy sand (CLS), massive, non sticky & non plastic when wet, loose when moist & dry, no roots distribution, clear wavy boundary
55 - > 70	dull orange (7.5YR 5/4), many coarse distinct mottles in entire horizon (dull brown 7.5YR 5/4), loamy sand (LS) ~ coarse loamy sand (CLS), underlain with layer abundant with consolidated sand (plinthite; 1 ~ 2 cm), massive, non sticky & non plastic when wet, loose when moist & dry, no roots distribution

Profile BP1 Luvic Arenosols (ARl)

Rice field at the test pit site (deep water rice)

Attachment C-4. Description of Typical Soil Profile: Boribo River Basin (2/6)

Soil Sub-unit: Haplic Arenosols (ARh)
(distributed in association of ARl/ARh)

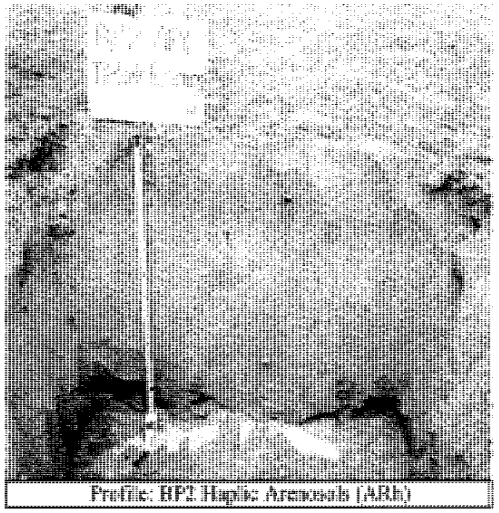
Distribution: 221,630 ha (31%)

Land Suitability Class:
Rice: S4/N
Upland crops: S4/N

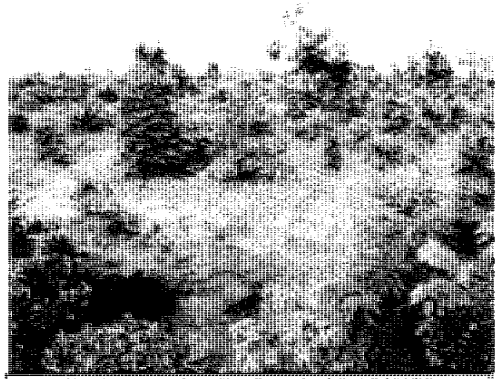
Typical Soil Profile

Location	Thlork Baleung, Krang Lvea Commune, Sameakki Mean Chey District, Kampung Chhnang Province		
Pit Number	BP 2	Parent materials	Quaternary pediments
Topography	Flat	Land Use	Grass land
Groundwater	0.8 m	Elevation	35 m
Agronomic Information	Cropping calendar: transplanting: June; harvesting: Nov/Dec. (in areas around the site) Rice variety & yield: IR 66, Neang Noy, Kong Srov Agronomic constraints: poor soil (sandy); water shortage		
Date of Survey	June 26, 2007		

Soil Depth	Description
0 - 16 (sampled)	dull brown (7.5YR 5/3), medium sized faint mottles common (dull brown 7.5YR 5/4), sand (S), massive, non sticky & non plastic when wet, loose when moist & dry, roots distribution common, clear wavy boundary
16 - 32 (sampled)	dull orange (7.5YR 7/4), few medium sized faint mottles (dull orange 7.5YR 6/4), sand (S), massive, non sticky & non plastic when wet, loose when moist & dry, few roots distribution, gradual wavy boundary
32 - 52 (sampled)	dull orange (7.5YR 7/4), few medium sized faint mottles (dull orange 7.5YR 6/4), sand (S), massive, non sticky & non plastic when wet, loose when moist & dry, no roots distribution, gradual wavy boundary
52 - > 80	orange (7.5YR 7/6), medium sized distinct mottles (bright brown 7.5YR 5/8), sand (S), massive, non sticky & non plastic when wet, loose when moist & dry, no roots distribution



Profile: BP2 Haplic Arenosols (ARh)



Shrub vegetation distributed with ARl/ARh

Attachment C-4. Description of Typical Soil Profile: Boribo River Basin (3/6)

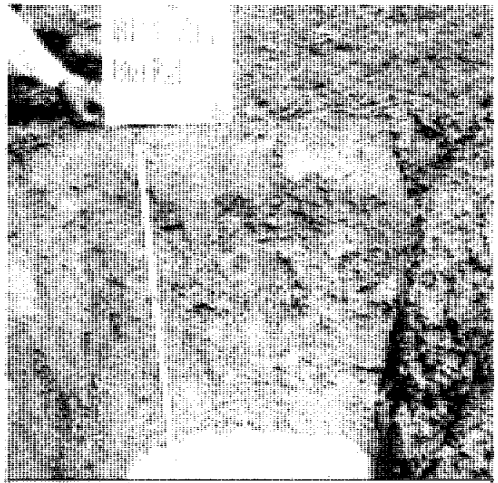
Soil Sub-unit: Plinthic Acrisols (ACp) Distribution: 23,270 ha (3%)

Land Suitability Class:
Rice: S3c Upland crops: S3c/S3tc

Typical Soil Profile

Location	Bra Kel, Preah Srae Commune, Odongk District, Kampung Speu Province		
Pit Number	BP 3	Parent materials	Quaternary pediments
Topography	Flat	Land Use	Rainfed rice field
Groundwater	0.55 m	Elevation	9 m
Agronomic Information	Cropping calendar: transplanting: early June; harvesting: Jan. Rice variety & yield: 59; 2.5 t/ha Agronomic constraints: water shortage		
Date of Survey	June 27, 2007		

Soil Depth	Description
0 - 12 (sampled)	dull yellow orange (10YR 6/4), medium sized faint ~ distinct mottles common (bright brown 7.5YR 5/8), loam (L), weak medium sized blocky structure, slightly sticky & slightly plastic when wet, firm when moist, hard when dry, roots distribution common, clear wavy boundary
12 - 25 (sampled)	dull yellow orange (10YR 6/4), many medium sized faint ~ distinct mottles (bright brown 7.5YR 5/6), loam (L), plinthite concretion (<0.5mm; 5YR 4/6) few ~ common, massive, slightly sticky when wet, slightly plastic when wet, very firm when moist & very hard when dry, few roots distribution, clear wavy boundary
25 - 45 (sampled)	dull yellow orange (10YR 6/3), many coarse distinct mottles (bright brown 7.5YR 5/8), clay loam (CL), plinthite concretion (<0.5mm, 5YR 3/2) common, massive, slightly sticky when wet, slightly plastic when wet, very firm when moist, very hard when dry, few roots distribution, gradual wavy boundary
45 - 70	dull yellow orange (10YR 6/3), many coarse distinct mottles (bright brown 7.5YR 5/8), clay loam (CL), many plinthite concretion (<0.5mm, 10YR 2/2), massive, slightly sticky ~ sticky when wet, slightly plastic ~ plastic when wet, very firm when moist, very hard when dry, no roots distribution,


Profile: BP3 Plinthic Acrisols (ACp)

Test pit site & rainfed rice fields surrounding

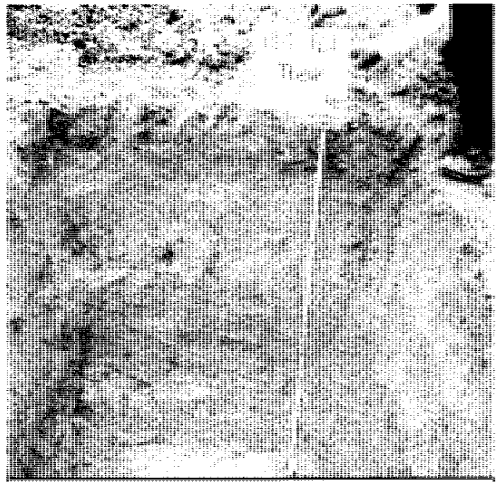
Attachment C-4. Description of Typical Soil Profile: Boribo River Basin (4/6)

Soil Sub-unit: Dystric Fluvisols (FLd) **Distribution: 40,650 ha (6%)** **Land Suitability Class: Rice: S2c/S2tc Upland crops: S2tcp/S3t**

Typical Soil Profile

Location	Tbeuk, Khon Rang Commune, Baribour District, Kampung Chhnang Province		
Pit Number	BP 4	Parent materials	Quaternary deltaic deposits
Topography	Flat	Land Use	Rainfed rice field
Groundwater	0.50 m	Elevation	9 m
Agronomic Information	Cropping calendar: transplanting: early July; harvesting: Dec. Rice variety & yield: Reang Chey Agronomic constraints: no		
Date of Survey	June 27, 2007		

Soil Depth	Description
0 - 16 (sampled)	grayish yellow brown (10YR 5/2), medium sized distinct mottles common (bright brown 7.5YR 5/6), sandy loam (SL), weak medium sized blocky structure, slightly sticky & slightly plastic when wet, firm when moist, very hard when dry, roots distribution common, clear wavy boundary
16 - 44 (sampled)	dull yellow orange (10YR 6/3), many medium sized distinct mottles (dull orange 7.5YR 6/4), sandy clay loam (SCL), massive, slightly sticky ~ sticky when wet, slightly plastic ~ plastic when wet, firm when moist, very hard when dry, few distribution common, clear wavy boundary
44 - 72 (sampled)	grayish yellow brown (10YR 5/2), few ~ common medium sized faint mottles (dull orange 7.5YR 6/4), sandy clay loam (SCL), massive, non sticky ~ slightly sticky when wet, non plastic ~ slightly plastic when wet, firm when moist, hard when dry, few distribution common, clear wavy boundary
72 - 100	**gley layer** yellow gray (2.5Y 6/1), medium sized faint mottles common (bright brown 7.5YR 5/6), clay (C), massive, sticky ~ very sticky when wet, plastic ~ very plastic when wet, very firm when moist, extremely hard when dry, no distribution common,



Profile: BP4 Dystric Fluvisols (FLd)

Rainfed rice field around the test pit site

Attachment C-4. Description of Typical Soil Profile: Boribo River Basin (5/6)

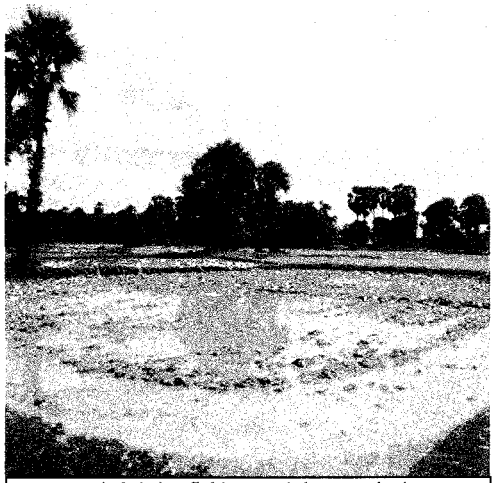
Soil Sub-unit: Gleic Acrisols (ACg) **Distribution: 92,340 ha (13%)** **Land Suitability Class:**
Rice: S3c :
Upland crops: S3c/S3tc

Typical Soil Profile

Location	Ou Achkok, Ou Sandan Commune, Krakor District, Pursat Province		
Pit Number	BP 5	Parent materials	Quaternary deltaic deposits
Topography	Flat	Land Use	Rainfed rice field
Groundwater	0.50 m	Elevation	19 m
Agronomic Information	Cropping calendar: transplanting: early July; harvesting: Dec. Rice variety & yield: local (medium); 2.0 t/ha Agronomic constraints: water shortage		
Date of Survey	June 27, 2007		

Soil Depth	Description
0 - 10 (sampled)	dull yellowish brown (10YR 5/4), medium sized faint ~ distinct mottles common (orange 5YR 6/6), sandy loam (SL), massive, non-sticky & non-plastic when wet, very friable when moist, soft when dry, roots distribution common, gradual wavy boundary
10 - 26 (sampled)	dull yellow orange (10YR 6/4), many medium sized distinct mottles (dull orange 5YR 6/4), sandy loam (SL), massive, non-sticky & non-plastic when wet, very friable when moist, soft when dry, roots distribution common, clear wavy boundary
26 - 49 (sampled)	dull yellow orange (10YR 6/4), many medium sized distinct mottles (bright reddish brown 5YR 5/6), sandy loam (SL), massive, non-sticky ~ slightly sticky when wet, non-plastic ~ slightly sticky when wet, very friable when moist, soft when dry, no roots distribution, clear wavy boundary; **layer fallen down due to seepage of groundwater**
49 - 70	dull yellow orange (10YR 6/4), many medium sized distinct mottles (bright reddish brown 5YR 5/6), sandy clay loam (SCL), massive, slightly sticky to sticky when wet, slightly plastic ~ plastic when wet, firm when moist, very hard when dry, no roots distribution,

Profile: BP5 Gleic Acrisols (ACg)



Rainfed rice field around the test pit site

Attachment C-4. Description of Typical Soil Profile: Boribo River Basin (6/6)

Soil Sub-unit: Dystric Cambisol (CMd)
(distributed in association of LPd/CMd)

Distribution: 153,860 ha (21%)

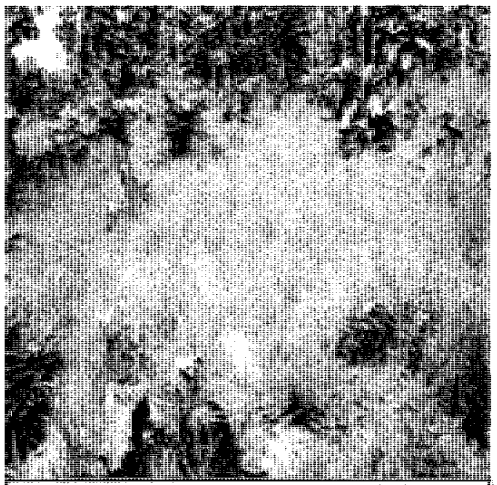
Land Suitability Class:
Rice: S2tc/S3t
Upland crops: S3t

Typical Soil Profile

Location	Tasam village, Krangskear commune, Tekphos District, Kampong Speu Province		
Pit Number	BP 6	Parent materials	Sand stone
Topography	Terrace (undulating)	Land Use	Sparse forest
Groundwater	> 1 m	Elevation	93 m
Agronomic Information	Cropping calendar: transplanting: early July; harvesting: Dec. Agronomic constraints: water shortage & poor soil (sandy)		
Date of Survey	July 10, 2007		

Soil Depth	Description
0 - 12 (sampled)	dark gray (7.5YR 8/1) to gray (7.5YR 6/1) when wet, medium sized distinct mottles common (pinkish white to Yellowish Red 5YR 8/2 to 5/8), loamy sand (LS), medium size weak blocky structure, friable when moist & slightly hard when dry, many roots distributions, gradual wavy boundary.
12 - 30 (sampled)	light gray (7.5YR 6/4), medium sized distinct mottles common (pinkish white to yellowish red 5YR 8/2 to 5/8), loamy sand (LS), medium sized moderate blocky structure, non-sticky when wet, friable when moist, slightly hard when dry, many roots distributions, gradual wavy boundary.
30 - > 100 (sampled)	reddish yellow (7.5 YR 7/6) many medium sized mottles (yellowish red 5YR 4/4), sandy clay loam (SCL), very sticky & plastic when wet, very firm when moist, very hard when dry, few roots distributions

Profile: BP6 Dystric Cambisol (CMd)



Rainfed rice field around the test pit site

Attachment C-5. Results of Questionnaire Survey on Farming Practices, Inputs Supply and Marketing: Battambang (1/4)

A. Farming Practices

A-1. Reason for fallow of rice field in Dry Season

Response (plural alternatives)	n	%
Labor shortage	0	0
Working capital shortage	0	0
Water shortage	99	100
Total	99	100

A-2. Rice variety: rainy season

Response (plural alternative)	n	%
Ha Pramboun (59)	9	8
Kha	4	4
Kha 11	9	8
Kha 5	5	5
Kha 6	2	2
Malis	11	10
Meang Ming	7	6
Neang Khon	7	6
Pka Khnhey	13	12
Reang Chey	7	6

A-3. Reasons for selection of rice variety

Response (plural alternatives)	n	%
Good taste	15	19
Higth yield	25	31
Easy to cultivate	19	23
Short Term	11	14
Flooded Area	2	2
Traditional variety	2	2
White seed rice	1	1
Based on soil condition	1	1
Good yield & high price in market price	1	1
High price in market price	3	4
Following other people	1	1
Total	81	100

A-4. Seed sources: rice

Response (one alternative)	n	%
Own products	78	71
Exchange with others	18	16
Certified seed purchased	8	7
Others	6	5
Total	110	100

A-5. Seed sources: upland crops

Response (one alternative)	n	%
Own products	72	77
Exchange with others	9	10
Certified seed purchased	13	14
Total	94	100

A-6. Seed sources: vegetables

Response (one alternative)	n	%
Own products	65	71
Exchange with others	8	9
Commercial seed procured at local market	18	20
Total	91	100

A-7. Seed replacement of rice

Response (one alternative)	n	%
Once per 3 croppings	41	58
Once per 4 - 6 croppings	8	11
Once > 6 croppings	22	31
Total	71	100

A-8. Land preparation method

Response (one alternative)	n	%
Draft aninal	48	44
Machinery	55	50
Manual	7	6
Total	110	100

A-10. Fertilization Volume: Urea (unit: kg/ha)

Item	Kg/ha
N	110
Mean	117
STD	437
Minimum	0
Maximum	4,500

A-11. Fertilization Volume: DAP (unit: kg/ha)

Item	Kg/ha
N	110
Mean	15
STD	41
Minimum	0
Maximum	300

A-12. Fertilizer (Compost/Manure)

Item	Kg/ha
N	110
Mean	156
STD	241
Minimum	0
Maximum	900

A-13. Transplanting method: rainy season

Response (one alternative)	n	%
Regular planting	99	85
Random planting	18	15
Total	117	100

A-14. Threshing (method)

Response	n	%
Engine thresher	98	89
Pedal thresher	5	5
Manual threshing	7	6
Total	110	100

A-15. Cleaning (method)

Response	n	%
Engine winnower	41	37
Manual winnower	27	25
Manual without winnower	42	38
Total	110	100

A-16. Drying (method)

Response	n	%
Sun drying	110	100
Dryer	0	0
Total	110	100

Attachment C-5. Results of Questionnaire Survey on Farming Practices, Inputs Supply and Marketing: Battambang (2/4)

B. Farm Input Supply

B-1. Procurement of certified seed

Response (one alternative)	n	%
Easy	77	70
Difficult	25	23
Not possible	8	7
Total	110	100

B-2. Procurement of wanted seed

Response (one alternative)	n	%
Easy	93	85
Difficult	9	8
Not possible	8	7
Total	110	100

B-3. Seed supply timing

Response (one alternative)	n	%
In time	82	75
Delayed	13	12
Not obtained	15	14
Total	110	100

B-4. Quality seed price

Response (one alternative)	n	%
Too expensive	29	26
Acceptable	15	14
Not purchased	66	60
Total	110	100

B-5. Procurement of wanted fertilizer

Response (one alternative)	n	%
Easy	94	85
Difficult	5	5
Not possible	11	10
Total	110	100

B-6. Fertilizer supply timing

Response (one alternative)	n	%
In time	90	82
Delayed	10	9
Not obtained	10	9
Total	110	100

B-7. Fertilizer price

Response (one alternative)	n	%
Too expensive	81	74
Acceptable	12	11
Not purchased	17	15
Total	110	100

C. Post-harvest

C-1. Rice milling cost (bran received by interviewee)

Item	Riel/ton
N	110
Mean	66,358
STD	14,960
Minimum	10,000
Maximum	35,000

C-2. Paddy storage (king of container used)

Response (one alternative)	n	%
Bag	40	36
Bamboo basket	15	14
Wooden box	48	44
Others	7	6
Total	110	100

C-3. Paddy (Maximum storage period; month)

Item	No.	%
0 - 12 months	96	87
0 - 6 months	14	12.7
Total	110	100.0

C-4. Rice (kind of container)

Response (one alternative)	n	%
Bag	106	96
Bamboo basket	1	1
Wooden box	0	0
Others	3	3
Total	110	100

C-5. Rice (Maximum storage period; month)

Item	Month
N	109
Mean	1.3
STD	0.6
Minimum	0.5
Maximum	3

C-6. Roughly estimated total losses (% of production)

	%
N	97
Mean	3.90
Minimum	0.10
Maximum	30

C-7. Most dominant loss of paddy

Response (one alternative)	n	%
During harvesting	34	31
At threshing,	65	59
At drying	4	4
At cleaning	0	0
At storage	5	5
At other time	2	2
Total	110	100

C-8. Second dominant loss

Response (one alternative)	n	%
During harvesting	24	22
At threshing,	32	29
At drying	18	16
At cleaning	4	4
At storage	29	26
At other time	3	3
Total	110	100

Attachment C-5. Results of Questionnaire Survey on Farming Practices, Inputs Supply and Marketing: Battambang (3/4)

D. Marketing

D-1. Sold product

Response (one alternative)	n	%
Field dried paddy	33	43
Sun dried paddy	35	46
Milled rice	8	11
Total	76	100

proportion to total marketing volume

D-2. Market Destiuation

Response	n	%
Rice miller in village	26	24
Rice miller in commune center	19	17
Rice miller in district center	9	8
Collector/middleman	45	41
Local market	6	5
Total	105	95

D-3. Marketing of vegetable

Response	n	%
Market in village	87	79
Market in commune center	8	7
Market in district center	4	4
Collector/middleman	3	3
Other (specify)	8	7
Total	110	100

D-4. Marketing of field crops

Response	n	%
Market in village	57	52
Market in commune center	11	10
Market in district center	14	13
Collector/middleman	15	14
Other (specify)	13	12
Total	110	100

D-5. Marketing of livestock

Response	n	%
Market in village	60	55
Market in commune center	6	5
Market in district center	4	4
Collector/middleman	23	21
Other (specify)	17	15
Total	110	100

D-6. Marketing of other product (fish)

Response	n	%
Market in village	56	51
Market in commune center	4	4
Market in district center	10	9
Other (specify)	40	36
Total	110	100

E. Food Supply Conditions

E-1. Food supply condition (rice)

Response (one alternative)	n	%
Own harvest/ product exceed the household demand	74	67
Own harvest/ product is just enough to the household demand	18	16
Purchased (or exchanged) to meet the household demand	7	6
Insufficient	11	10
Total	110	100

E-2. Food supply conditiou (vegetables)

Response (one alternative)	n	%
Own harvest/ product exceed the household demand	47	43
Own harvest/ product is just enough to the household demand	17	15
Purchased (or exchanged) to meet the household demand	14	13
Insufficient	32	29
Total	110	100

E-3. Food supply condition (other cereals)

Response (one alternative)	n	%
Own harvest/ product exceed the household demand	20	18
Own harvest/ product is just enough to the household demand	12	11
Purchased (or exchanged) to meet the household demand	21	19
Insufficient	57	52
Total	110	100

E-4. Food supply condition (meat)

Response (one alternative)	n	%
Own harvest/ product exceed the household demand	5	5
Own harvest/ product is just enough to the household demand	5	5
Purchased (or exchanged) to meet the household demand	43	39
Insufficient	57	52
Total	110	100

E-5. Food supply condition (roots and tuber crops)

Response (one alternative)	n	%
Own harvest/ product exceed the household demand	5	5
Own harvest/ product is just enough to the household demand	14	13
Purchased (or exchanged) to meet the household demand	27	25
Insufficient	64	58
Total	110	100

E-6. Food condition (fish)

Response (one alternative)	n	%
Own harvest/ product exceed the household demand	4	4
Own harvest/ product is just enough to the household demand	4	4
Purchased (or exchanged) to meet the household demand	34	31
Insufficient	68	62
Total	110	100

E-7. Food supply condition (beans)

Response (one alternative)	n	%
Own harvest/ product exceed the household demand	10	9
Own harvest/ product is just enough to the household demand	6	5
Purchased (or exchanged) to meet the household demand	29	26
Insufficient	65	59
Total	110	100

E-8. Rice purchased in last year (kg)

	kg/farm
N	70
Proportion to sample farmers (100)	19
Mean (per respondent)	255
Minimum	0
Maximum	8,000

Attachment C-5. Results of Questionnaire Survey on Farming Practices, Inputs Supply and Marketing: Battambang (4/4)

F. Extension Services

F-1. Visit of extension worker

Response (one alternative)	n	%
One per < week	5	5
Once per 2 weeks-1 month	10	9
Seldom visited	95	86
Total	110	100

F-2. Technical capability of extension workers

Response (one alternative)	n	%
Sufficient	41	37
Not sufficient	27	25
No service provided	42	38
Total	110	100

F-3. Are you satisfied with current extension services

Response (one alternative)	n	%
Satisfied	60	55
Not satisfied	6	5
No service provided	44	40
Total	110	100

F-4. What kind of extension services are you needed

Response (specified)	n	%
Technical training & technical guidance	81	90
Fertilizer application & compost	5	6
visit of extension staff	2	2
Seed/farm input supply	2	2
Total	90	100

Totals exceed 100% due to multiple responses

G. Farm Credit

G-1. Access to farm credit

Response (one alternative)	n	%
Easy	28	25
Difficult	15	14
Not provided	67	61
Total	110	100

G-2. Timing of provision

Response (one alternative)	n	%
In time	23	21
Delayed	16	15
Not provided	71	65
Total	110	100

G-3. Amount of credit

Response (one alternative)	n	%
Sufficient	20	30
Not sufficient	17	26
Not provided	29	44
Total	66	100

G-4. Procedures for credit application

Response (one alternative)	n	%
Easy	8	7
Difficult	27	25
Not possible	75	68
Total	110	100

Attachment C-6 Results of Questionnaire Survey on Farming Practices, Farm Inputs Supply and Marketing: Moung Russei (1/4)

A. Farming Practices

A-1. Reason for fallow of rice field in Dry Season

Response (plural alternatives)	n	%
Labor shortage	3	3
Working capital shortage	4	4
Water shortage	95	93
Total	102	100

A-2. Rice variety: rainy season

Response (plural alternative)	n	%
Pkamalis	7	9
Habuon	9	12
Kamping Pouy	8	11
Kha 6	4	5
Kha 9	2	3
Kon Khamum	5	7
Neang mign	5	7
Neangrith	9	12
Rang Chay	3	4
Rice 59	11	15
Sen Chey	8	11
Somaly	3	4
Total	74	100

A-3. Reasons for selection of rice variety

Response (plural alternatives)	n	%
High Price	8	8
High Yield	40	38
Easy to grow	13	12
Short term	23	22
Suitable to land	8	8
Suitable to climate	4	4
Good taste	9	9
Total	105	100

A-4. Seed sources: rice

Response (one alternative)	n	%
Own products	88	77
Exchange with others	14	12
Certified seed purchased	7	6
Others	5	4
Total	114	100

A-5. Seed sources: upland crops

Response (one alternative)	n	%
Own products	54	76
Exchange with others	11	15
Certified seed purchased	6	8
Total	71	100

A-6. Seed sources: vegetables

Response (one alternative)	n	%
Own products	60	78
Exchange with others	10	13
Commercial seed procured at local market	7	9
Total	77	100

A-7. Seed replacement of rice

Response (one alternative)	n	%
Once per 3 croppings	52	72
Once per 4 - 6 croppings	2	3
Once > 6 croppings	18	25
Total	72	100

A-8. Land preparation method

Response (one alternative)	n	%
Draft animal	46	38
Machinery	66	55
Manual	8	7
Total	120	100

A-9. Fertilization Volume: Urea (unit: kg/ha)

Item	Kg/ha
N	120
Mean	72
STD	106
Minimum	0
Maximum	500

A-10. Fertilization Volume: DAP (unit: kg/ha)

Item	Kg/ha
N	120
Mean	21
STD	62
Minimum	0
Maximum	500

A-11. Fertilizer (Compost/Manure)

Item	Kg/ha
N	116
Mean	240
STD	512
Minimum	0
Maximum	4,000

A-12. Threshing (method)

Response	n	%
Engine thresher	107	89
Pedal thresher	9	8
Manual threshing	4	3
Total	120	100

A-13. Drying (method)

Response	n	%
Sun drying	119	99
Dryer	1	1
Total	120	100

A-14. Cleaning (method)

Response	n	%
Engine winnower	42	35
Manual winnower	4	3
Manual without winnower	74	62
Total	120	100

Attachment C-6 Results of Questionnaire Survey on Farming Practices, Farm Inputs Supply and Marketing: Moung Russei (2/4)

B. Farm Input Supply

B-1. Procurement of certified seed

Response (one alternative)	n	%
Easy	62	52
Difficult	45	38
Not possible	13	11
Total	120	100

B-2. Procurement of wanted seed

Response (one alternative)	n	%
Easy	75	63
Difficult	36	30
Not possible	9	8
Total	120	100

B-3. Seed supply timing

Response (one alternative)	n	%
In time	71	59
Delayed	27	23
Not obtained	22	18
Total	120	100

B-4. Quality seed price

Response (one alternative)	n	%
Too expensive	29	24
Acceptable	24	20
Not purchased	67	56
Total	120	100

B-5. Procurement of wanted fertilizer

Response (one alternative)	n	%
Easy	94	78
Difficult	13	11
Not possible	13	11
Total	120	100

B-6. Fertilizer supply timing

Response (one alternative)	n	%
In time	89	74
Delayed	17	14
Not obtained	14	12
Total	120	100

B-7. Fertilizer price

Response (one alternative)	n	%
Too expensive	69	58
Acceptable	21	18
Not purchased	30	25
Total	120	100

C. Post-harvest

C-1. Rice milling cost (bran received by interviewee)

Item	Riel/ton
N	
Mean	66,358
STD	14,960
Minimum	10,000
Maximum	35,000

C-2. Paddy storage (king of container used)

Response (one alternative)	n	%
Bag	33	28
Bamboo basket	14	12
Wooden box	73	61
Others		0
Total	120	100

C-3. Rice (kind of container)

Response (one alternative)	n	%
Bag	117	98
Bamboo basket	1	1
Wooden box	1	1
Others	1	1
Total	120	100

C-4. Rice (Maximum storage period; month)

Item	Month
N	119
Mean	3
STD	4
Minimum	1
Maximum	25

C-5. Paddy (Maximum storage period; month)

Item	No.	%
0 - 12 months	104	87
0 - 6 months	16	13.3
Total	120	100.0

C-6. Use of fumigant

Response (one alternative)	n	%
Not used	120	100
Used	0	0
Total	120	100

C-7. Most dominant loss of paddy

Response (one alternative)	n	%
During harvesting	38	32
At threshing,	70	58
At drying	6	5
At cleaning	2	2
At storage	4	3
At other time	0	0
Total	120	100

C-8. Second dominant loss

Response (one alternative)	n	%
During harvesting	38	32
At threshing,	34	28
At drying	12	10
At cleaning	6	5
At storage	29	24
At other time	1	1
Total	120	100

C-9. Roughly estimated total losses (% of production)

	%
N	120
Mean	10
Minimum	0
Maximum	90

Attachment C-6 Results of Questionnaire Survey on Farming Practices, Farm Inputs Supply and Marketing: Moung Russei (3/4)

D. Marketing

D-1. Market Destination

Response	n	%
Rice miller in village	30	27
Rice miller in commune center	14	13
Rice miller in district center	11	10
Collector/middleman	54	49
Local market	2	2
Total	111	100

D-2. Marketing of vegetable

Response	n	%
Market in village	97	81
Market in commune center	8	7
Market in district center	3	3
Collector/middleman	1	1
Other (specify)	11	9
Total	120	100

D-3. Marketing of field crops

Response	n	%
Market in village	55	46
Market in commune center	16	13
Market in district center	16	13
Collector/middleman	24	20
Other (specify)	9	8
Total	120	100

D-4. Marketing of livestock

Response	n	%
Market in village	61	51
Market in commune center	9	8
Market in district center	7	6
Collector/middleman	32	27
Other (specify)	11	9
Total	120	100

D-5. Marketing of other product (fish)

Response	n	%
Market in village	71	59
Market in commune center	8	7
Market in district center	9	8
Other (specify)	32	27
Total	120	100

E. Food Supply Conditions

E-1. Food supply condition (rice)

Response (one alternative)	n	%
Own harvest/ product exceed the household demand	84	70
Own harvest/ product is just enough to the household demand	11	9
Purchased (or exchanged) to meet the household demand	9	8
Insufficient	16	13
Total	120	100

E-2. Food supply condition (vegetables)

Response (one alternative)	n	%
Own harvest/ product exceed the household demand	23	19
Own harvest/ product is just enough to the household demand	28	23
Purchased (or exchanged) to meet the household demand	23	19
Insufficient	46	38
Total	120	100

E-3. Food supply condition (other cereals)

Response (one alternative)	n	%
Own harvest/ product exceed the household demand	13	11
Own harvest/ product is just enough to the household demand	18	15
Purchased (or exchanged) to meet the household demand	29	24
Insufficient	60	50
Total	120	100

E-4. Food supply condition (meat)

Response (one alternative)	n	%
Own harvest/ product exceed the household demand	6	5
Own harvest/ product is just enough to the household demand	5	4
Purchased (or exchanged) to meet the household demand	58	48
Insufficient	51	43
Total	120	100

E-5. Food supply condition (roots and tuber crops)

Response (one alternative)	n	%
Own harvest/ product exceed the household demand	4	3
Own harvest/ product is just enough to the household demand	7	6
Purchased (or exchanged) to meet the household demand	38	32
Insufficient	71	59
Total	120	100

E-6. Food condition (fish)

Response (one alternative)	n	%
Own harvest/ product exceed the household demand	11	9
Own harvest/ product is just enough to the household demand	2	2
Purchased (or exchanged) to meet the household demand	47	39
Insufficient	60	50
Total	120	100

E-7. Food supply condition (beans)

Response (one alternative)	n	%
Own harvest/ product exceed the household demand	6	5
Own harvest/ product is just enough to the household demand	3	3
Purchased (or exchanged) to meet the household demand	41	34
Insufficient	70	58
Total	120	100

E-8. Rice purchased in last year (kg)

	kg/farm
N	120
Proportion to sample farmers (100)	6
Mean (per respondent)	14
Minimum	0
Maximum	750

Attachment C-6 Results of Questionnaire Survey on Farming Practices, Farm Inputs Supply and Marketing: Moung Russei (4/4)

F. Extension Services

F-1. Visit of extension worker

Response (one alternative)	n	%
One per < week	9	8
Once per 2 weeks-1 month	12	10
Seldom visited	99	83
Total	120	100

F-2. Technical capability of extension workers

Response (one alternative)	n	%
Sufficient	54	45
Not sufficient	23	19
No service provided	43	36
Total	120	100

F-3. Are you satisfied with current extension services

Response (one alternative)	n	%
Satisfied	68	57
Not satisfied	9	8
No service provided	43	36
Total	120	100

F-4. What kind of extension services are you needed

Response (specified)	n	%
Technical training & technical guidance	69	119
Using fertilizer and/or diseases prevention	9	16
visit of extension staff and/or agricultural promotion	12	21
Seed/farm input soppy	8	14
Animal feeding techniques	2	3
Total	100	172

G. Farm Credit

G-1. Access to farm credit

Response (one alternative)	n	%
Easy	45	38
Difficult	7	6
Not provided	68	57
Total	120	100

G-2. Timing of provision

Response (one alternative)	n	%
In time	38	32
Delayed	12	10
Not provided	70	58
Total	120	100

G-3. Amount of credit

Response (one alternative)	n	%
Sufficient	37	48
Not sufficient	16	21
Not provided	24	31
Total	77	100

G-4. Procedures for credit application

Response (one alternative)	n	%
Easy	16	13
Difficult	31	26
Not possible	73	61
Total	120	100

Attachment C-7 Results of Questionnaire Survey on Farming Practices, Inputs Supply and Marketing : Pursat (1/4)

A. Farming Practices

A-1. Reason for fallow of rice field in Dry Season

Response (plural alternatives)	n	%
Labor shortage	0	0
Working capital shortage	3	3
Water shortage	114	97
Total	117	100

A-2. Rice variety: rainy season

Response (plural alternative)	n	%
Pkamlis	6	5
Chong Banla	31	24
Kamping Pouy	4	3
Kha 9	9	7
Neangkeo	2	2
Neangrith	2	2
Phka Romdul	16	13
Pkaknhey	8	6
Somali	18	14

A-3. Reasons for selection of rice variety

Response (plural alternatives)	n	%
Productivity (high yield)	42	39
Easy to grow	20	19
High price	5	5
Good quality and/or good taste	10	9
Short term of growing period	11	10
Suitable for land	5	5
Following neighbor	2	2
Without other seed/unavailability	3	3
Others	9	8
Total	107	100

A-4. Seed sources: rice

Response (one alternative)	n	%
Own products	97	76
Exchange with others	17	13
Certified seed purchased	8	6
Others	6	5
Total	128	100

A-5. Seed sources: upland crops

Response (one alternative)	n	%
Own products	77	77
Exchange with others	11	11
Certified seed purchased	12	12
Total	100	100

A-6. Seed sources: vegetables

Response (one alternative)	n	%
Own products	65	71
Exchange with others	9	10
Commercial seed procured at local market	18	20
Total	92	100

A-7. Seed replacement of rice

Response (one alternative)	n	%
Once per 3 croppings	39	38
Once per 4 - 6 croppings	9	9
Once > 6 croppings	56	54
Total	104	100

A-8. Land preparation method

Response (one alternative)	n	%
Draft animal	108	83
Machinery	15	12
Manual	7	5
Total	130	100

A-9. Fertilization Volume: Urea (unit: kg/ha)

Item	Kg/ha
N	130
Mean	39
STD	69
Minimum	500
Maximum	0

A-10. Fertilization Volume: DAP (unit: kg/ha)

Item	Kg/ha
N	130
Mean	24
STD	54
Minimum	0
Maximum	500

A-11. Fertilizer (Compost/Manure)

Item	Kg/ha
N	130
Mean	422
STD	511
Minimum	0
Maximum	2000

A-12. No. of plants per hill: rainy season

Response (one alternative)	n	%
1 plant/hill	4	3
2 - 3 plants/hill	21	17
4 - 5 plants/hill	87	69
> 5 plants/hill	14	11
Total	126	100

A-13. Age of seedlings: rainy season

Response (one alternative)	n	%
< 30 days	1	1
30 days	4	3
35 - 44 days	16	13
45 days	104	83
> 45 days	1	1
Total	126	100

A-14. Threshing (method)

Response	n	%
Engine thresher	92	71
Pedal thresher	13	10
Manual threshing	25	19
Total	130	100

A-15. Cleaning (method)

Response	n	%
Engine winnower	44	34
Manual winnower	6	5
Manual without winnower	80	62
Total	130	100

A-16. Drying (method)

Response	n	%
Sun drying	128	98
Dryer	2	2
Total	130	100

Attachment C-7 Results of Questionnaire Survey on Farming Practices, Inputs Supply and Marketing : Pursat (2/4)

B. Farm Input Supply

B-1. Procurement of certified seed

Response (one alternative)	n	%
Easy	70	54
Difficult	45	35
Not possible	15	12
Total	130	100

B-2. Procurement of wanted seed

Response (one alternative)	n	%
Easy	94	72
Difficult	25	19
Not possible	11	8
Total	130	100

B-3. Seed supply timing

Response (one alternative)	n	%
In time	78	60
Delayed	29	22
Not obtained	23	18
Total	130	100

B-4. Quality seed price

Response (one alternative)	n	%
Too expensive	38	29
Acceptable	14	11
Not purchased	78	60
Total	130	100

B-5. Procurement of wanted fertilizer

Response (one alternative)	n	%
Easy	95	73
Difficult	18	14
Not possible	17	13
Total	130	100

B-6. Fertilizer supply timing

Response (one alternative)	n	%
In time	91	70
Delayed	19	15
Not obtained	20	15
Total	130	100

B-7. Fertilizer price

Response (one alternative)	n	%
Too expensive	73	56
Acceptable	15	12
Not purchased	42	32
Total	130	100

C. Post-harvest

C-1. Rice milling cost (bran received by interviewee)

Item	Riel/ton
N	96
Mean	49,679
STD	14,037
Minimum	15,000
Maximum	70,000

C-2. Paddy storage (king of container used)

Response (one alternative)	n	%
Bag	37	28
Bamboo basket	31	24
Wooden box	57	44
Others	5	4
Total	130	100

C-3. Paddy (Maximum storage period; month)

Item	n	%
0 - 12 months	84	65
0 - 6 months	46	35
Total	130	100

C-4. Rice (kind of container)

Response (one alternative)	n	%
Bag	124	95
Bamboo basket	1	1
Wooden box	0	0
Others	6	5
Total	131	100

C-5. Rice (Maximum storage period; month)

Item	Month
N	125
Mean	1.5
STD	1.1
Minimum	0.5
Maximum	

C-6. Use of fumigant

Response (one alternative)	n	%
Not used	129	99
Used	1	1
Total	130	100

C-7. Most dominant loss of paddy

Response (one alternative)	n	%
During harvesting	38	29
At threshing,	76	58
At drying	5	4
At cleaning	1	1
At storage	6	5
At other time	4	3
Total	130	100

C-8. Second dominant loss

Response (one alternative)	n	%
During harvesting	33	25
At threshing,	29	22
At drying	18	14
At cleaning	17	13
At storage	27	21
At other time	6	5
Total	130	100

Attachment C-7 Results of Questionnaire Survey on Farming Practices, Inputs Supply and Marketing : Pursat (3/4)

D. Marketing

D-1. Farm gate price of irrigated paddy in wet season

	Riel/kg
N	
Median	
Mean	
Minimum	
Maximum	

D-2. Farm gate price of irrigated paddy in dry season

	Riel/kg	
N		
Median		
Mean		
Minimum		
Maximum		

D-3. Marketing time of rice: just after harvest

	% of sold
N	130
Mean	11.46
Minimum	0
Maximum	90

proportion to total marketing volume

D-4. Marketing time of rice: when cash is needed

	% of sold
N	130
Mean	7.52
Minimum	0
Maximum	76

proportion to total marketing volume

D-5. Marketing time of rice: when price is high

	% of sold
N	130
Mean	6.19
Minimum	0
Maximum	80

proportion to total marketing volume

D-6. Sold product

Response (one alternative)	n	%
Field dried paddy	26	21
Sun dried paddy	46	37
Milled rice	54	43
Total	126	100

D-7. Market Destination

Response	n	%
Rice miller in village	22	32
Rice miller in commune center	22	32
Rice miller in district center	6	9
Collector/middleman	17	25
Local market	2	3
Total	69	100

D-8. Marketing of vegetable

Response	n	%
Market in village	104	80
Market in commune center	10	8
Market in district center	0	0
Collector/middleman	1	1
Other (specify)	15	12
Total	130	100

D-9. Marketing of field crops

Response	n	%
Market in village	57	44
Market in commune center	21	16
Market in district center	10	8
Collector/middleman	26	20
Other (specify)	16	12
Total	130	100

D-10. Marketing of livestock

Response	n	%
Market in village	68	52
Market in commune center	9	7
Market in district center	2	2
Collector/middleman	40	31
Other (specify)	11	8
Total	130	100

D-11. Marketing of other product (fish)

Response	n	%
Market in village	69	58
Market in commune center	9	8
Market in district center	10	8
Other (specify)	30	25
Total	118	100

E. Food Supply Conditions

E-1. Food supply condition (rice)

Response (one alternative)	n	%
Own harvest/ product exceed the household demand	73	56
Own harvest/ product is just enough to the household demand	21	16
Purchased (or exchanged) to meet the household demand	18	14
Insufficient	18	14
Total	130	100

E-2. Food supply condition (vegetables)

Response (one alternative)	n	%
Own harvest/ product exceed the household demand	39	30
Own harvest/ product is just enough to the household demand	22	17
Purchased (or exchanged) to meet the household demand	28	22
Insufficient	41	32
Total	130	100

E-3. Food supply condition (other cereals)

Response (one alternative)	n	%
Own harvest/ product exceed the household demand	13	10
Own harvest/ product is just enough to the household demand	12	9
Purchased (or exchanged) to meet the household demand	29	22
Insufficient	76	58
Total	130	100

E-4. Food supply condition (meat)

Response (one alternative)	n	%
Own harvest/ product exceed the household demand	10	8
Own harvest/ product is just enough to the household demand	10	8
Purchased (or exchanged) to meet the household demand	47	36
Insufficient	63	48
Total	130	100

Attachment C-7 Results of Questionnaire Survey on Farming Practices, Inputs Supply and Marketing : Pursat (4/4)

E. Food Supply Conditions - continued

E-5. Food supply condition (roots and tuber crops)

Response (one alternative)	n	%
Own harvest/ product exceed the household demand	9	7
Own harvest/ product is just enough to the household dem	7	5
Purchased (or exchanged) to meet the household demand	35	27
Insufficient	79	61
Total	130	100

E-6. Food condition (fish)

Response (one alternative)	n	%
Own harvest/ product exceed the household demand	9	7
Own harvest/ product is just enough to the household dem	8	6
Purchased (or exchanged) to meet the household demand	35	27
Insufficient	78	60
Total	130	100

E-7. Food supply condition (beans)

Response (one alternative)	n	%
Own harvest/ product exceed the household demand	8	6
Own harvest/ product is just enough to the household dem	4	3
Purchased (or exchanged) to meet the household demand	40	31
Insufficient	78	60
Total	130	100

E-8. Rice purchased in last year (kg)

	kg/farm	
N	130	
Proportion to sample farmers (100)	9	
Mean (per respondent)	37.28	
Minimum	0	
Maximum	1500	

F. Extension Services

F-1. Visit of extension worker

Response (one alternative)	n	%
One per < week	7	5
Once per 2 weeks-1 month	34	26
Seldom visited	89	68
Total	130	100

F-2. Technical capability of extension workers

Response (one alternative)	n	%
Sufficient	64	49
Not sufficient	49	38
No service provided	17	13
Total	130	100

F-3. Are you satisfied with current extension services

Response (one alternative)	n	%
Satisfied	103	79
Not satisfied	12	9
No service provided	15	12
Total	130	100

F-4. What kind of extension services are you needed

Response (specified)	n	%
Technical training & technical guidance	80	66
Using fertilizer	6	5
visit of extension staff	18	15
Seed/farm input supply	16	13
Animal feeding & aquatic cultivation	2	2
Total	122	100

G. Farm Credit

G-1. Access to farm credit

Response (one alternative)	n	%
Easy	43	33
Difficult	21	16
Not provided	66	51
Total	130	100

G-2. Timing of provision

Response (one alternative)	n	%
In time	38	29
Delayed	26	20
Not provided	66	51
Total	130	100

G-3. Amount of credit

Response (one alternative)	n	%
Sufficient	31	24
Not sufficient	30	23
Not provided	69	53
Total	130	100

G-4. Procedures for credit application

Response (one alternative)	n	%
Easy	17	13
Difficult	44	34
Not possible	69	53
Total	130	100

Attachment C-8 Results of Questionnaire Survey on Farming Practices, Inputs Supply and Marketing: Boribo (1/4)

A. Farming Practices

A-1. Reason for fallow of rice field in Dry Season

Response (plural alternatives)	n	%
Labor shortage	1	1
Working capital shortage	0	0
Water shortage	92	99
Total	93	100

A-2. Rice variety: rainy season

Response (plural alternative)	n	%
Angkar	2	2
Kang Keo	3	4
Kantuy Khmav	3	4
Khmomg Romiang	3	4
Leak Sanlek	4	5
Leak Sanloek	10	12
Middle rice	4	5
NGO	3	4
Phka Sla	2	2
Porng Angkrang	15	19
Poupen	2	2
Rumdoul	4	5
Sambok Angkrang	11	14
Santos Phlork	13	16
Sloek Sral	2	2
Total	81	100

A-3. Rice variety: early rainy season

Response (one alternative)	n	%
IR 66	1	100
Sen Pidao		0
Others		0
Total	1	100

A-4. Reasons for selection of rice variety

Response (plural alternatives)	n	%
Productivity (high yield)	24	26
Short and/or medium term of growing period	16	17
Tradition	8	9
Provided by NGOs	4	4
Land condition and suitable for soil	16	17
Easy to grow	11	12
Good taste	4	4
Depending on water availability	2	2
Others	9	10
Total	94	100

A-5. Seed sources: rice

Response (one alternative)	n	%
Own products	99	84
Exchange with others	12	10
Certified seed purchased	1	1
Others	6	5
Total	118	100

A-6. Seed sources: upland crops

Response (one alternative)	n	%
Own products	69	82
Exchange with others	12	14
Certified seed purchased	3	4
Total	84	100

A-7. Seed sources: vegetables

Response (one alternative)	n	%
Own products	68	80
Exchange with others	14	16
Commercial seed procured at local market	3	4
Total	85	100

A-8. Seed replacement of rice

Response (one alternative)	n	%
Once per 3 croppings	45	54
Once per 4 - 6 croppings	5	6
Once > 6 croppings	33	40
Total	83	100

A-9. Land preparation method

Response (one alternative)	n	%
Draft animal	110	92
Machinery	4	3
Manual	6	5
Total	120	100

A-10. No. of plants per hill: rainy season

Response (one alternative)	n	%
1 plant/hill	4	3
2 - 3 plants/hill	37	31
4 - 5 plants/hill	58	49
> 5 plants/hill	19	16
Total	118	100

A-11. Age of seedlings: rainy season

Response (one alternative)	n	%
< 30 days	2	2
30 days	13	11
35 - 44 days	7	6
45 days	94	80
> 45 days	2	2
Total	118	100

A-12. Threshing (method)

Response	n	%
Engine thresher	23	19
Pedal thresher	4	3
Manual threshing	93	78
Total	120	100

A-13. Drying (method)

Response	n	%
Sun drying	92	77
Dryer	28	23
Total	120	100

A-14. Cleaning (method)

Response	n	%
Engine winnower	11	9
Manual winnower	10	8
Manual without winnower	99	83
Total	120	100

Attachment C-8 Results of Questionnaire Survey on Farming Practices, Inputs Supply and Marketing: Boribo (2/4)

B. Farm Input Supply

B-1. Procurement of certified seed

Response (one alternative)	n	%
Easy	62	52
Difficult	40	33
Not possible	18	15
Total	120	100

B-2. Procurement of wanted seed

Response (one alternative)	n	%
Easy	96	80
Difficult	17	14
Not possible	7	6
Total	120	100

B-3. Seed supply timing

Response (one alternative)	n	%
In time	87	73
Delayed	17	14
Not obtained	16	13
Total	120	100

B-4. Quality seed price

Response (one alternative)	n	%
Too expensive	16	13
Acceptable	33	28
Not purchased	71	59
Total	120	100

B-5. Procurement of wanted fertilizer

Response (one alternative)	n	%
Easy	74	62
Difficult	25	21
Not possible	21	18
Total	120	100

B-6. Fertilizer supply timing

Response (one alternative)	n	%
In time	71	59
Delayed	22	18
Not obtained	27	23
Total	120	100

B-7. Fertilizer price

Response (one alternative)	n	%
Too expensive	43	36
Acceptable	11	9
Not purchased	66	55
Total	120	100

C. Post-harvest

C-1. Rice milling cost (bran received by interviewee)

Item	Riel/ton
N	105
Mean	45,857
STD	14,238
Minimum	10,000
Maximum	80,000

C-2. Paddy storage (king of container used)

Response (one alternative)	n	%
Bag	41	34
Bamboo basket	27	23
Wooden box	48	40
Others	4	3
Total	120	100

C-3. Paddy (Maximum storage period; month)

Item	n	%
0 - 12 months	80	67
0 - 6 months	40	33
Total	120	100

C-4. Rice (kind of container)

Response (one alternative)	n	%
Bag	114	95
Bamboo basket	0	0
Wooden box	0	0
Others	6	5
Total	120	100

C-5. Rice (Maximum storage period; month)

Item	Month
N	113
Mean	2
STD	1.3
Minimum	0.2
Maximum	6

C-6. Use of fumigant

Response (one alternative)	n	%
Not used	120	100
Used	0	0
Total	120	100

C-7. Most dominant loss of paddy

Response (one alternative)	n	%
During harvesting	47	39
At threshing,	53	44
At drying	3	3
At cleaning	13	11
At storage	2	2
At other time	2	2
Total	120	100

C-8. Second dominant loss

Response (one alternative)	n	%
During harvesting	26	22
At threshing,	39	33
At drying	16	13
At cleaning	23	19
At storage	13	11
At other time	3	3
Total	120	100

Attachment C-8 Results of Questionnaire Survey on Farming Practices, Inputs Supply and Marketing: Boribo (3/4)

D. Marketing

D-1. Sold product

Response (one alternative)	n	%
Field dried paddy	8	7
Sun dried paddy	29	24
Milled rice	82	69
Total	119	100

D-2. Market Destination

Response	n	%
Rice miller in village	19	51
Rice miller in commune center	4	11
Rice miller in district center	4	11
Collector/middleman	8	22
Local market	2	5
Total	37	100

D-3. Marketing of vegetable

Response	n	%
Market in village	72	60
Market in commune center	0	0
Market in district center	6	5
Collector/middleman	7	6
Other (specify)	35	29
Total	120	100

D-4. Marketing of field crops

Response	n	%
Market in village	48	40
Market in commune center	12	10
Market in district center	12	10
Collector/middleman	11	9
Other (specify)	37	31
Total	120	100

D-5. Marketing of livestock

Response	n	%
Market in village	40	33
Market in commune center	2	2
Market in district center	6	5
Collector/middleman	56	47
Other (specify)	16	13
Total	120	100

D-6. Marketing of other product (fish)

Response	n	%
Market in village	39	34
Market in commune center	2	2
Market in district center	6	5
Other (specify)	68	59
Total	115	100

E. Food Supply Conditions

E-1. Food supply condition (rice)

Response (one alternative)	n	%
Own harvest/ product exceed the household demand	46	38
Own harvest/ product is just enough to the household dem	37	31
Purchased (or exchanged) to meet the household demand	6	5
Insufficient	31	26
Total	120	100

E-2. Food supply condition (vegetables)

Response (one alternative)	n	%
Own harvest/ product exceed the household demand	26	22
Own harvest/ product is just enough to the household dem	21	18
Purchased (or exchanged) to meet the household demand	16	13
Insufficient	57	48
Total	120	100

E-3. Food supply condition (other cereals)

Response (one alternative)	n	%
Own harvest/ product exceed the household demand	5	4
Own harvest/ product is just enough to the household demand	9	8
Purchased (or exchanged) to meet the household demand	13	11
Insufficient	93	78
Total	120	100

E-4. Food supply condition (meat)

Response (one alternative)	n	%
Own harvest/ product exceed the household demand	8	7
Own harvest/ product is just enough to the household demand	7	6
Purchased (or exchanged) to meet the household demand	24	20
Insufficient	81	68
Total	120	100

E-5. Food supply condition (roots and tuber crops)

Response (one alternative)	n	%
Own harvest/ product exceed the household demand	8	7
Own harvest/ product is just enough to the household demand	13	11
Purchased (or exchanged) to meet the household demand	13	11
Insufficient	86	72
Total	120	100

E-6. Food condition (fish)

Response (one alternative)	n	%
Own harvest/ product exceed the household demand	2	2
Own harvest/ product is just enough to the household demand	9	8
Purchased (or exchanged) to meet the household demand	20	17
Insufficient	89	74
Total	120	100

E-7. Food supply condition (beans)

Response (one alternative)	n	%
Own harvest/ product exceed the household demand	6	5
Own harvest/ product is just enough to the household demand	11	9
Purchased (or exchanged) to meet the household demand	13	11
Insufficient	90	75
Total	120	100

E-8. Rice purchased in last year (kg)

	kg/farm
N	120
Proportion to sample farmers (100)	10
Mean (per respondent)	21
Minimum	0
Maximum	800

Attachment C-8 Results of Questionnaire Survey on Farming Practices, Inputs Supply and Marketing: Boribo (4/4)

F. Extension Services

F-1. Visit of extension worker

Response (one alternative)	n	%
One per < week	7	6
Once per 2 weeks-1 month	22	18
Seldom visited	91	76
Total	120	100

F-2. Technical capability of extension workers

Response (one alternative)	n	%
Sufficient	60	50
Not sufficient	46	38
No service provided	14	12
Total	120	100

F-3. Are you satisfied with current extension services

Response (one alternative)	n	%
Satisfied	103	86
Not satisfied	7	6
No service provided	10	8
Total	120	100

F-4. What kind of extension services are you needed

Response (specified)	n	%
Technical training & technical guidance	100	78
Animal feeding technique	11	9
Visit of extension staff	7	5
Seed/farm input supply	3	2
More frequencies of promotion services	7	5
Total	128	100

G. Farm Credit

G-1. Access to farm credit

Response (one alternative)	n	%
Easy	26	22
Difficult	19	16
Not provided	75	63
Total	120	100

G-2. Timing of provision

Response (one alternative)	n	%
In time	28	23
Delayed	16	13
Not provided	76	63
Total	120	100

G-3. Amount of credit

Response (one alternative)	n	%
Sufficient	20	19
Not sufficient	20	19
Not provided	67	63
Total	107	100

G-4. Procedures for credit application

Response (one alternative)	n	%
Easy	16	13
Difficult	23	19
Not possible	81	68
Total	120	100