LAND SUITABILITY MAP

ROBUSTA, LIBERICA AND EXCELSA COFFEE

LAND RESOURCES EVALUATION AND SUITABILITY ASSESSMENT OF STRATEGIC PRODUCTION AREAS

PROVINCE OF LANAO DEL NORTE

REPUBLIC OF THE PHILIPPINES
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MAP INDEX

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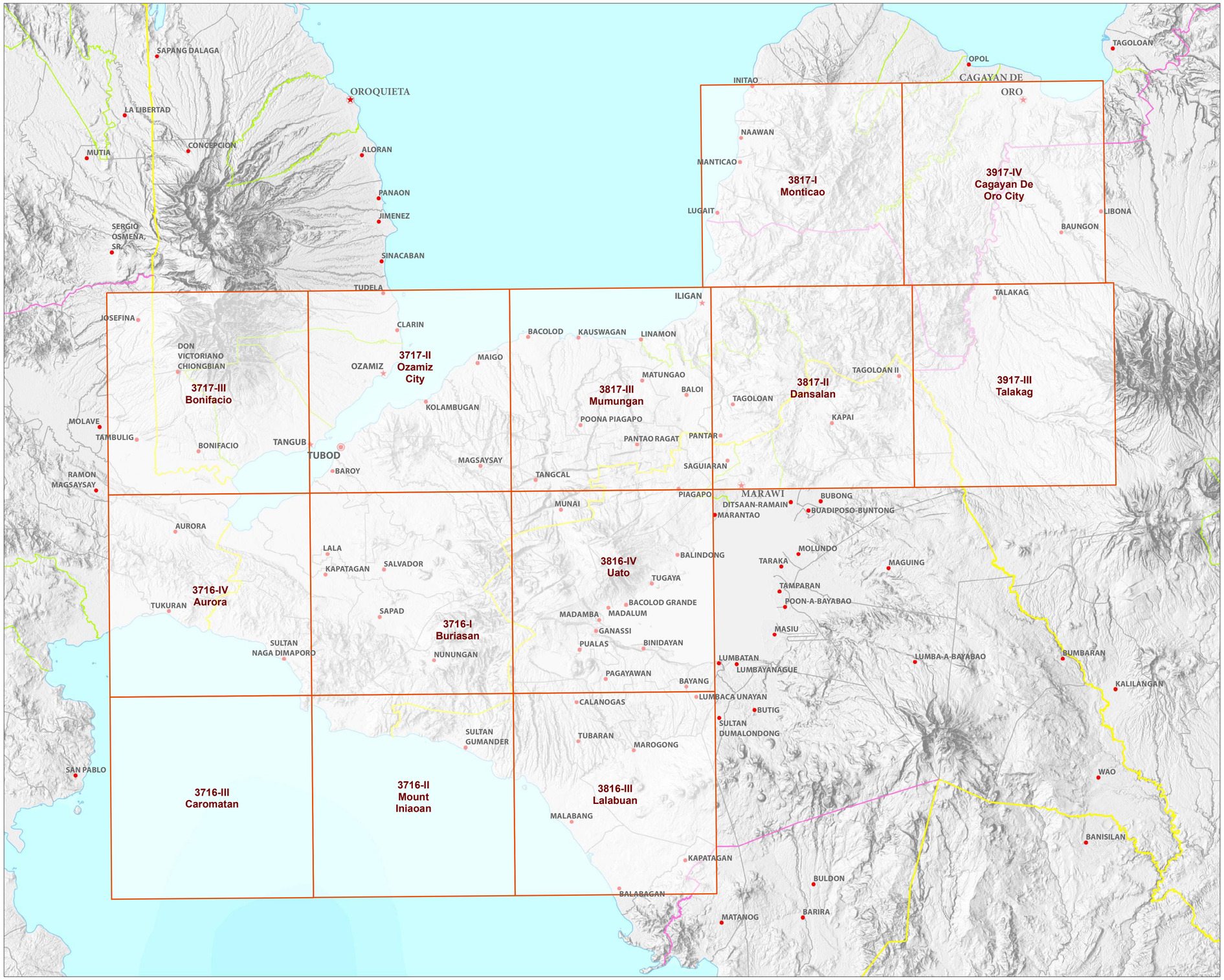
PROVINCE OF LANAO DEL NORTE



LEGEND

Places

- Capital City
- City
- Capital Town
- Town

Administrative Boundary

- Regional
- Provincial
- City
- Municipal

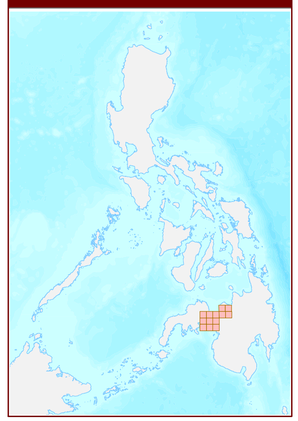
Map Index

- Index grid

Topographic Relief

Bathymetry

LOCATION MAP



MISCELLANEOUS INFORMATION

Land suitabilityinformation produced by the Bureau of Soils and Water Management (BSWM) through the **Land Resources Evaluation and Suitability Assessment of Strategic Production Areas for Major Commodities Project** duly supported by the Philippine Council on Agriculture and Fisheries (PCAF) and funded by the Bureau of Agricultural Research (BAR).

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LAND SUITABILITY MAP FOR ROBUSTA, LIBERICA AND EXCELSA COFFEE

LAND RESOURCES EVALUATION AND SUITABILITY ASSESSMENT OF STRATEGIC PRODUCTION AREAS

LANAO DEL NORTE, REGION X

EXTENT OF SUITABILITY FOR ROBUSTA, LIBERICA AND EXCELSA COFFEE PRODUCTION BY MUNICIPALITY

MUNICIPALITY	EXISTING COFFEE (Ha)			TOTAL EXISTING AREA (Ha)	EXPANSION AREA (Ha)						CONFLICT RESOLUTION (Ha)						TOTAL POTENTIAL EXPANSION AREA (Ha)
					Coconut		Shrubland, unmanaged*		Grassland, unmanaged*		Corn		Rice paddy, non-irrigated		Other crops		
	S1	S2	S3		S1	S2	S1	S2	S1	S2	S1	S2	S1	S2	S1	S2	
BACOLOD	51	-	17	69	3,612	-	-	-	-	-	92	-	-	-	-	-	3,705
BALOI	-	-	-	-	726	-	108	-	-	-	4,157	59	-	-	-	-	5,050
BAROY	-	-	-	-	1,896	-	-	-	-	-	49	-	-	-	-	-	1,945
ILIGAN CITY	159	-	541	700	4,516	13	1,600	183	1,748	33	253	149	-	-	-	-	8,495
KAPATAGAN	-	-	-	-	2,862	1,278	16	-	7	43	284	6	-	-	-	-	4,494
KAUSWAGAN	12	-	-	12	5,020	242	31	27	-	-	142	39	-	-	-	-	5,502
KOLAMBUGAN	-	-	-	-	2,381	-	-	-	-	-	16	-	-	-	-	-	2,397
LALA	-	-	-	-	590	-	-	-	-	-	375	-	-	-	-	-	965
LINAMON	-	-	-	-	1,350	-	4	-	-	-	75	-	-	-	-	-	1,429
MAGSAYSAY	-	-	-	-	3,277	109	-	-	-	-	-	-	-	-	-	-	3,386
MAIGO	12	-	53	64	3,722	2	21	-	-	-	1	-	-	-	-	-	3,746
MATUNGAO	-	-	-	-	351	3	23	18	-	-	1,322	167	-	-	-	-	1,885
MUNAI	-	-	-	-	480	1,844	1	793	-	-	182	703	-	-	-	-	4,003
NUNUNGAN	-	-	-	-	1,703	936	71	92	25	262	146	84	-	-	-	-	3,319
PANTAO RAGAT	-	26.15	-	26	-	470	27	509	-	-	132	1,509	-	-	-	-	2,648
PANTAR	-	111.58	156	268	-	-	156	342	-	5	311	814	-	-	-	-	1,628
POONA PIAGAPO	-	71.02	223	294	1,232	301	67	267	-	-	816	1,139	-	-	-	-	3,822
SALVADOR	-	-	-	-	3,223	-	-	-	67	-	886	-	-	-	-	-	4,176
SAPAD	-	-	-	-	1,718	59	1	-	-	-	1,078	-	-	-	-	-	2,856
SULTAN NAGA DIMAPORO	-	-	-	-	3,575	1,364	-	10	-	-	955	464	-	-	-	-	6,368
TAGOLOAN	6	5.68	97	109	793	54	241	391	158	23	386	1,443	-	-	-	-	3,488
TANGCAL	-	-	-	-	1,271	114	-	4	-	-	-	-	-	-	-	-	1,389
TUBOD	-	-	-	-	6,550	124	-	-	-	-	9	-	-	-	-	-	6,683
TOTAL	241	214	1,088	**1,543**	50,850	6,913	2,366	2,638	2,004	366	11,666	6,575	-	-	-	-	**83,378**

Note: Delivery of robusta coffee planting materials must be started on the onset of rainy season.
**establishment of shade trees prior to planting of robusta coffee.*

AGRONOMIC REQUIREMENT OF ROBUSTA, LIBERICA AND EXCELSA COFFEE PRODUCTION

LAND UTILIZATION TYPE	SUITABILITY RATING	SLOPE (%)	SOIL DEPTH (cm)	SOIL TEXTURE	SOIL DRAINAGE	SOIL REACTION (pH)	INHERENT FERTILITY	FLOODING CLASS	EROSION CLASS	ROCK OUTCROPS	ELEVATION (masl)	ANNUAL RAINFALL (mm)	CLIMATIC TYPE
Coffee (Robusta, Excelsa, Liberica)	S1	<8	>100	CL, SiCL, SCL, SC, SiC, C, HC	WD,MWD	5.6 -7.2	high	none-slight	none-slight	none-few	<1000	2001-4500	I, III, IV
	S2	8 - 30	30 - 100	FSL, L, SiL	SPD,PD	5.1 - 5.5 7.3 - 7.8	medium	moderate	moderate	common	1000-2000	1000-2000	I, II
	S3	>30	<30	S, LS, CSL, SL	VPD,ED	<5.0 -> 7.9	low	severe	severe	many	>2000	<1000 >4500	

SLOPE (%)
0 - 3 - level to gently sloping
3 - 8 - gently sloping to undulating
8 - 18 - undulating to rolling
18 - 30 - rolling to moderately steep
30 - 50 - steep
> 50 - very steep

SOIL DRAINAGE
ED - excessively drained
WD - well drained
MWD - moderately well drained
SPD - somewhat poorly drained
PD - poorly drained
VPD - very poorly drained

SOIL REACTION (pH)
< 4.5 - extremely acid
4.5 - 5.0 - very strongly acid
5.1 - 5.5 - strongly acid
5.6 - 6.0 - medium acid
6.1 - 6.5 - slightly acid
6.6 - 7.2 - neutral
7.3 - 7.8 - mildly alkaline
7.9 - 8.4 - moderately alkaline
> 8.5 - strongly alkaline

SOIL TEXTURE
Coarse
S - sand
LS - loamy sand
CSL - coarse sandy loam
SL - sandy loam
Medium
FSL - fine sandy loam
L - loam
SiL - silt loam
CL - clay loam
SiCL - silty clay loam
SCL - sandy clay loam
Fine
SC - sandy clay
SiC - silty clay
C - clay
HC - heavy clay

SOIL DEPTH (cm)
0 - 30 - very shallow
30 - 50 - shallow
50 - 100 - moderately deep
> 100 - deep to very deep

SURFACE IMPEDIMENT
ROCK OUTCROPS
< 10% - none - few
10 - 30% - common
> 30% - many

LAND LIMITATIONS DESCRIPTION AND COMBINATIONS

ELEVATION
El2 - 1000m - 2000m
El3 - > 2000m

SOIL DRAINAGE
D2 - Somewhat poorly drained to poorly drained
D3 - Very poorly drained or excessively drained

SOIL DEPTH
Sh2 - Shallow to moderately deep (30 - 100cm)
Sh3 - Very shallow (< 30cm)

SOIL EROSION
E2 - Moderate erosion
E3 - Severe erosion

SLOPE/TOPOGRAPHY
T2 - Undulating to moderately steep
T3 - Steep to very steep

SOIL TEXTURE
Tc - Coarse texture

ROCK OUTCROPS
Rc2 - Common
Rc3 - Many

FLOODING
F2 - Moderate seasonal flooding
F3 - Severe seasonal flooding

CODE	LIMITATION	CODE	LIMITATION	CODE	LIMITATION	CODE	LIMITATION
1	E2-Sh2-Rc2	11	Sh2-Rc3	21	T2-F2-D2	31	T3-El2-E3-Sh3-Rc3
2	E3-Rc3	12	T2	22	T2-F3-D2	32	T3-F2-D2
3	El2	13	T2-E3	23	T3	33	T3
4	El2-Sh2-Rc2	14	T2-E3-Rc2	24	T3-E3	34	T3-E3
5	El2-Sh2-Rc3	15	T2-E3-Rc3	25	T3-E3-Rc2	35	T3-E3-Sh3-Rc3
6	F2-D2	16	T2-E3-Sh2-Rc2	26	T3-E3-Sh2-Rc3	36	T3-El2-E3-Sh3-Rc3
7	F2-Tc	17	T2-E3-Sh2-Rc3	27	T3-E3-Sh3-Rc2	37	T3-El3
8	F3-D2	18	T2-El2-E3	28	T3-E3-Sh3-Rc3		
9	Rc2	19	T2-El2-E3-Sh2-Rc2	29	T3-El2-E3		
10	Sh2-Rc2	20	T2-El2-E3-Sh2-Rc3	30	T3-El2-E3-Sh3-Rc2		

CODE	LANDUSE
4	Corn
81	Coffee
82	Cacao
116	Coconut
126	Grassland
134	Srubs, unmanaged

SUITABILITY CLASSES:

Highly Suitable (S1)
Land having no significant limitation to sustained application of a given use, or only minor limitations that will not significantly reduce productivity or benefits and will not raise inputs above an acceptable level.

Marginally Suitable (S3)
Land having limitations which in aggregate are severe for sustained application of a given use and will so reduce productivity or benefits, or increase required inputs, that this expenditure will be only marginally justified.

Moderately Suitable (S2)
Land having limitation which in aggregate are moderately severe for sustained application of a given use; the limitation will reduce productivity or benefits and increase required inputs to the extent that the overall advantage to be gained from the use, although still attractive, will be appreciably inferior to that expected on class S1 land.

Not Suitable / Not Relevant
Land having limitations which may be surmountable in time but which cannot be corrected with existing knowledge at currently acceptable cost; the limitations are so severe as to preclude successful sustained use of the land in the given manner. Existing forest, shrubland greater than 18% slope, irrigated paddy rice and miscellaneous land types such as built up areas, roads, etc are considered as not relevant.

CLIMATE TYPE

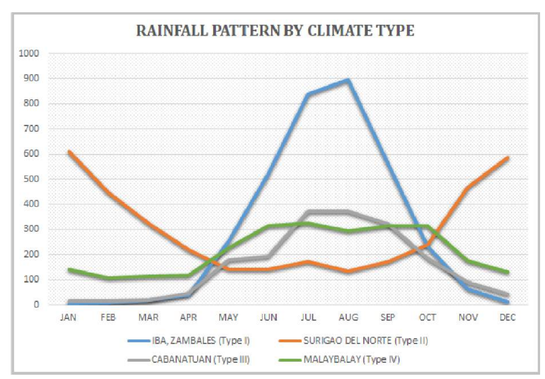
TYPE I : Two pronouced season, dry from November to April and wet during the rest of the year. Maximum rain period is from June to September

TYPE II : No dry season with a very pronounced maximum rain period from December to February. There is not a single dry month. Maximum monthly rainfall occurs during the period from March to May.

TYPE III : No very pronounced maximum rain period, with a dry season lasting only from one to three months, either during the period from December to February or from March to May. This type resembles Type I since it has a short dry season.

TYPE IV : Rainfall is more or less evenly distributed throughout the year. This type resembles Type II since it has no dry season.

Whole part of Lanao Del Norte is classified as climatic Type III.



Source: PAGASA 2018, *Climatological Normals (Rainfall)*, Philippine Atmospheric, Geophysical and Astronomical Services Administration (PAGASA), accessed 27 July 2018, <https://www1.pagasa.dost.gov.ph/index.php/climate/climatological-normals>.

LAND SUITABILITY MAP ROBUSTA, LIBERICA AND EXCELSA COFFEE

LAND RESOURCES EVALUATION AND SUITABILITY ASSESSMENT OF STRATEGIC PRODUCTION AREAS

N W E S

SCALE 1 : 50 000

0 0.5 1 2 3 4 5 Kilometers

0 0.5 1 2 3 Miles

Universal Transverse Mercator Zone 51 N. PRS 1992 Datum

DISCLAIMER : All political boundaries are not authoritative.

LEGEND

SUITABILITY CLASSES

S1 **Highly Suitable** - Land having no significant limitations to sustained application of a given use, or only minor limitations that will not significantly reduce productivity or benefits and will not raise inputs above an acceptable level.

S2 **Moderately Suitable** - Land having limitations which in aggregate are moderately severe for sustained application of a given use; the limitations will reduce productivity or benefits and increase required inputs to the extent that the overall advantage to be gained from the use, although still attractive, will be appreciably inferior to that expected on class S1 land.

S3 **Marginally Suitable** - Land having limitations which in aggregate are severe for sustained application of a given use and will so reduce productivity or benefits, or increase required inputs, that this expenditure will be only marginally justified.

Not Suitable/ Not Relevant

OTHER SIGNS

NGP Areas

Cacao

1 Land limitation

116 Land use

CONVENTIONAL SIGNS

ROADS

Expressway

Trunk line

Primary

Secondary

Tertiary

BOUNDARY

Region

Province

District

Municipality

Barangay

HYDROLOGY

Sea / Shoreline

Lakes / Rivers

PLACES

Capital City / City

Capital Town / Town

LAND USE

Built-up

Fishpond

Mangrove

ADJOINING SHEETS

3817-I

INDEX MAP

3817-I 3917-IV 3817-III 3817-II 3917-III

MISCELLANEOUS INFORMATION

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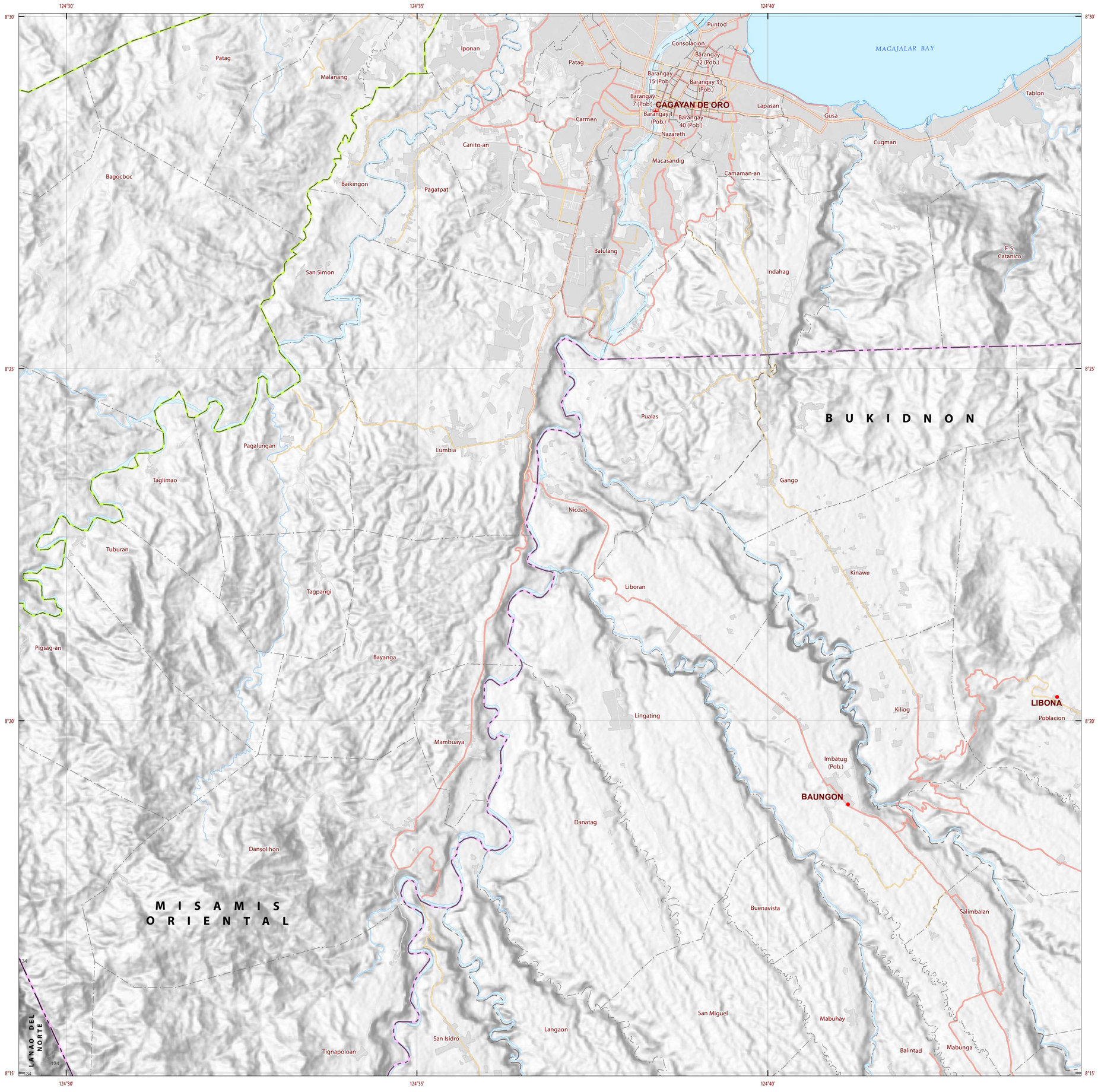

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LAND RESOURCES EVALUATION AND SUITABILITY ASSESSMENT OF STRATEGIC PRODUCTION AREAS

N
W E
S

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0 0.5 1 2 3 4 5
Kilometers

0 0.5 1 2 3
Miles

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S3 **Marginally Suitable** - Land having limitations which in aggregate are severe for sustained application of a given use and will so reduce productivity or benefits, or increase required inputs, that this expenditure will be only marginally justified.

Not Suitable/ Not Relevant

OTHER SIGNS

NGP Areas
Cacao
1 Land limitation
H1 Land use

CONVENTIONAL SIGNS

ROADS
Expressway
Trunk line
Primary
Secondary
Tertiary

BOUNDARY
Region
Province
District
Municipality
Barangay

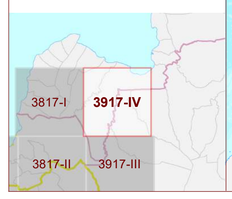
HYDROLOGY
Sea / Shoreline
Lakes / Rivers

PLACES
Capital City / City
Capital Town / Town

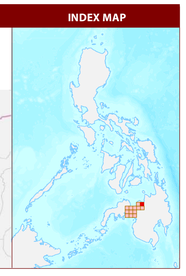
LAND USE
Built-up
Fishpond
Mangrove

ADJOINING SHEETS

3917-IV



INDEX MAP



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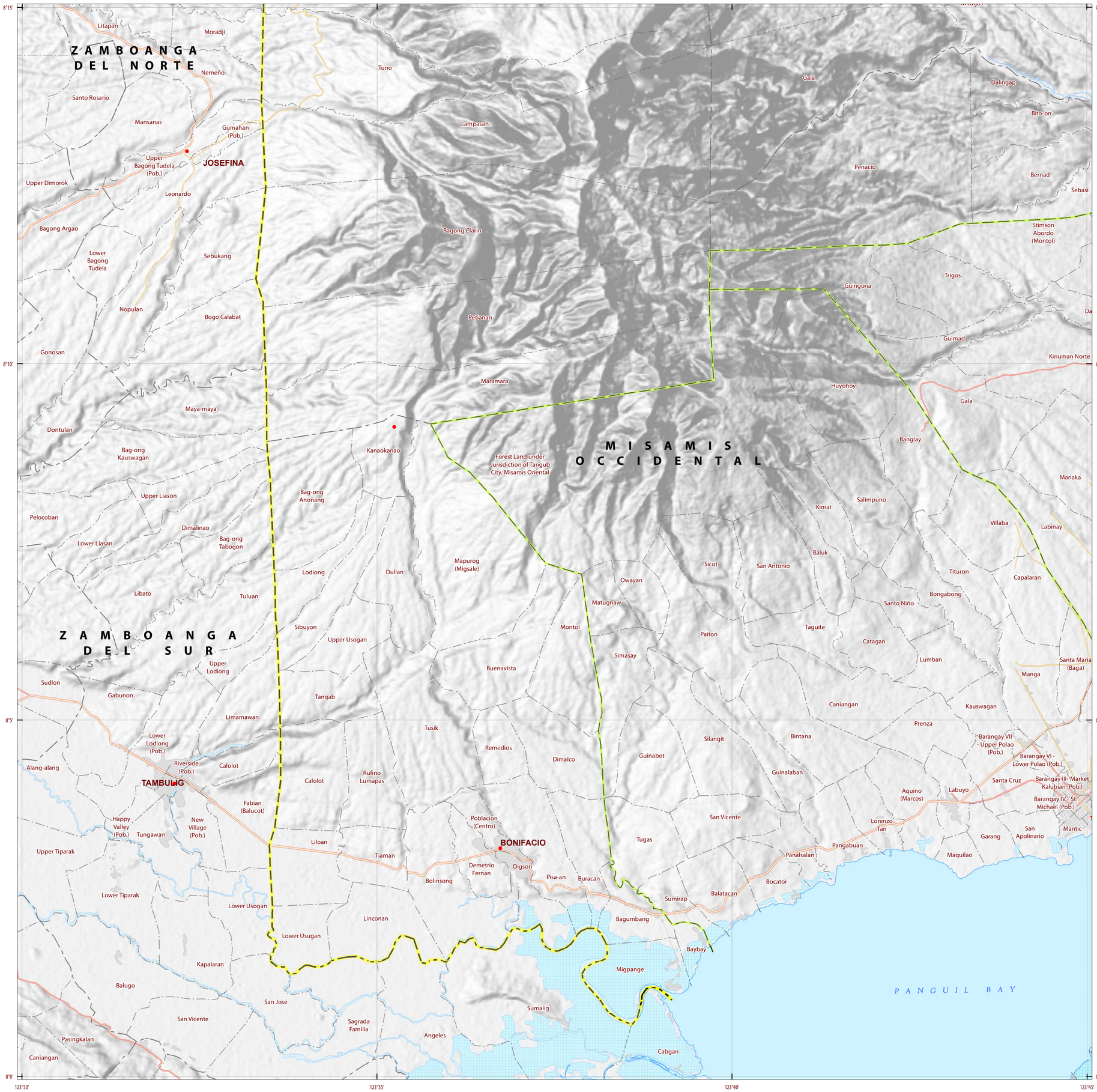

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LAND RESOURCES EVALUATION AND SUITABILITY ASSESSMENT OF STRATEGIC PRODUCTION AREAS

N W E S

SCALE 1 : 50 000

0 0.5 1 2 3 4 5 Kilometers

0 0.5 1 2 3 Miles

Universal Transverse Mercator Zone 51 N. PRS 1992 Datum

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LEGEND

SUITABILITY CLASSES

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Not Suitable/ Not Relevant

OTHER SIGNS

NGP Areas

Cacao

1 Land limitation

11B Land use

CONVENTIONAL SIGNS

ROADS

Expressway

Trunk line

Primary

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Tertiary

BOUNDARY

Region

Province

District

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Barangay

HYDROLOGY

Sea / Shoreline

Lakes / Rivers

PLACES

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Capital Town / Town

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3717-III 3717-II 3716-IV 3716-I

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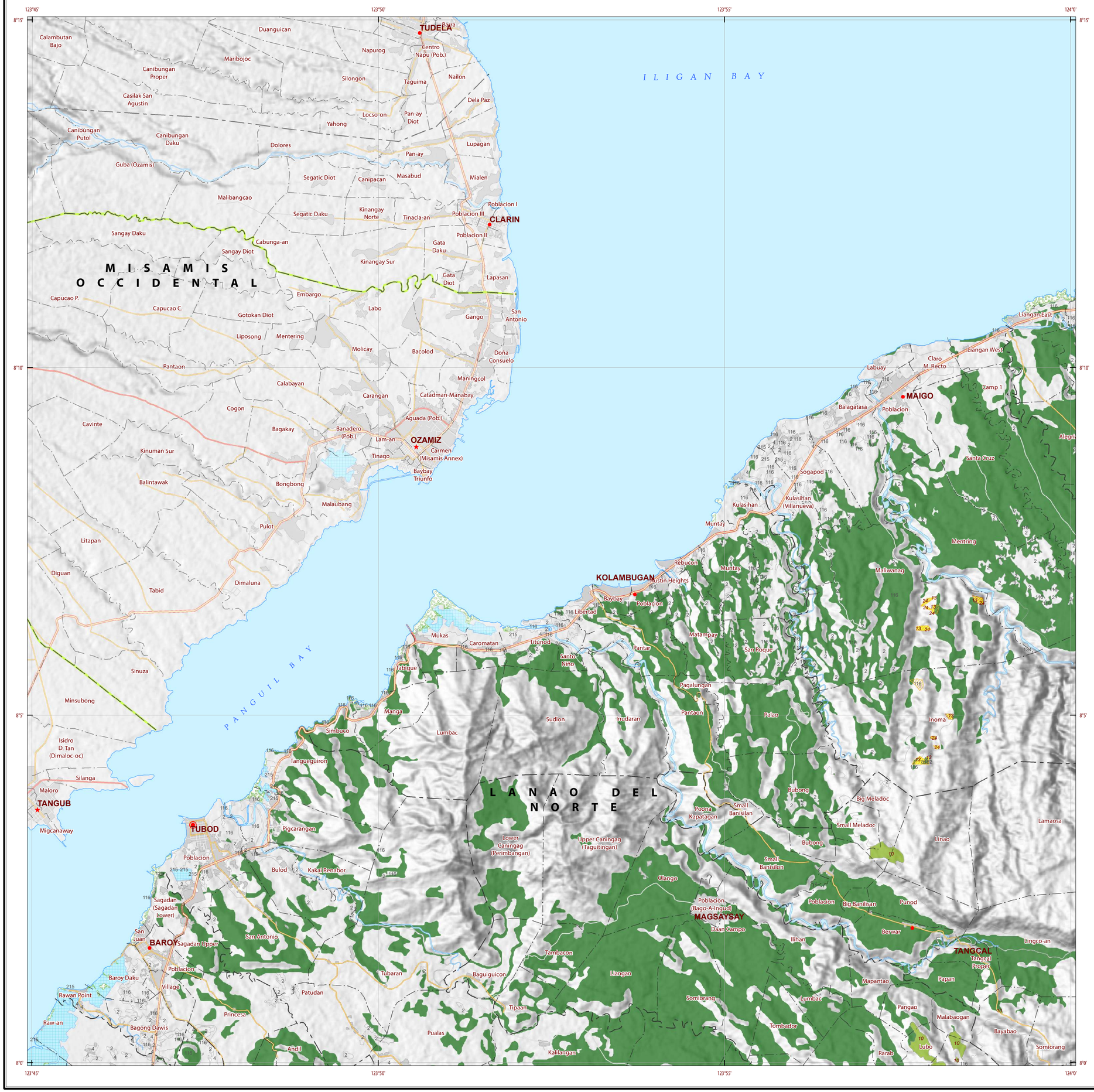

DEPARTMENT OF AGRICULTURE 1898

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LAND RESOURCES EVALUATION AND SUITABILITY ASSESSMENT OF STRATEGIC PRODUCTION AREAS

N W E S

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0 0.5 1 2 3 4 5 Kilometers

0 0.5 1 2 3 Miles

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- **Not Suitable/ Not Relevant**

OTHER SIGNS

- NGP Areas
- Cacao
- 1 Land limitation
- 116 Land use

CONVENTIONAL SIGNS

ROADS

- Expressway
- Trunk line
- Primary
- Secondary
- Tertiary

BOUNDARY

- Region
- Province
- District
- Municipality
- Barangay

HYDROLOGY

- Sea / Shoreline
- Lakes / Rivers

PLACES

- Capital City / City
- Capital Town / Town

LAND USE

- Built-up
- Fishpond
- Mangrove

ADJOINING SHEETS

3717-II

3817-I

3717-III | 3717-II | 3817-III

3716-IV | 3716-I | 3816-IV

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LAND SUITABILITY MAP ROBUSTA, LIBERICA AND EXCELSA COFFEE

LAND RESOURCES EVALUATION AND SUITABILITY ASSESSMENT OF STRATEGIC PRODUCTION AREAS

N W E S

SCALE 1 : 50 000

0 0.5 1 2 3 4 5 Kilometers

0 0.5 1 2 3 Miles

Universal Transverse Mercator Zone 51 N. PRS 1992 Datum

DISCLAIMER : All political boundaries are not authoritative.

LEGEND

SUITABILITY CLASSES

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1 Land limitation

118 Land use

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Tertiary

BOUNDARY

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Province

District

Municipality

Barangay

HYDROLOGY

Sea / Shoreline

Lakes / Rivers

PLACES

Capital City / City

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LAND USE

Built-up

Fishpond

Mangrove

ADJOINING SHEETS

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3717-II

3817-III

3817-II

3716-I

3816-IV

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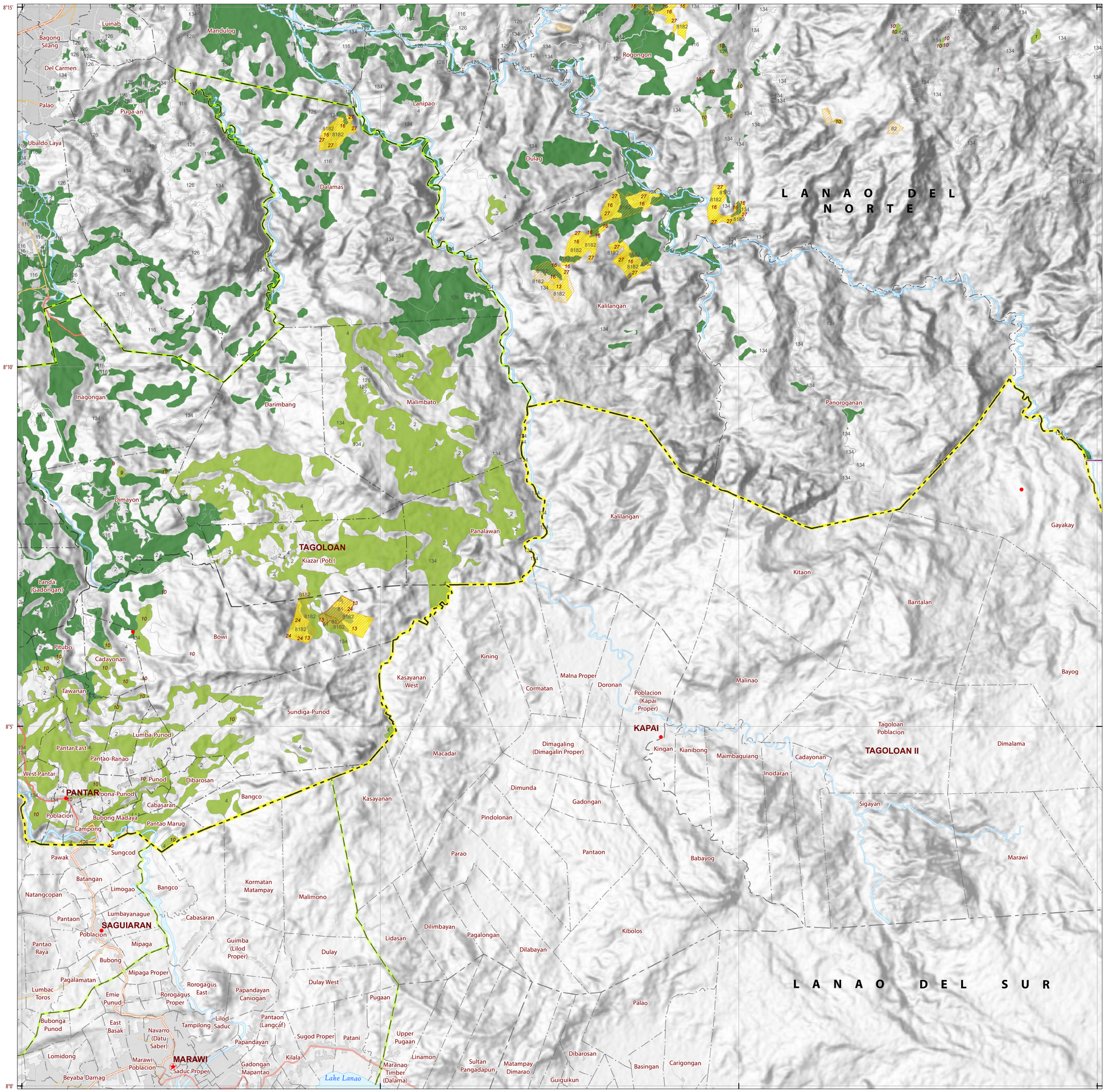

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Province

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Barangay

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Lakes / Rivers

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LAND USE

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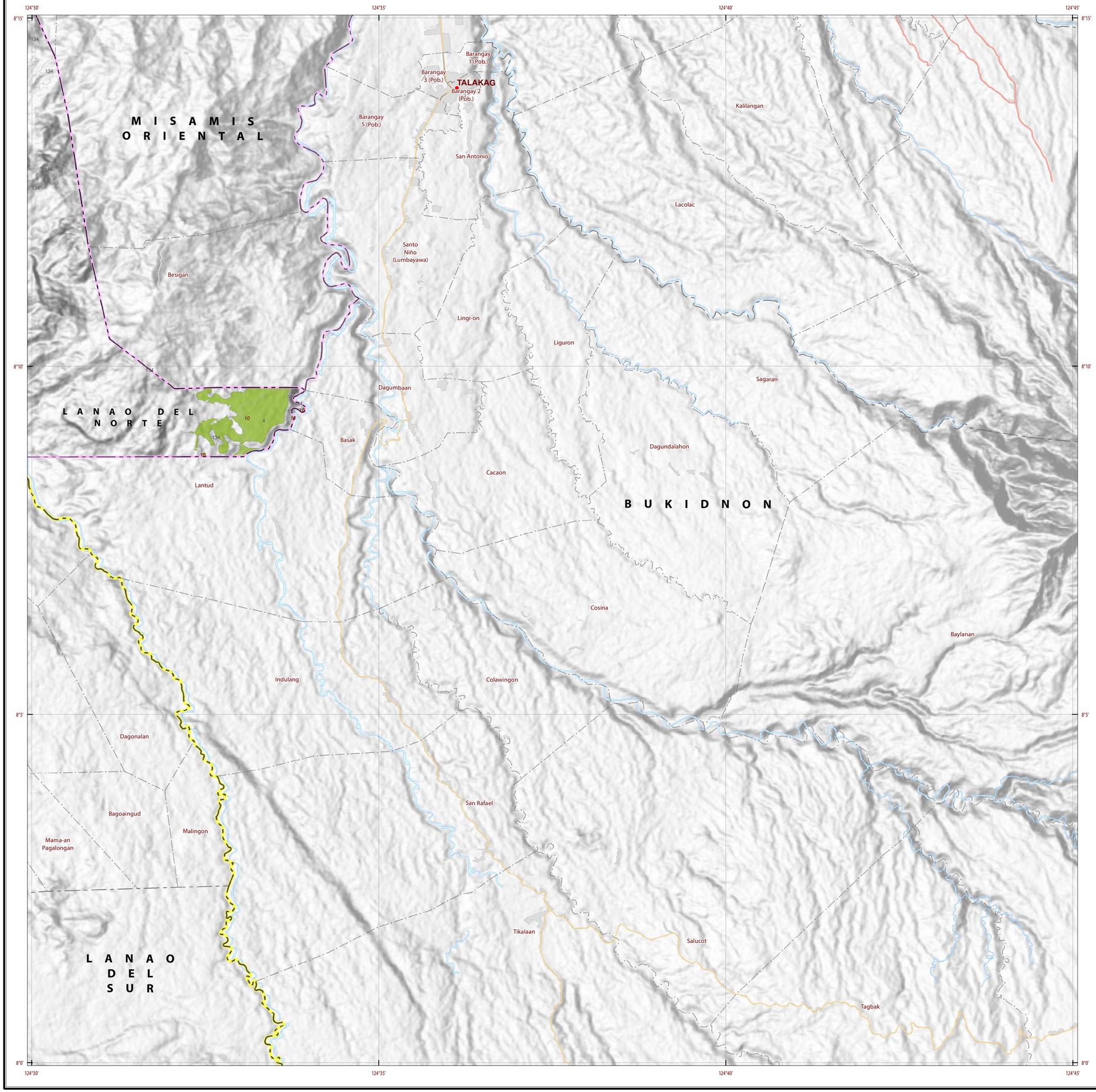

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LAND RESOURCES EVALUATION AND SUITABILITY ASSESSMENT OF STRATEGIC PRODUCTION AREAS

N W E S

SCALE 1 : 50 000

0 0.5 1 2 3 4 5 Kilometers

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LEGEND

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Cacao

1 Land limitation

118 Land use

CONVENTIONAL SIGNS

ROADS

Expressway

Trunk line

Primary

Secondary

Tertiary

BOUNDARY

Region

Province

District

Municipality

Barangay

HYDROLOGY

Sea / Shoreline

Lakes / Rivers

PLACES

Capital City / City

Capital Town / Town

LAND USE

Built-up

Fishpond

Mangrove

ADJOINING SHEETS

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3817-II 3917-III

3816-IV

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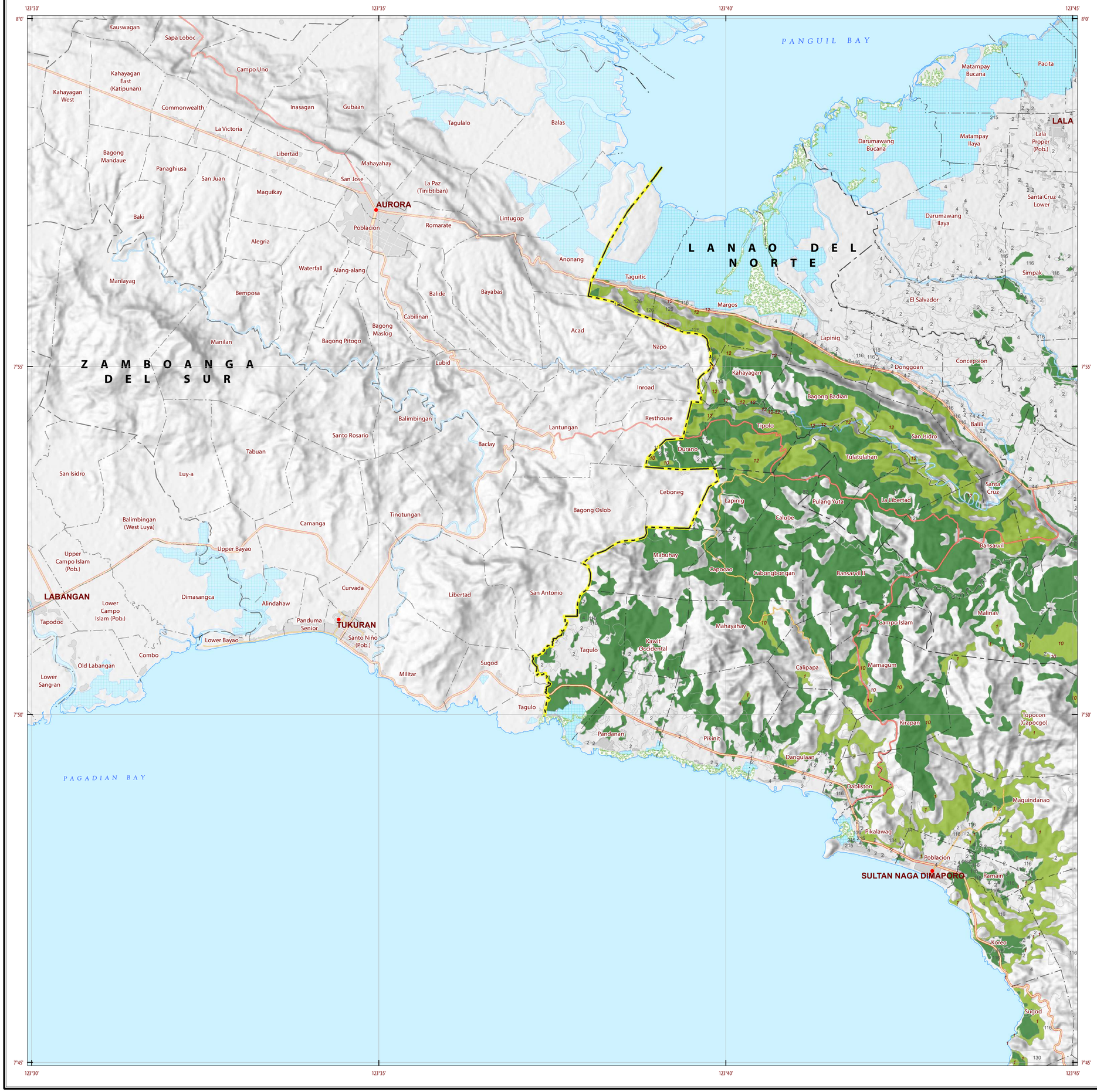

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LAND RESOURCES EVALUATION AND SUITABILITY ASSESSMENT OF STRATEGIC PRODUCTION AREAS

N
W E
S

SCALE 1 : 50 000

0 0.5 1 2 3 4 5
Kilometers

0 0.5 1 2 3
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Universal Transverse Mercator Zone 51 N. PRS 1992 Datum
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- Cacao
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- Land use

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ROADS

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- Primary
- Secondary
- Tertiary

BOUNDARY

- Region
- Province
- District
- Municipality
- Barangay

HYDROLOGY

- Sea / Shoreline
- Lakes / Rivers

PLACES

- Capital City / City
- Capital Town / Town

LAND USE

- Built-up
- Fishpond
- Mangrove

ADJOINING SHEETS

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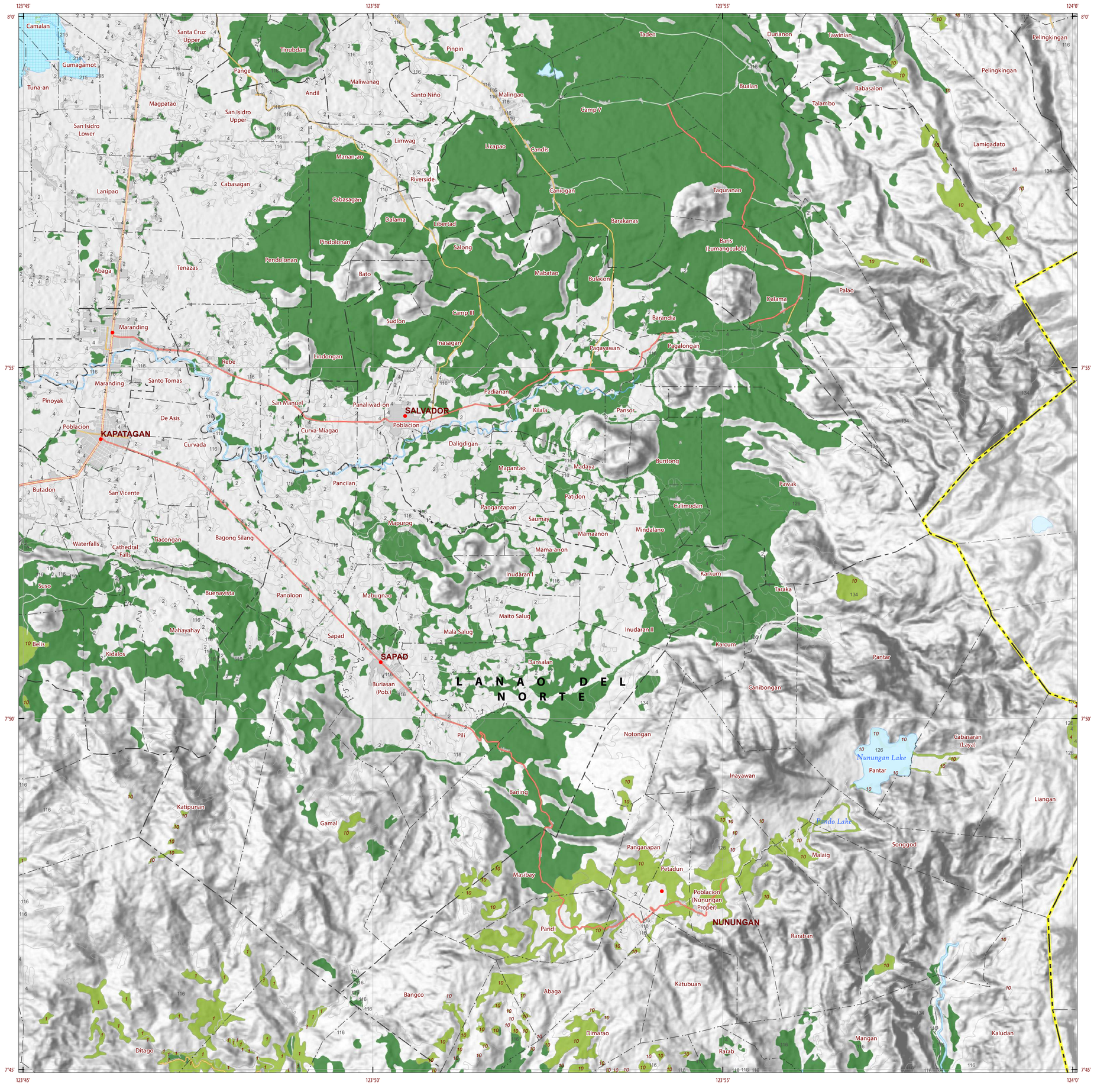

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LAND RESOURCES EVALUATION AND SUITABILITY ASSESSMENT OF STRATEGIC PRODUCTION AREAS

N W E S

SCALE 1 : 50 000

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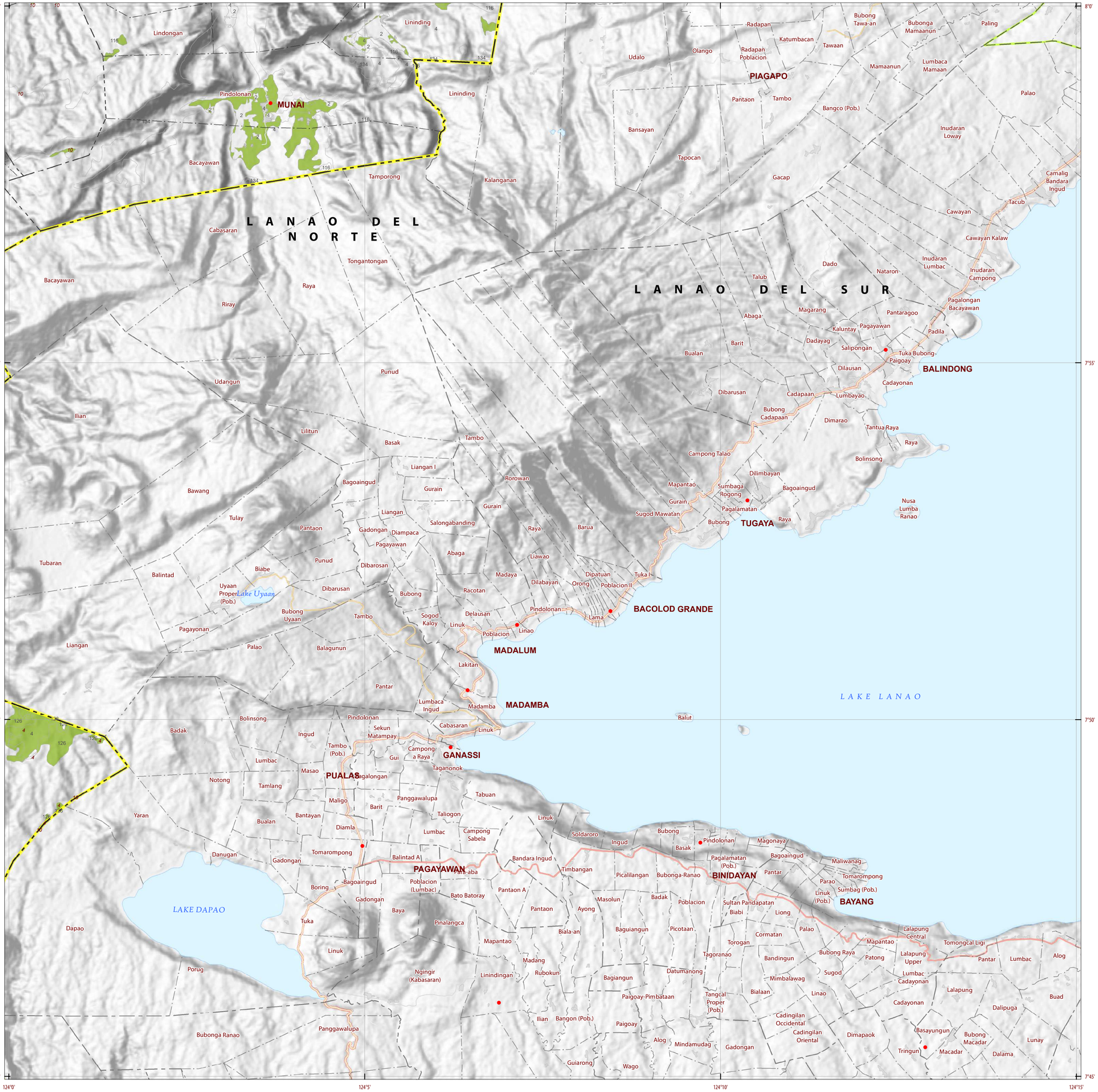

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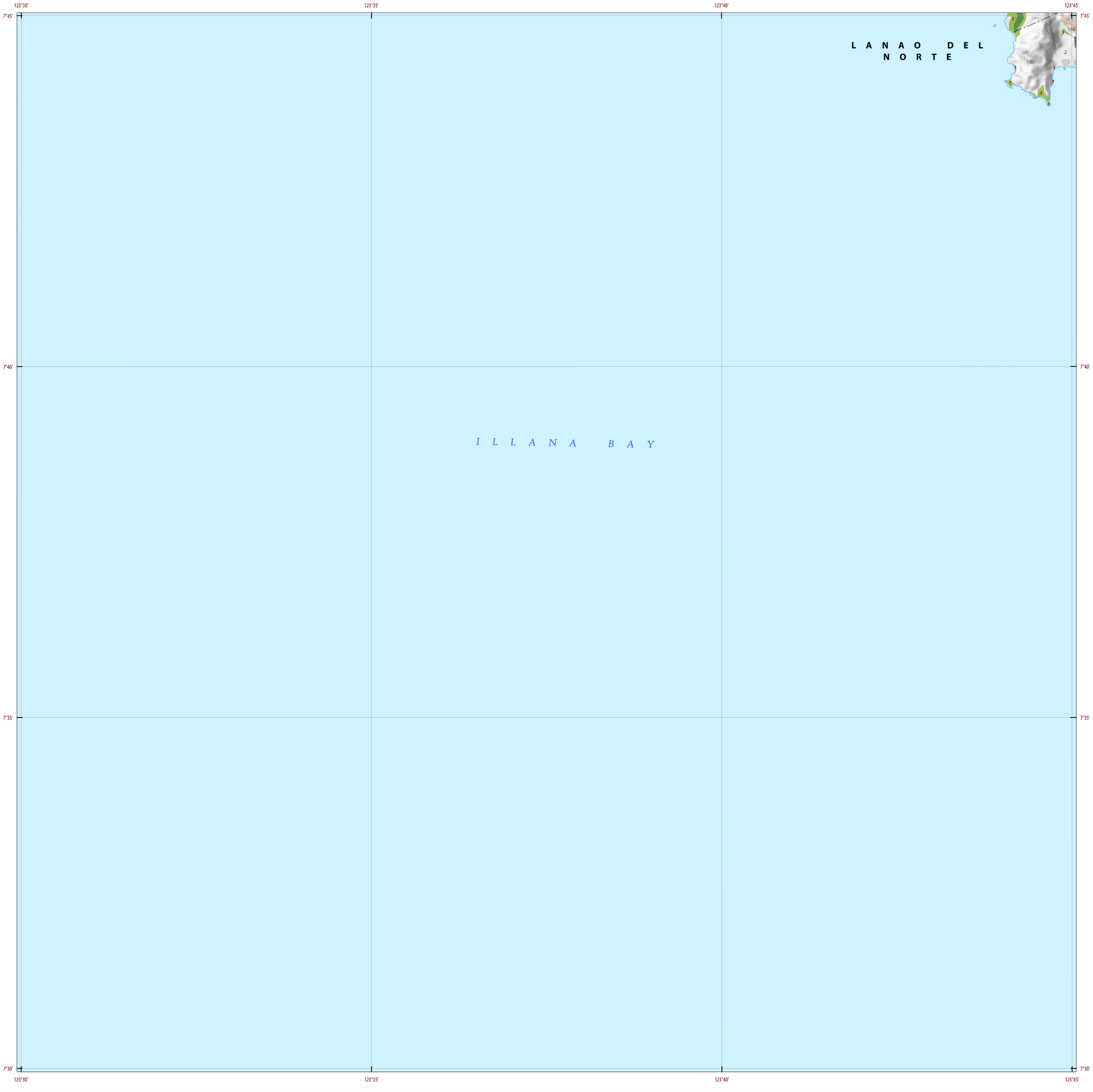

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LAND RESOURCES EVALUATION AND SUITABILITY ASSESSMENT OF STRATEGIC PRODUCTION AREAS

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MISCELLANEOUS INFORMATION

SOURCES OF INFORMATION : Topographic information taken from NAMRIA Topographic Map at 1:50,000 scale. Land resources information from the Agricultural Land Management and Evaluation Division (ALMED), Soils Survey Division (SSD) and Laboratory Services Division (LSD) of BSWM. Rice areas obtained from the Land Use System (FAO, 2015) and Philippine Rice Information System (PRISM) (IRRI, 2015). Data analysis and compilation through the **Land Resources Evaluation and Suitability Assessment of Strategic Production Areas for Major Commodities Project** implemented by BSWM (2017).

Project Leader : BERNARDO B. PASCUA
GIS and Cartography : IRVIN K. SAMALCA

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: Local Government Unit (LGU) of covered provinces and municipalities

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LAND SUITABILITY MAP ROBUSTA, LIBERICA AND EXCELSA COFFEE

LAND RESOURCES EVALUATION AND SUITABILITY ASSESSMENT OF STRATEGIC PRODUCTION AREAS

N W E S

SCALE 1 : 50 000

0 0.5 1 2 3 4 5 Kilometers

0 0.5 1 2 3 Miles

Universal Transverse Mercator Zone 51 N. PRS 1992 Datum

DISCLAIMER : All political boundaries are not authoritative.

LEGEND

SUITABILITY CLASSES

S1 **Highly Suitable** - Land having no significant limitations to sustained application of a given use, or only minor limitations that will not significantly reduce productivity or benefits and will not raise inputs above an acceptable level.

S2 **Moderately Suitable** - Land having limitations which in aggregate are moderately severe for sustained application of a given use; the limitations will reduce productivity or benefits and increase required inputs to the extent that the overall advantage to be gained from the use, although still attractive, will be appreciably inferior to that expected on class S1 land.

S3 **Marginally Suitable** - Land having limitations which in aggregate are severe for sustained application of a given use and will so reduce productivity or benefits, or increase required inputs, that this expenditure will be only marginally justified.

Not Suitable/ Not Relevant

OTHER SIGNS

NGP Areas

Cacao

1 Land limitation

118 Land use

CONVENTIONAL SIGNS

ROADS

Expressway

Trunk line

Primary

Secondary

Tertiary

BOUNDARY

Region

Province

District

Municipality

Barangay

HYDROLOGY

Sea / Shoreline

Lakes / Rivers

PLACES

Capital City / City

Capital Town / Town

LAND USE

Built-up

Fishpond

Mangrove

ADJOINING SHEETS

3716-II

3716-IV 3716-I 3816-IV

3716-III 3716-II 3816-III

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S

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0 0.5 1 2 3 4 5
Kilometers

0 0.5 1 2 3
Miles

Universal Transverse Mercator Zone 51 N. PRS 1992 Datum
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3816-III

3716-I
3816-IV
3716-II
3816-III

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