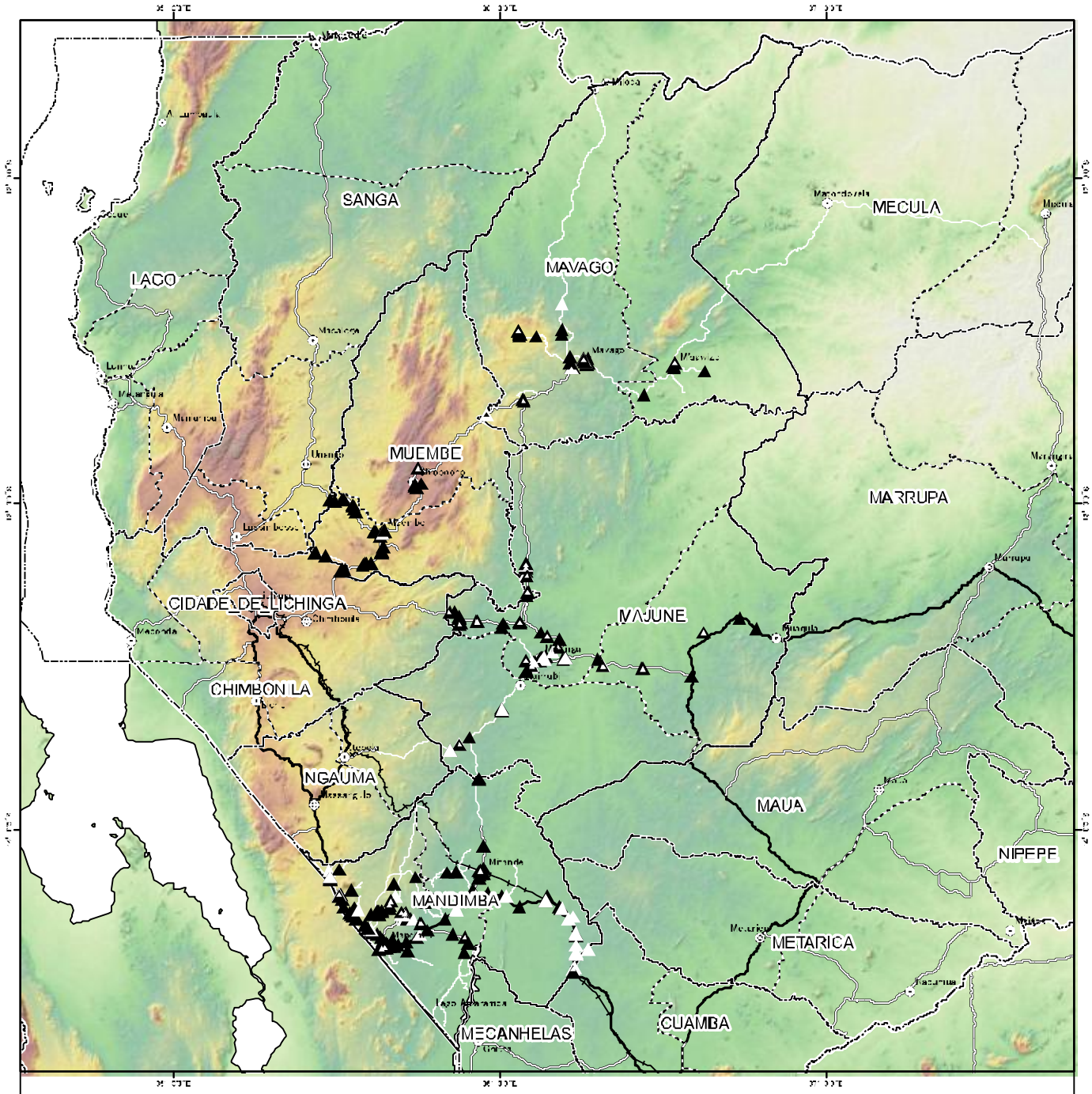
ANEXO 7: Resultados Relacionados com o SIG (GIS)



Mapa de Furo e Poço

Legenda

Fontes
SINAS 2016 Jun
- Furo Mecanico (273)
- Poço (59)
- Não identificado (1)

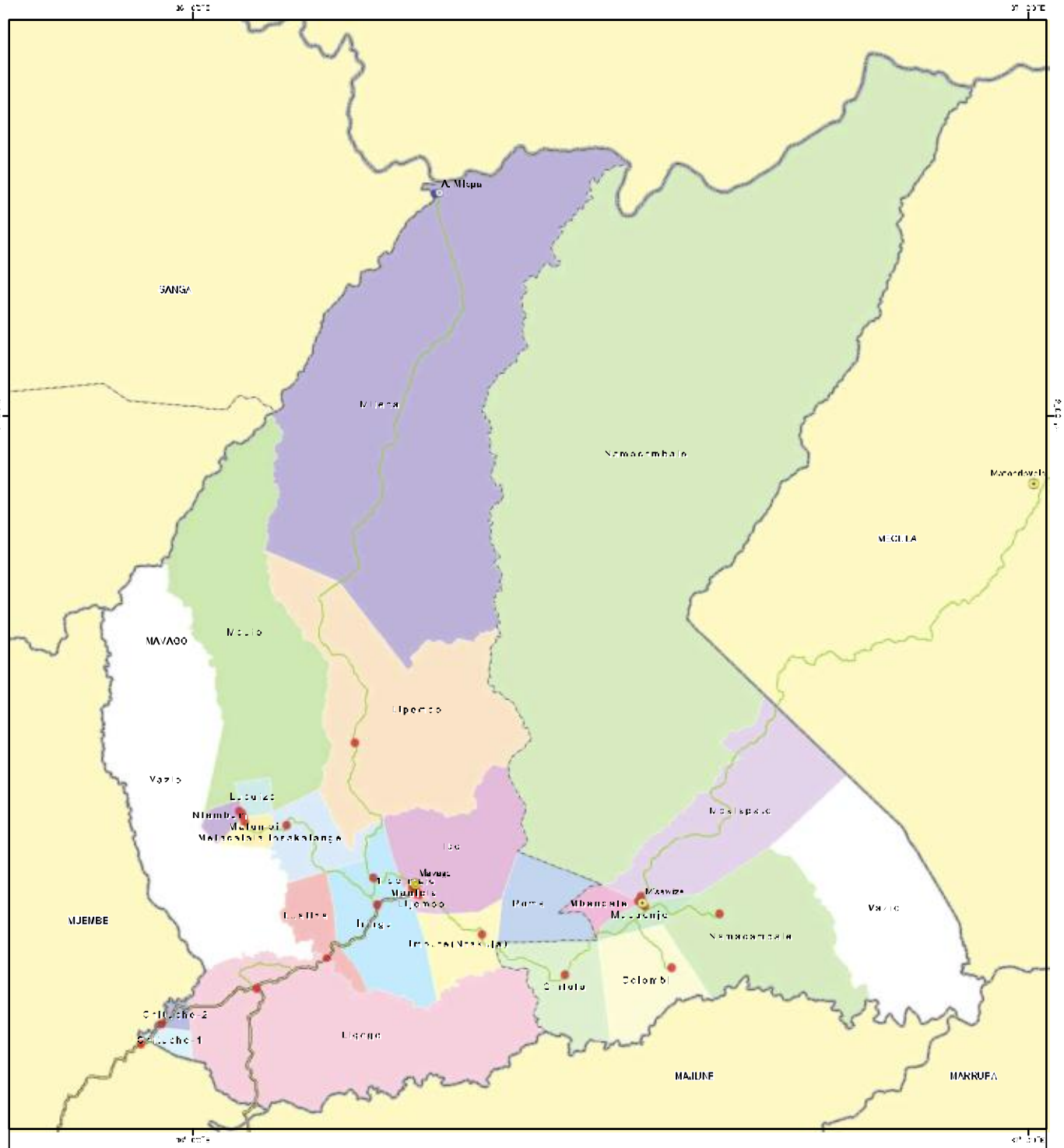
Fontes
Estado
- Inoperacional (83)
- Obsoleto (2)

- Provincial Capital
- District Capital
- PA Capital
- Others
- Provincia
- Distrito
- PA
- Lagos
- Estrada principal
- Estrada secundária
- Outras
- Linha férrea

PROSUAS, 2016

1:1,300,000

0 20 40 80 120 160 km



Mapa da Comunidade de Mavago

Legenda

Comunidade
- Estudo de Base fase I
- Estudo de Base fase I, II

- Provincial Capital
- District Capital
- PA Capital
- Others

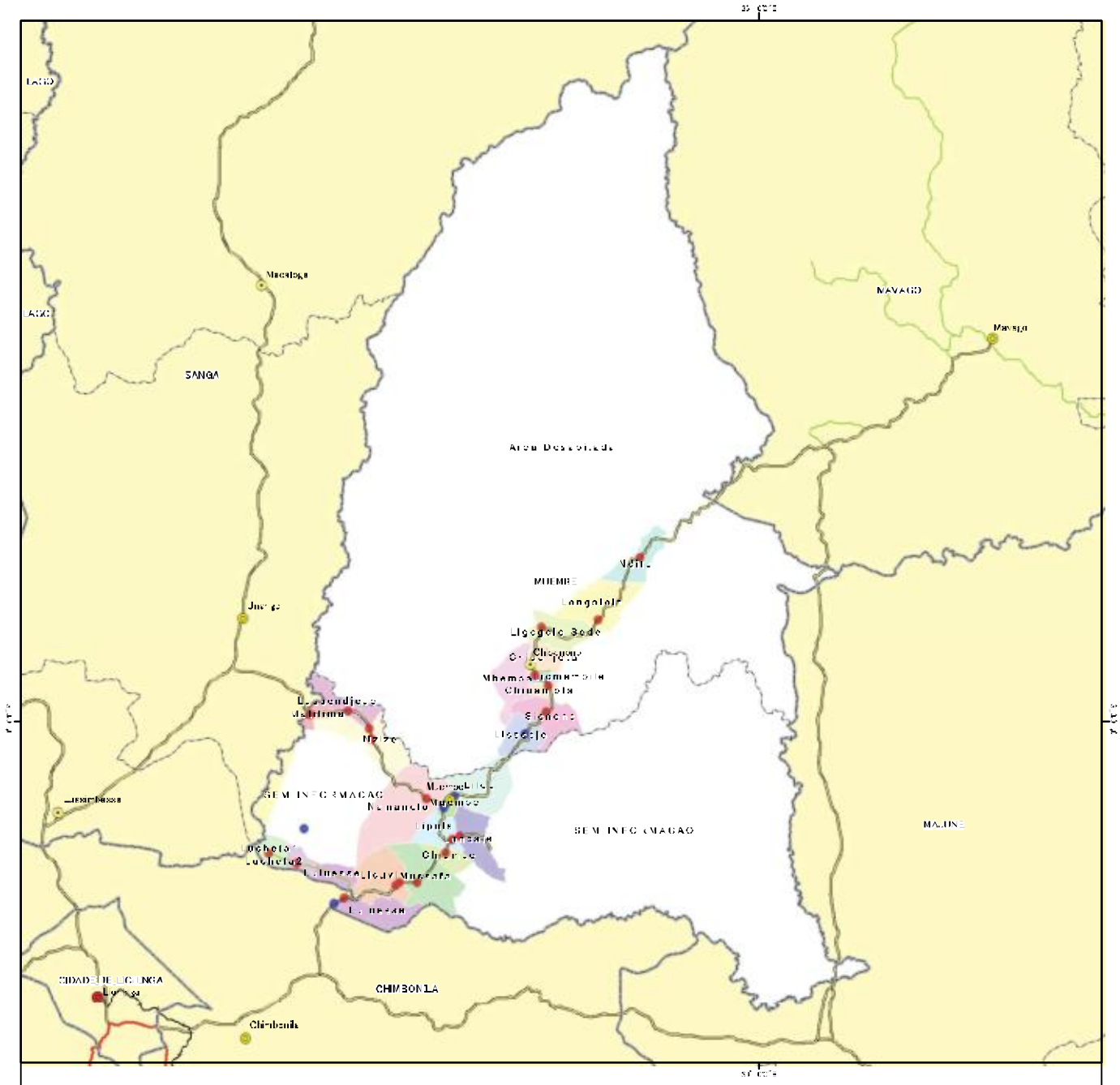
- Provincia
- Distrito
- PA

- Estrada principal
- Estrada secundaria
- Others
- Linha férrea

1:500,000

0 5 10 20 30 40 km

PROSUAS, 2013



Mapa da Comunidade de Muembe

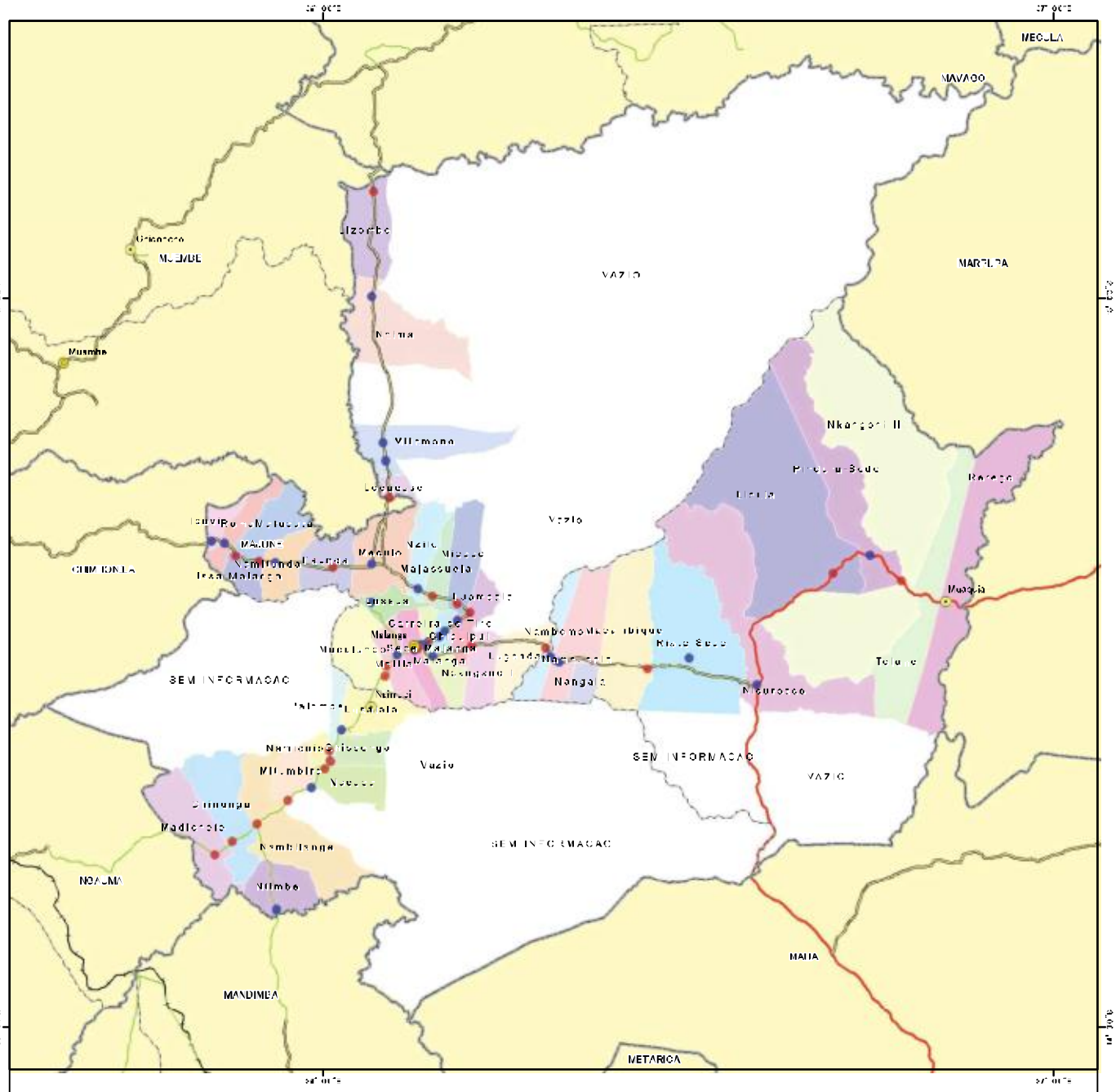
Legenda

Comunidade					
Estudo de Base fase I	Provincial Capital	Provincia	Estrada principal		
Estudo de Base fase I, II	District Capital	Distrito	Estrada secundaria		
	PA Capital	PA	Outras		
	Others		Linha férrea		

1:500,000

0 5 10 20 30 40 km

PROSUAS, 2013



Mapa da Comunidade de Majune

Legenda

Comunidade
- Estudo de Base fase I (31)
- Estudo de Base fase I, II (25)

- Provincial Capital
- District Capital
- PA Capital
- Others

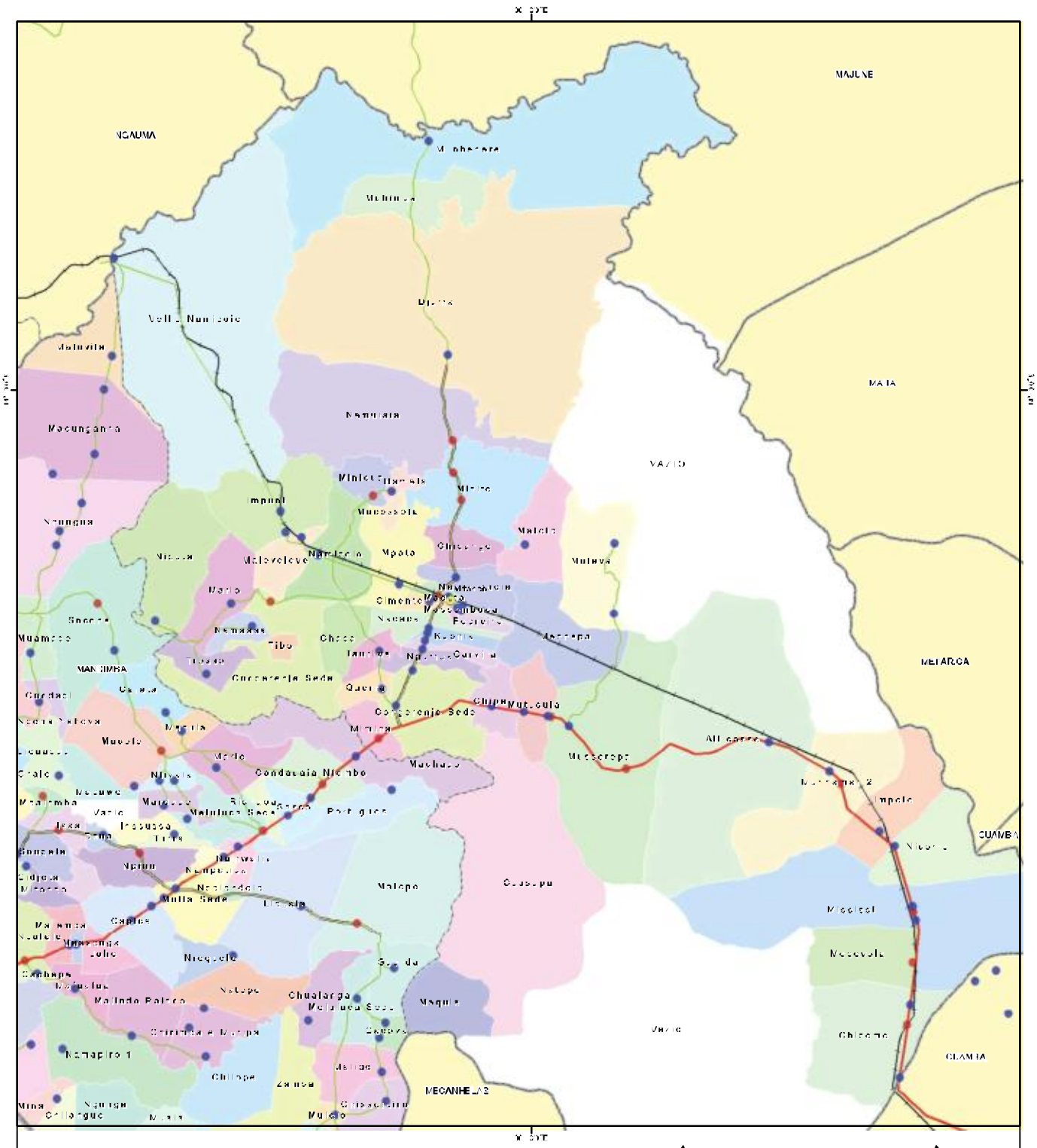
- Provincia
- Distrito
- PA

- Estrada principal
- Estrada secundária
- Outras
- Linha férrea

1:600,000

0 10 20 40 60 80 KM

PROSUAS, 2013



Mapa da Comunidade de Mandimba (PA de Mitande)

Legenda

Comunidade
- Estudo de Base fase I
- Estudo de Base fase I, II

Provincial Capital
District Capital
PA Capital
Others

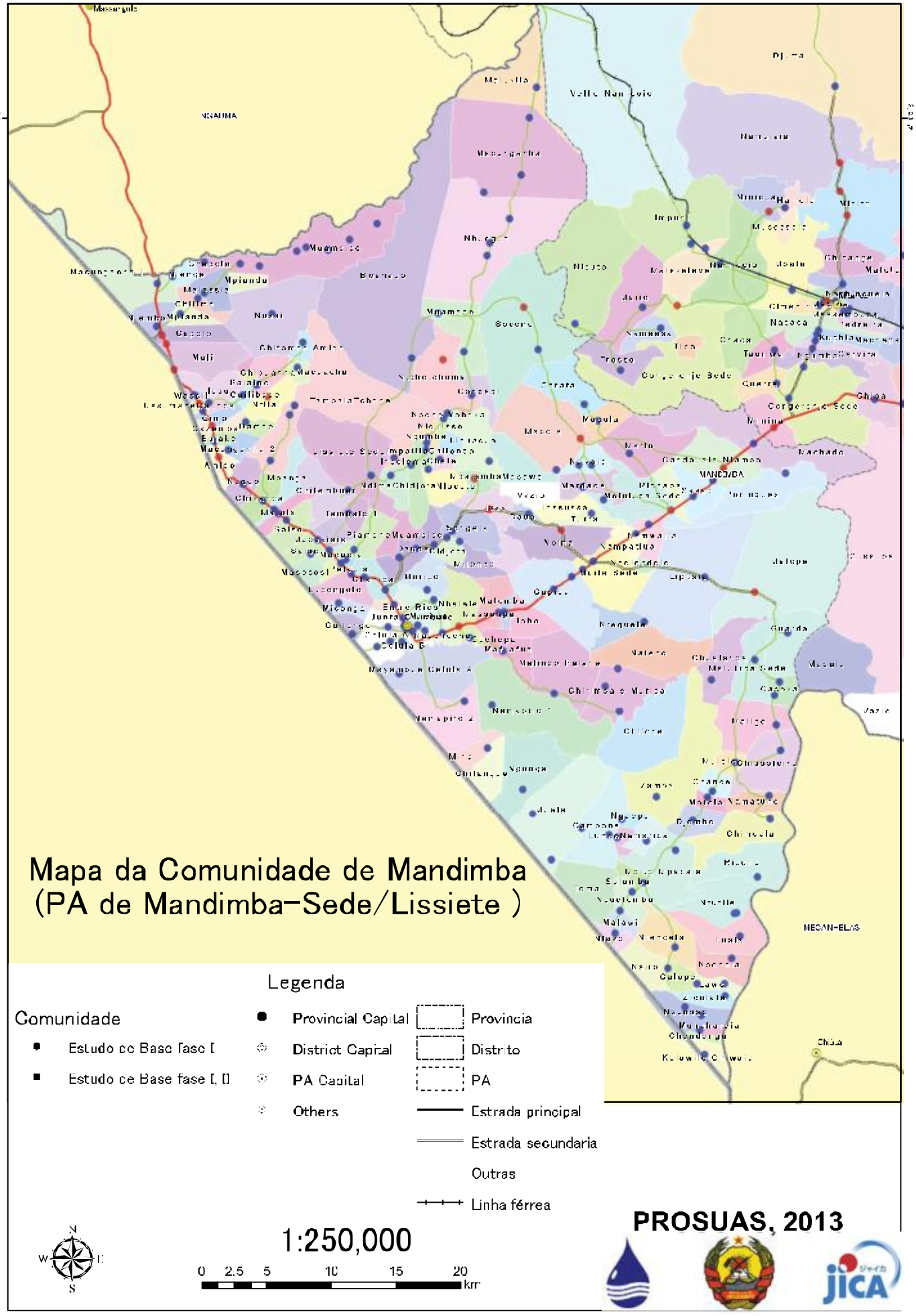
Provincia
Distrito
PA

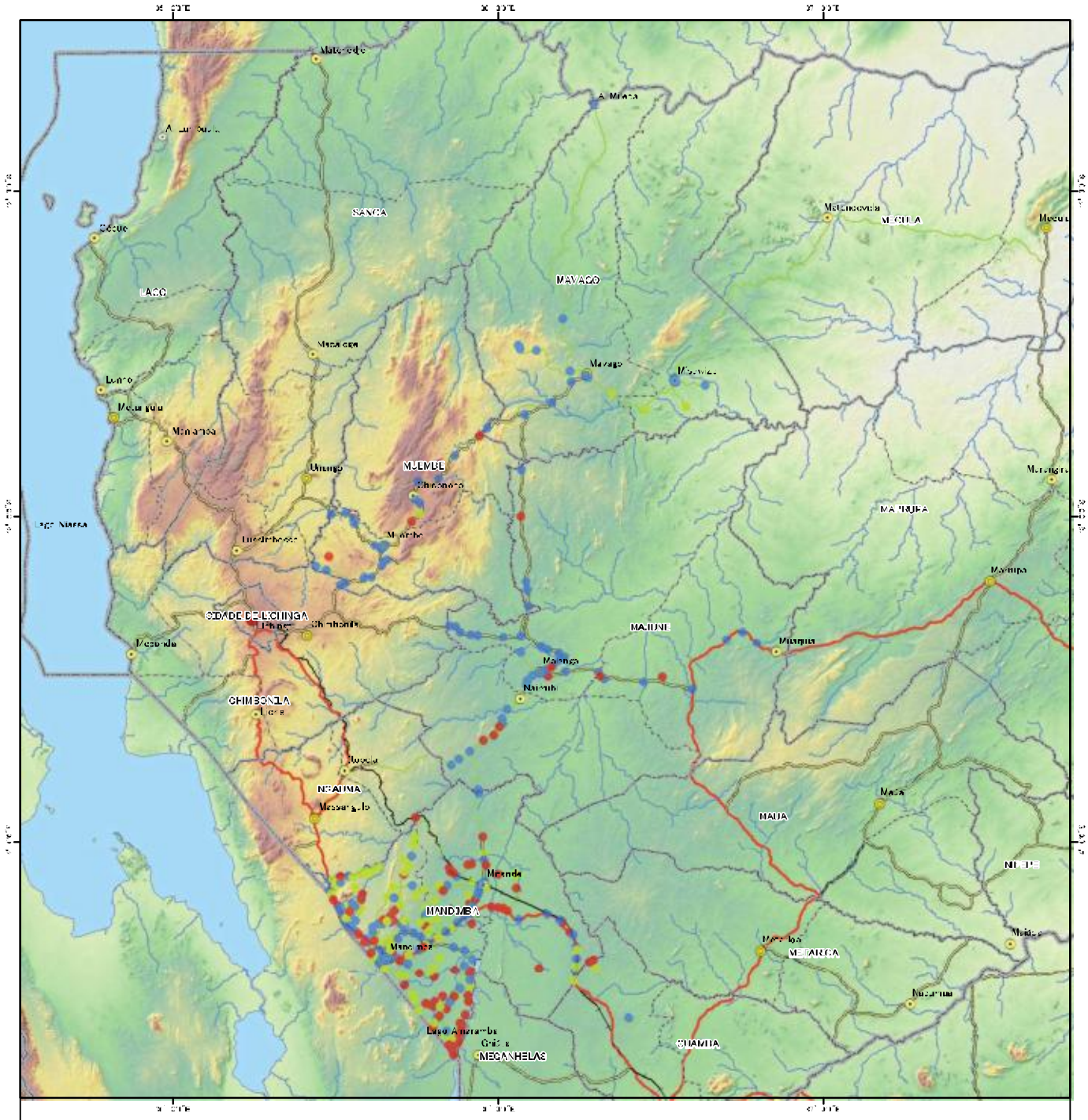
Estrada principal
Estrada secundaria
Outras
Linha férrea

1:250,000

0 2.5 5 10 15 20 km

PROSUAS, 2013


Mapa da Comunidade de Mandimba
(PA de Mandimba-Sede/Lissiete)
Legenda
Comunidade
Estudo de Base fase I
Estudo de Base fase I, II
Provincial Capital
District Capital
PA Capital
Others
Provincia
Distrito
PA
Estrada principal
Estrada secundaria
Outras
Linha férrea
1:250,000
0 2.5 5 10 15 20
km
PROSUAS, 2013
NIASSA
MECANHELAS
MANDIMBA



Mapa de Comunidades PROSUAS_Área de Estudo

* Based on PROSUAS baseline survey, 2013

Legenda

Comunicade
- com Furo, Poço (187)
- com Poço (unprotected) (84)
- sem Furo, Poço (86)

- Capital Provincial
- Capital Districtal
- Capital do PA
- Outras

- Provincia
- Distrito
- PA
- Lagos
- Rio

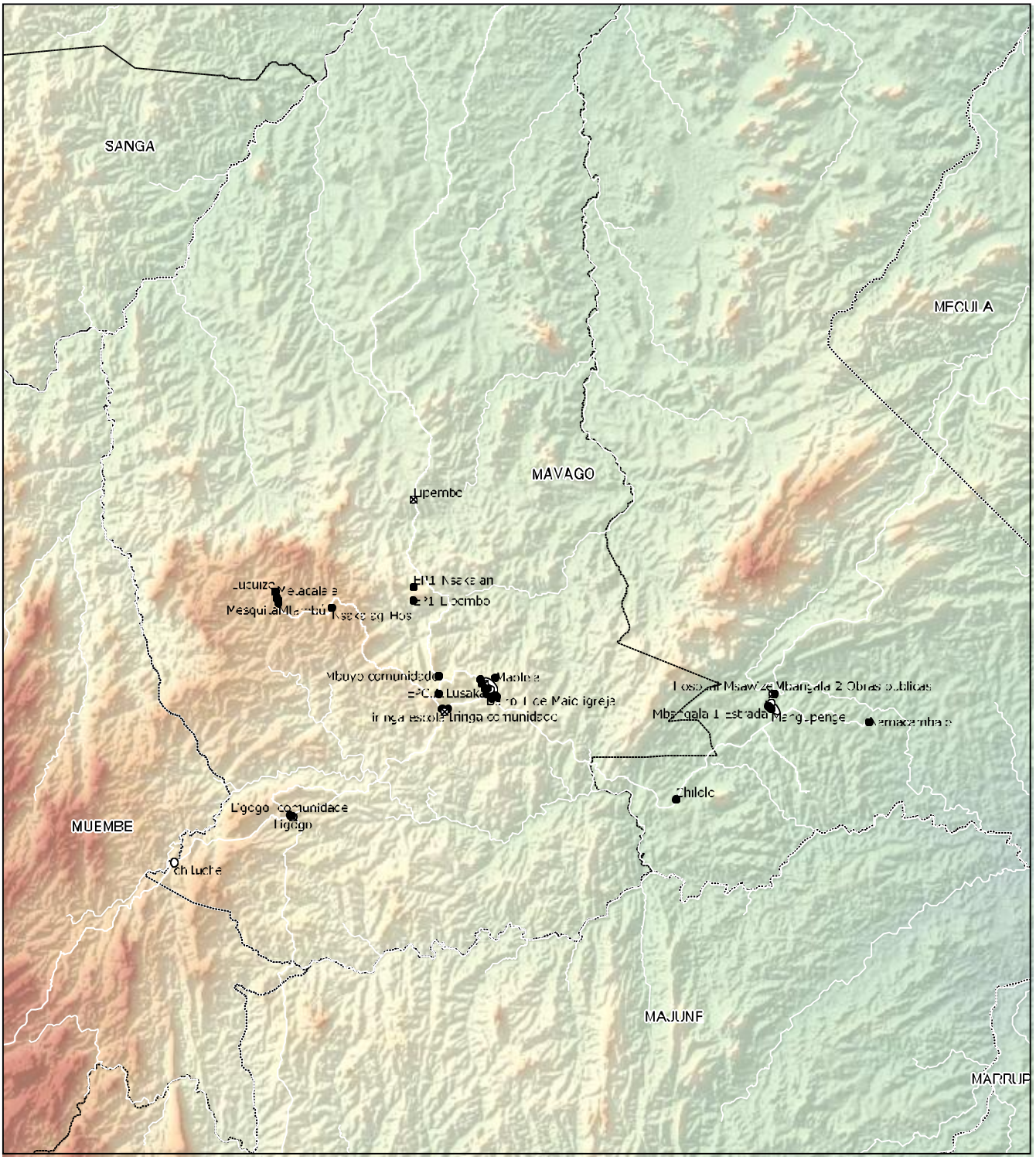
Estradas
- Estrada principal
- Estrada secundaria
- Outras
- Linha ferrea

Elevação (m)
- High : 2500
- Low : 0

1:1,300,000

0 15 30 60 90 120 km

PROSUAS, 2013



Mapa da fontes de Mavago

Baseado nos Dados de SINAS
2016

10 0 10 20 30 40 km

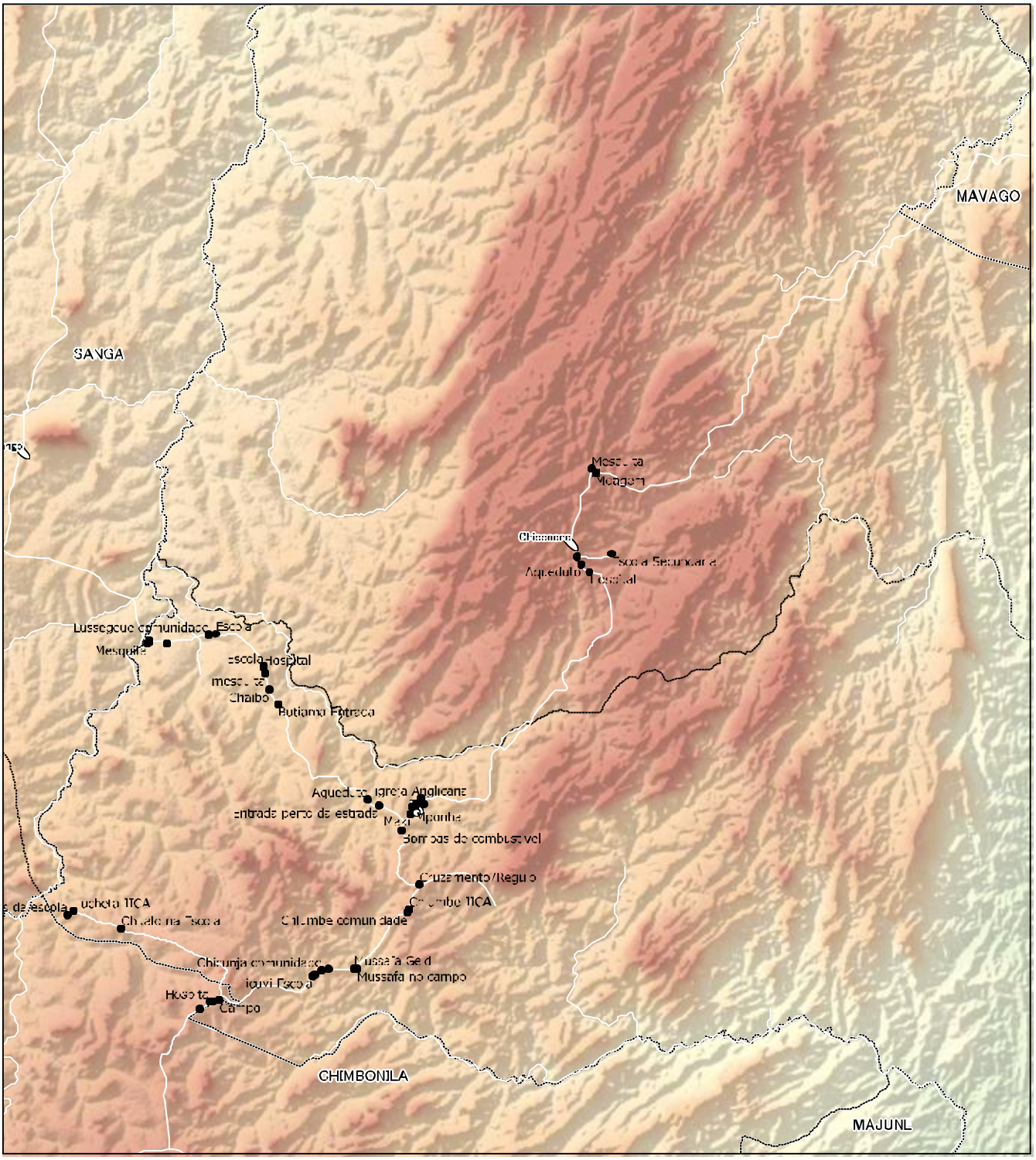
PROSUAS

Elaborado: Zeca Carlos

Legenda

Fontes
- Furo Mecanico
- Poço
- Sem informação

Fontes
- Inoperacional
- Cacimbas
- Estradas
- Provincia
- Distrito
- PA
- River
- Lakes



Mapa da fontes de Muembe

Baseado nos Dados de SINAS
2016

N

5 0 5 10 15 20 km

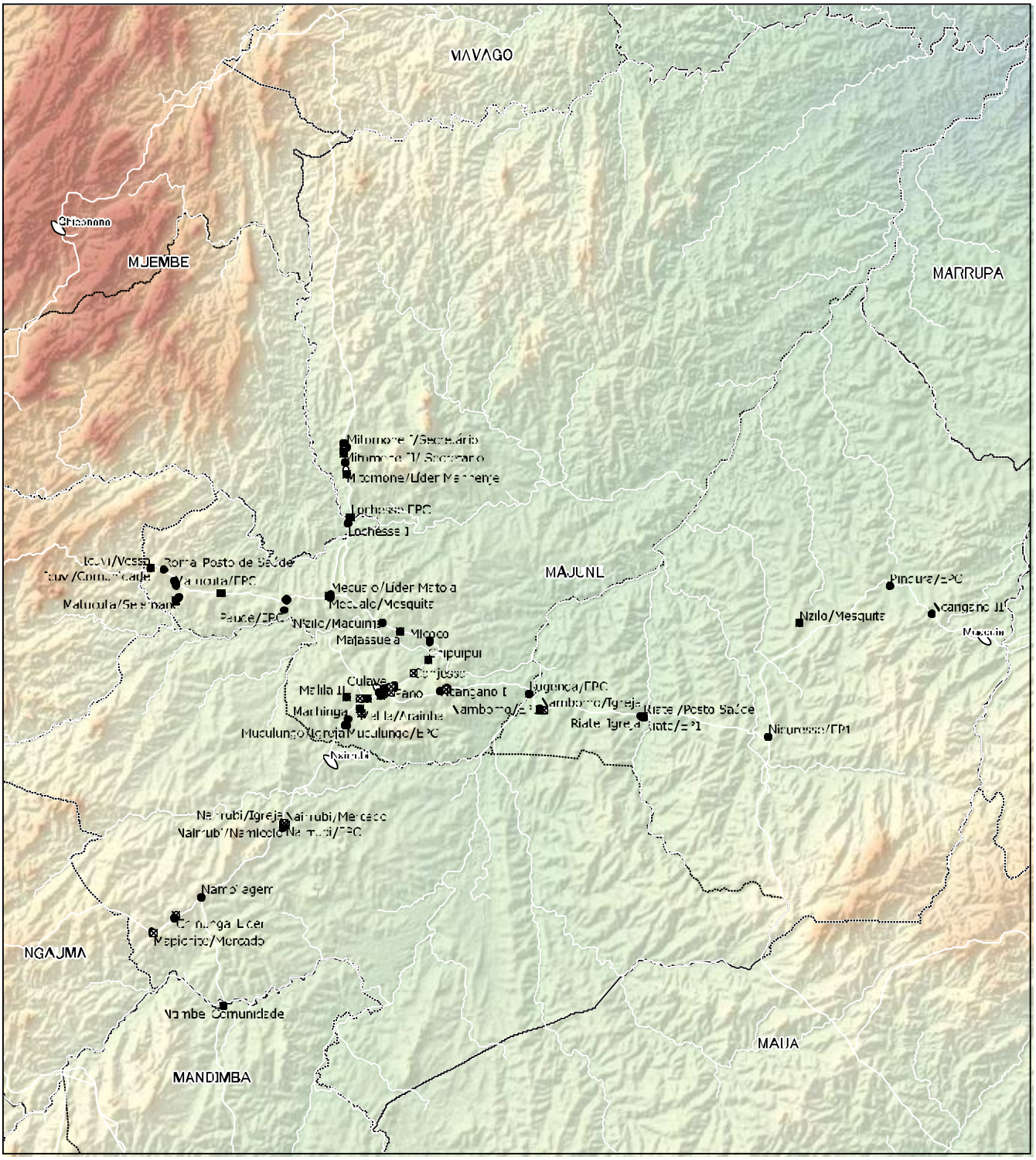
PROSUAS

Legenda

Fontes
- Furo Mecanico
- Poço
- Sem informação

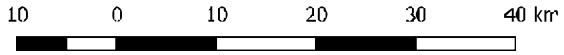
Fontes
- Inoperacional
- Ocasos
- Estradas
- Provincia
- Distrito
- PA
- River
- Lakes

Elaborado: Zeca Carlos



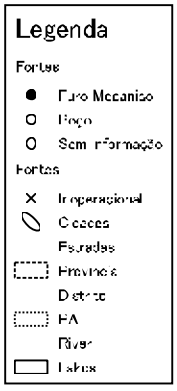
Mapa da fontes de Majune

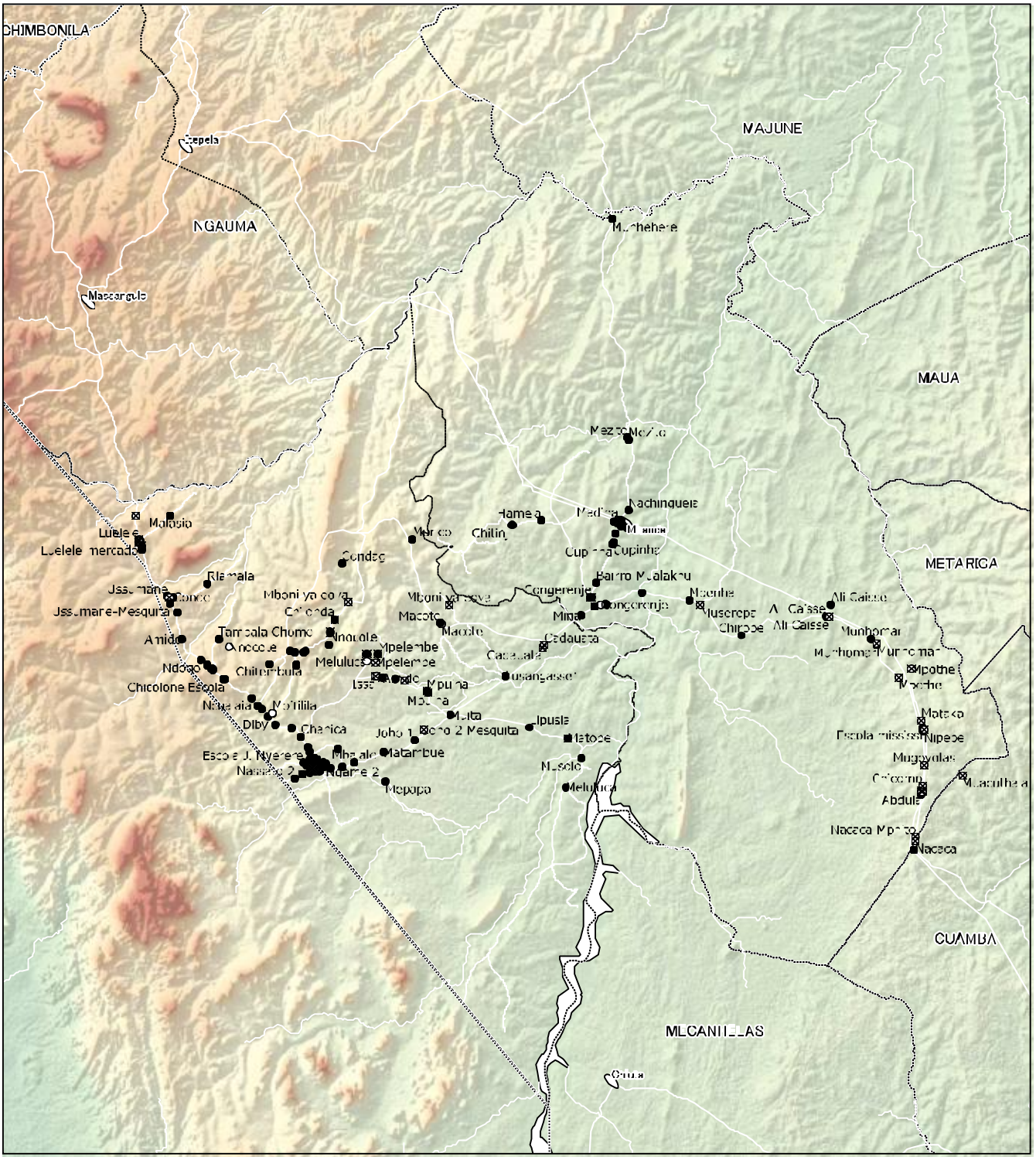
Baseado nos Dados de SINAS
2016



PROSUAS

Elaborado: Zeca Carlos





Mapa da fontes de Mandimba

Baseado nos Dados de SINAS
2016

10 0 10 20 30 40 km

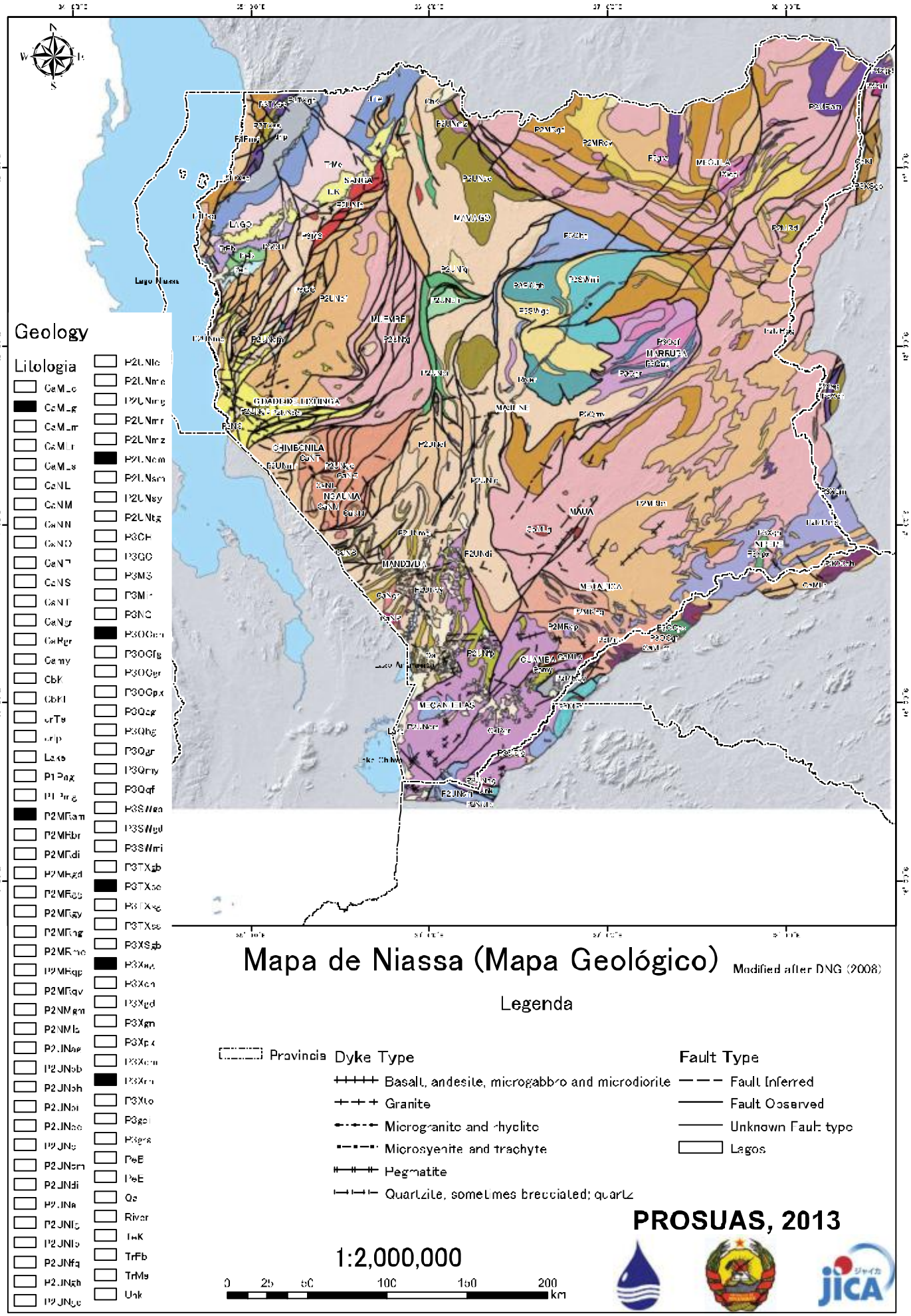
PROSUAS

Elaborado: Zeca Carlos

Legenda

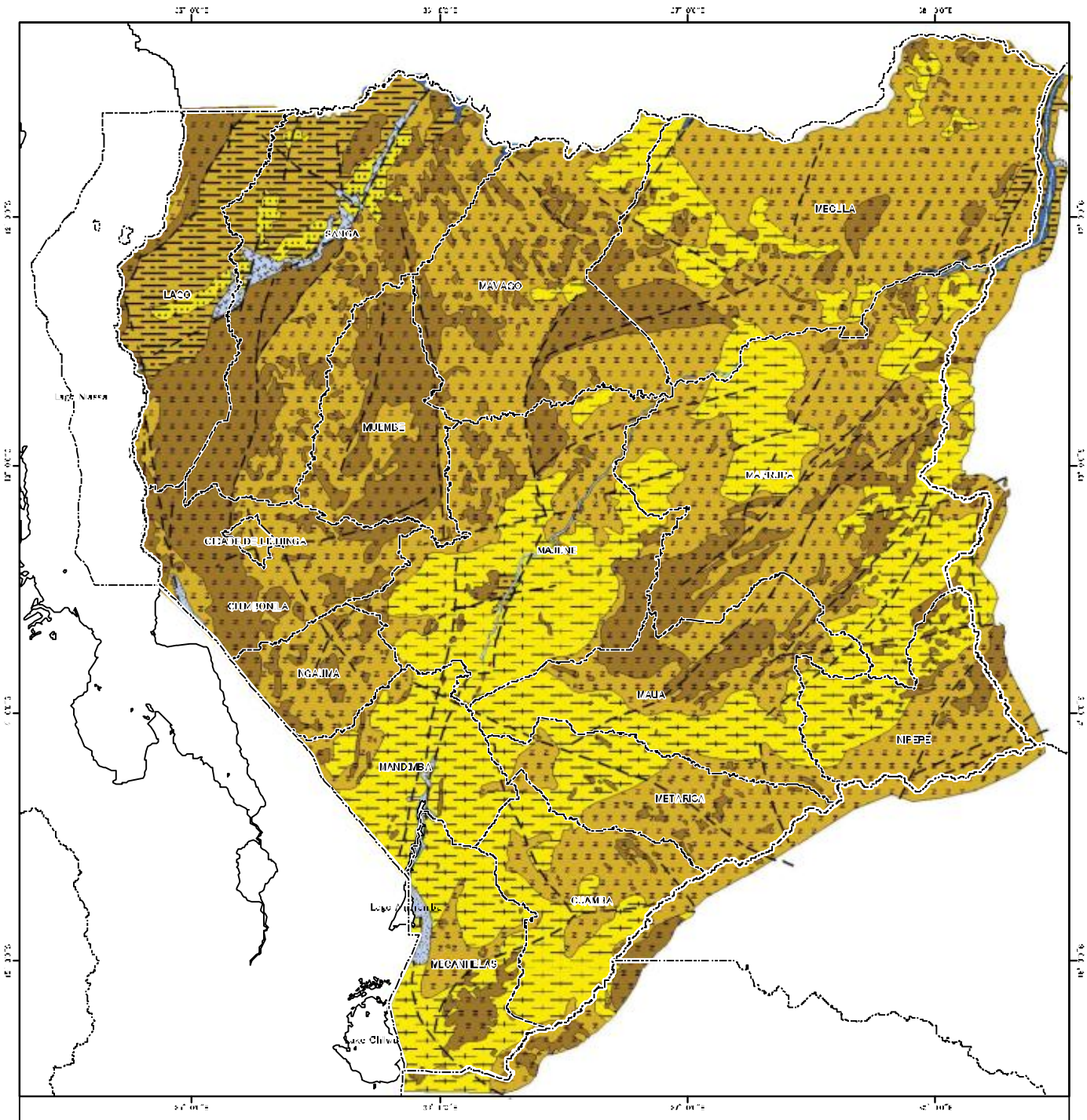
Fontes
- Furo Mecanico
- Poço
- Sem informação

Fontes
- Inoperacional
- Cacimbas
- Estradas
- Provincia
- Distrito
- PA
- River
- Lakes


Geology
Litologia
Mapa de Niassa (Mapa Geológico)
Modified after DNG (2008)
Legenda
Provincia
Dyke Type
Basalt, andesite, microgabbro and microdiorite
Granite
Microgranite and rhyolite
Microsyenite and trachyte
Pegmatite
Quartzite, sometimes brecciated; quartz
Fault Type
Fault Inferred
Fault Observed
Unknown Fault type
Lagos
1:2,000,000
0 25 50 100 150 200 km
PROSUAS, 2013

MAP CODE	DESCRIPTION	COMPLEX	SUPERGROUP	NAME	ROCK TYPE	EON	ERA	PERIOD
CaMzc	Charnockite			Serra Mossalua Charnockite	Intrusive Rocks	Phanerozoic		Cambrian
CaMzg	Granite				Intrusive Rocks	Phanerozoic		Cambrian
CaMzm	Monzogranite			Serra Namaenha Monzogranite	Intrusive Rocks	Phanerozoic		Cambrian
CaMzr	Monzogranite			Serra Ribaue Monzogranite	Intrusive Rocks	Phanerozoic		Cambrian
CaMzs	Syenite				Intrusive Rocks	Phanerozoic		Cambrian
Camy	Mylonite				Intrusive Rocks	Phanerozoic		Cambrian
CaNgr	Gneissic granite				Intrusive Rocks	Phanerozoic		Cambrian
CaNL	Syenite			Monte Livigio Syenite	Intrusive Rocks	Phanerozoic		Cambrian
CaNM	Granite			Monte Massangulo Granite	Intrusive Rocks	Phanerozoic		Cambrian
CaNN	Syenite			Monte Nhoucuto Syenite	Intrusive Rocks	Phanerozoic		Cambrian
CaNO	Granite			Monte Muslale Granite	Intrusive Rocks	Phanerozoic		Cambrian
CaNP	Granite			Serra Lipano Granite	Intrusive Rocks	Phanerozoic		Cambrian
CaNS	Granite			Monte Lissiess Granite and Syenite	Intrusive Rocks	Phanerozoic		Cambrian
CaNT	Syenite and quartz syenite			Monte Metonia Syenite	Intrusive Rocks	Phanerozoic		Cambrian
CaPgr	Equigranular medium-grained leucocratic granite			Granite	Intrusive Rocks	Phanerozoic		Cambrian
CtrK	Sedimentary and volcanic rock		Karoo Supergroup		Sedimentary and Volcanic Rocks	Phanerozoic		Carboniferous
CtrK	Sedimentary rock		Karoo Supergroup		Sedimentary and Volcanic Rocks	Phanerozoic		Carboniferous
Jrp	Siltstone, sandstone, mudstone		Karoo Supergroup		Sedimentary and Volcanic Rocks	Phanerozoic		Jurassic
JrLs	Siltstone, sandstone		Karoo Supergroup		Sedimentary and Volcanic Rocks	Phanerozoic		Jurassic
P1Pam	Augen gneiss	Ponta Messuli Complex			Sedimentary and Volcanic Rocks	Proterozoic	Palaeoproterozoic	
P1Pmg	Migmatitic gneiss	Ponta Messuli Complex			Sedimentary and Volcanic Rocks	Proterozoic	Palaeoproterozoic	
P2MRam	Amphibolitic gneiss	Marrupa Complex			Intrusive Rocks	Proterozoic	Mesoproterozoic	
P2MRbn	Banded biotite-hornblende gneiss with some leucogneiss	Marrupa Complex		Banded biotite-hornblende gneiss	Sedimentary and Volcanic Rocks	Proterozoic	Mesoproterozoic	
P2MRdi	Dioritic gneiss	Marrupa Complex			Intrusive Rocks	Proterozoic	Mesoproterozoic	
P2MRgd	Granitic to granodioritic gneiss	Marrupa Complex		Granodioritic gneiss	Intrusive Rocks	Proterozoic	Mesoproterozoic	
P2MRgg	Granitic gneiss	Marrupa Complex			Intrusive Rocks	Proterozoic	Mesoproterozoic	
P2MRgn	Migmatitic grey gneiss	Marrupa Complex			Intrusive Rocks	Proterozoic	Mesoproterozoic	
P2MRmg	Migmatitic quartzofeldspathic and hornblende gneiss	Marrupa Complex			Intrusive Rocks	Proterozoic	Mesoproterozoic	
P2MRmc	Migmatitic leucogneiss	Marrupa Complex			Sedimentary and Volcanic Rocks	Proterozoic	Mesoproterozoic	
P2MRqp	Quartz-rich gneiss	Marrupa Complex			Sedimentary and Volcanic Rocks	Proterozoic	Mesoproterozoic	
P2MRqz	Paragneiss (quartz-feldspar leucogneiss with amphibolite bands)	Marrupa Complex		Quartz-feldspar gneiss	Sedimentary and Volcanic Rocks	Proterozoic	Mesoproterozoic	
P2NMam	Banded biotite gneiss and migmatite	Nampula Complex			Sedimentary and Volcanic Rocks	Proterozoic	Mesoproterozoic	
P2NMlc	Medium-grained leucocratic gneiss, migmatitic	Nampula Complex		Leucocratic gneiss	Sedimentary and Volcanic Rocks	Proterozoic	Mesoproterozoic	
P2UNag	Augen gneiss, granitic	Unango Complex		Augen Gneiss	Intrusive Rocks	Proterozoic	Mesoproterozoic	
P2UNbb	Biotite and biotite-hornblende gneiss	Unango Complex		Meponda Gneiss	Intrusive Rocks	Proterozoic	Mesoproterozoic	
P2UNbh	Hornblende gneiss	Unango Complex			Sedimentary and Volcanic Rocks	Proterozoic	Mesoproterozoic	
P2UNb	Biotite gneiss, mylonitic	Unango Complex		Biotite gneiss	Sedimentary and Volcanic Rocks	Proterozoic	Mesoproterozoic	
P2UNce	Charnockitic to enderbitic granofels, partly gneissic	Unango Complex			Intrusive Rocks	Proterozoic	Mesoproterozoic	
P2UNcf	Charnockitic gneiss, feldspar-porphyric	Unango Complex		Feldspar-porphyric charnockitic gneiss	Intrusive Rocks	Proterozoic	Mesoproterozoic	
P2UNcm	Charnockitic gneiss, partially migmatitic	Unango Complex		Migmatitic charnockitic	Intrusive Rocks	Proterozoic	Mesoproterozoic	
P2UNd	Granitic to granodioritic gneiss, monzonitic	Unango Complex		Granitic to granodioritic gneiss	Intrusive Rocks	Proterozoic	Mesoproterozoic	
P2UNer	Enderbitic to charnockitic granofels, partially migmatitic	Unango Complex		Lichinga Gneiss	Intrusive Rocks	Proterozoic	Mesoproterozoic	
P2UNfg	Granite, locally feldsparphyric	Unango Complex		Granite	Intrusive Rocks	Proterozoic	Mesoproterozoic	
P2UNfp	Charnockitic granofels and gneiss, partially porphyritic	Unango Complex		Monte Lhanco Granofels	Intrusive Rocks	Proterozoic	Mesoproterozoic	
P2UNfq	Quartz-feldspar gneiss and quartzite, locally magnetite-bearing	Unango Complex		Quartz-feldspar gneiss	Sedimentary and Volcanic Rocks	Proterozoic	Mesoproterozoic	
P2UNgb	Metagabbro, mafic gneiss	Unango Complex			Intrusive Rocks	Proterozoic	Mesoproterozoic	
P2UNgo	Granitic to granodioritic migmatitic gneiss	Unango Complex			Intrusive Rocks	Proterozoic	Mesoproterozoic	
P2UNlc	Leucogranite	Unango Complex			Intrusive Rocks	Proterozoic	Mesoproterozoic	
P2UNmc	Stromatic mafic gneiss of charnockitic gneiss	Unango Complex		Mafic to charnockitic gneiss	Intrusive Rocks	Proterozoic	Mesoproterozoic	
P2UNmg	Migmatitic stromatic gneiss	Unango Complex			Sedimentary and Volcanic Rocks	Proterozoic	Mesoproterozoic	
P2UNmi	Banded mafic granulitic gneiss	Unango Complex		Chala Gneiss	Sedimentary and Volcanic Rocks	Proterozoic	Mesoproterozoic	
P2UNmz	Monzonite, foliated	Unango Complex			Intrusive Rocks	Proterozoic	Mesoproterozoic	
P2UNqm	Muscovite- and kyanite-bearing quartzite	Unango Complex		Quartzite	Sedimentary and Volcanic Rocks	Proterozoic	Mesoproterozoic	
P2UNsm	Banded migmatitic gneiss	Unango Complex			Sedimentary and Volcanic Rocks	Proterozoic	Mesoproterozoic	
P2UNsy	Syenitic gneiss	Unango Complex			Intrusive Rocks	Proterozoic	Mesoproterozoic	
P2UNtg	Granodioritic gneiss, locally feldsparphyric	Unango Complex		Chiconono Gneiss	Intrusive Rocks	Proterozoic	Mesoproterozoic	
P3CH	Nepheline syenite			Monte Chissindo Nepheline Syenite	Intrusive Rocks	Proterozoic	Neoproterozoic	
P3CO	Limestone, mica schist, conglomerate, volcanic rock				Sedimentary and Volcanic Rocks	Proterozoic	Neoproterozoic	
P3go	Granodiorite, granitic pegmatite			Serra Mecula Granodiorite	Intrusive Rocks	Proterozoic	Neoproterozoic	
P3gr	Granite				Intrusive Rocks	Proterozoic	Neoproterozoic	
P3MK	Gneissic granite				Intrusive Rocks	Proterozoic	Neoproterozoic	
P3MS	Quartz porphyry			Monte Sanga Quartz	Intrusive Rocks	Proterozoic	Neoproterozoic	
P3MC	Syenite			Monte Nuemalo Syenite	Intrusive Rocks	Proterozoic	Neoproterozoic	
P3OCch	Charnockitic gneiss	Ocua Complex			Intrusive Rocks	Proterozoic	Neoproterozoic	
P3OCfm	Felsic to intermediate granulitic gneiss	Ocua Complex		Felsic to mafic granulitic gneiss	Intrusive Rocks	Proterozoic	Neoproterozoic	
P3OCqm	Mylonitic quartz-feldspar gneiss, quartzite	Ocua Complex		Mylonitic quartz-feldspar gneiss	Sedimentary and Volcanic Rocks	Proterozoic	Neoproterozoic	
P3OCpx	Two-pyroxene granulite/garnet metagabbro	Ocua Complex		Mafic granulitic gneiss	Intrusive Rocks	Proterozoic	Neoproterozoic	
P3Qag	Amphibolitic gneiss	Muaquia Complex			Intrusive Rocks	Proterozoic	Neoproterozoic	
P3Qbg	Paragneiss (muscovite-biotite-quartz-feldspar, calc-silicate)	Muaquia Complex		Muscovite-biotite gneiss, schist	Sedimentary and Volcanic Rocks	Proterozoic	Neoproterozoic	
P3Qgr	Granitic to granodioritic gneiss	Muaquia Complex			Intrusive Rocks	Proterozoic	Neoproterozoic	
P3Qmy	Granitic to granodioritic gneiss, mylonitic	Muaquia Complex			Intrusive Rocks	Proterozoic	Neoproterozoic	
P3Qqf	Quartz-feldspar gneiss (metaarkose)	Muaquia Complex		Quartz-feldspar gneiss	Sedimentary and Volcanic Rocks	Proterozoic	Neoproterozoic	
P3SWga	Metagabbro, amphibolite	Msawize Complex			Intrusive Rocks	Proterozoic	Neoproterozoic	
P3SWgo	Granodioritic to gabbroic gneiss	Msawize Complex			Intrusive Rocks	Proterozoic	Neoproterozoic	
P3SWm	Banded migmatite, minor migmatitic granite, amphibolite	Msawize Complex			Intrusive Rocks	Proterozoic	Neoproterozoic	
P3TXgs	Greenstone, greenschist, metagabbro			Greenstone, greenschist, metagabbro	Sedimentary and Volcanic Rocks	Proterozoic	Neoproterozoic	
P3TXqs	Quartz-mica schist, chlorite schist			Quartz-mica schist	Sedimentary and Volcanic Rocks	Proterozoic	Neoproterozoic	
P3TXsg	Metasandstone, metagreywacke, quartz-mica schist			Sandstone, greywacke and schist	Sedimentary and Volcanic Rocks	Proterozoic	Neoproterozoic	
P3TXsa	Meta-arkose to meta-arenite			Arkosic sandstone	Sedimentary and Volcanic Rocks	Proterozoic	Neoproterozoic	
P3Xam	Amphibolitic gneiss	Xixano Complex			Intrusive Rocks	Proterozoic	Neoproterozoic	
P3Xcr	Charnockitic rock	Xixano Complex			Intrusive Rocks	Proterozoic	Neoproterozoic	
P3Xgd	Granitic to granodioritic gneiss	Xixano Complex			Intrusive Rocks	Proterozoic	Neoproterozoic	
P3Xgr	Quartz-feldspar garnet gneiss	Xixano Complex			Sedimentary and Volcanic Rocks	Proterozoic	Neoproterozoic	
P3Xpx	Mafic granulite	Xixano Complex			Sedimentary and Volcanic Rocks	Proterozoic	Neoproterozoic	
P3Xqm	Metasedimentary and volcanic rock	Xixano Complex		Quartz-mica gneiss and schist	Sedimentary and Volcanic Rocks	Proterozoic	Neoproterozoic	
P3Xrh	Metarhyolite	Xixano Complex			Sedimentary and Volcanic Rocks	Proterozoic	Neoproterozoic	
P3XSgd	Metagabbro, quartz diorite	Xixano Complex			Intrusive Rocks	Proterozoic	Neoproterozoic	
P3Xto	Tonalitic gneiss	Xixano Complex			Intrusive Rocks	Proterozoic	Neoproterozoic	

MAPCODE	DESCRIPTION	COMPLEX	SUPERGROUP	NAME	ROCK TYPE	EON	ERA	PERIOD
PeB	Mudstone, conglomerate, sandstone		Karoo Supergroup		Sedimentary and Volcanic Rocks	Phanerozoic		Permian
PeE	Siltstone, sandstone, coal		Karoo Supergroup		Sedimentary and Volcanic Rocks	Phanerozoic		Permian
Qa	Alluvium, sand, sandy soil, silt, gravel, lacustrine saline mud, pebble bearing dunes, estuarine and tidal flat sediment, back-barrier and interdune wetland clay, mangrove swamp, salt marsh pan				Sedimentary and Volcanic Rocks	Phanerozoic		Quaternary
TeK	Unconsolidated sand, sandstone, conglomerate				Sedimentary and Volcanic Rocks	Phanerozoic		Tertiary (Neogene)
TrFc	Conglomerate, sandstone, siltstone, mudstone		Karoo Supergroup		Sedimentary and Volcanic Rocks	Phanerozoic		Triassic
TrMo	Sandstone, conglomerate, siltstone		Karoo Supergroup		Sedimentary and Volcanic Rocks	Phanerozoic		Triassic
unk	unknown							



Mapa Hidrogeológico

Modified after DNA (1987)

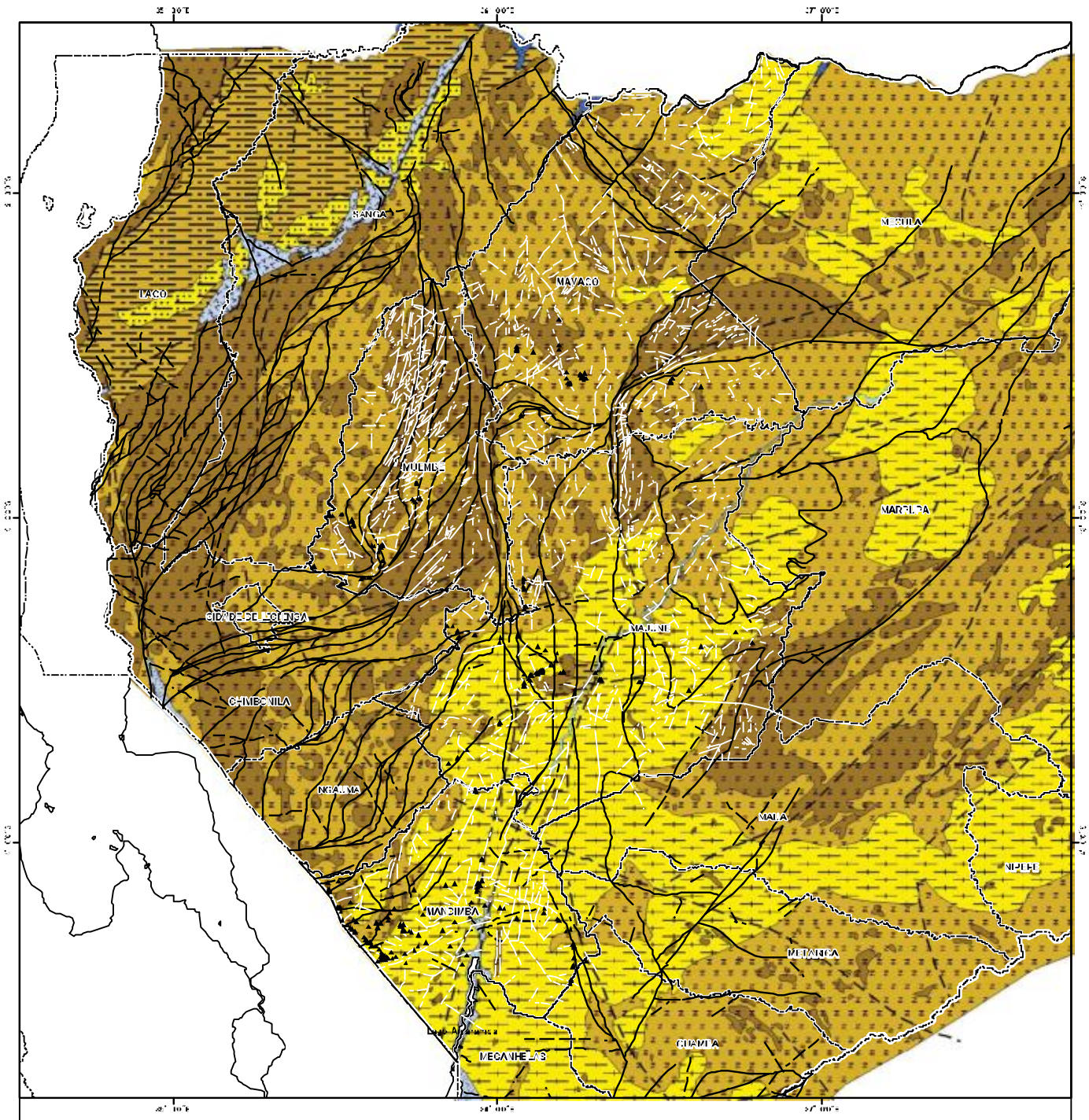
Legenda

Mapa Hidrológico	C1, Qal	C2, Rs	Falha geológica
A1, Qal	C1, Qp	C2, pEG	Provincia
A3, Qal	C1, QpE	C3, pEG	Distrito
A3, Qc	C2, Ri	Lake	

1:1,700,000

0 15 30 60 90 120 km

PROSUAS, 2013



Mapa Hidrologico com Fontes de Água

Modified after DNA (1987)

Legenda

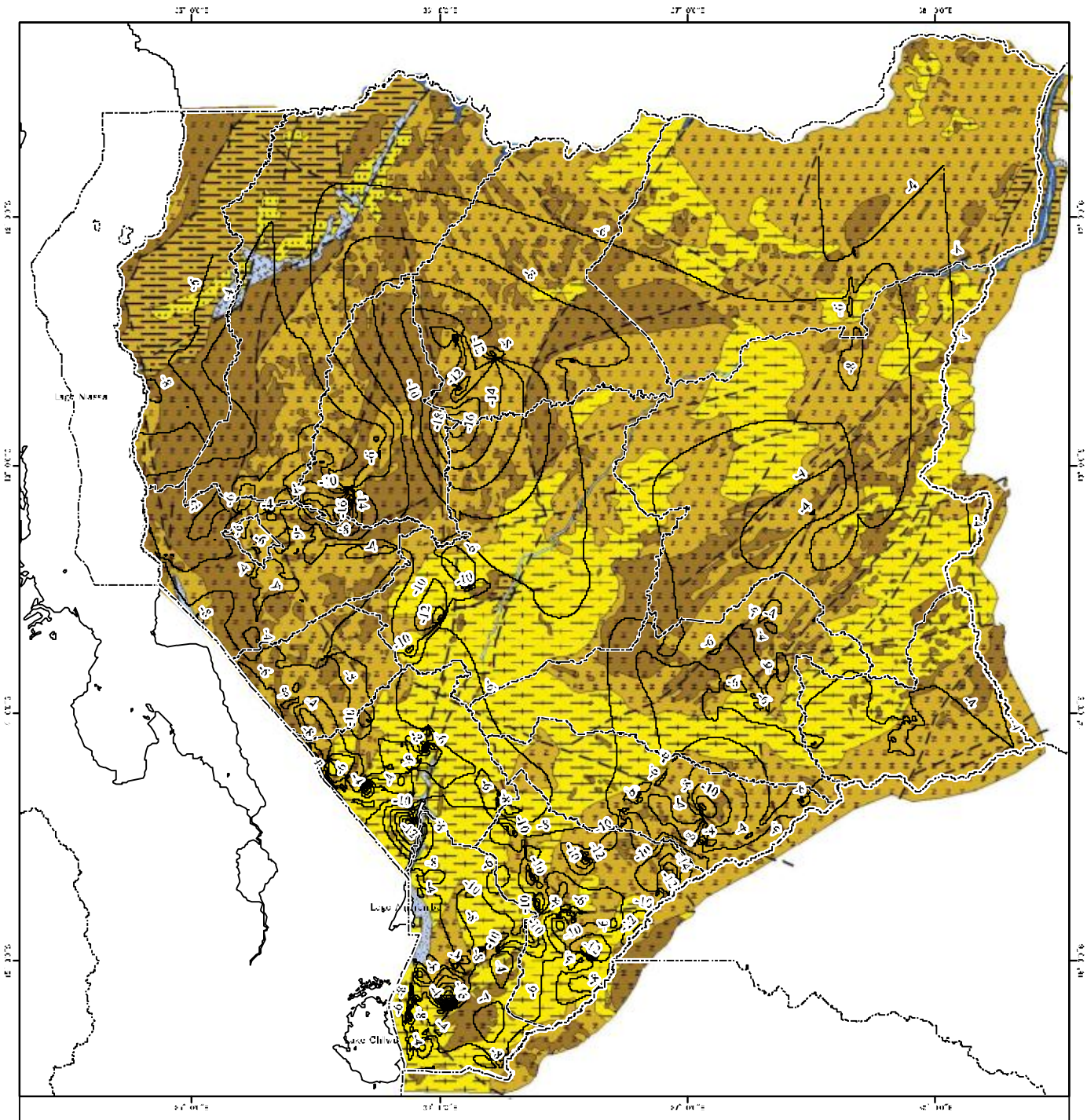
Mapa Hidrologico

- A1, Qal
- A3, Qal
- A3, Qc
- C1, Qal
- C1, Qa
- C1, QaE
- C2, Ri
- C2, Rs
- C2, pEG
- C3, pEG
- Lake
- Falha geológica
- Provincia
- Distrito
- Fault
- Fault (DNG, 2008)
- Fault Inferred
- Fault Observed
- Unknown Fault type
- Lineament clear
- Lineament unclear
- Fontes

1:1,300,000

0 15 30 60 90 120 km

PROSUAS, 2016



Mapa de Static Water Level (GL- m)

Legenda

Mapa Hidrológico

- A1, Qal
- A3, Qal
- A3, Qc
- C1, Qal
- C1, Qp
- C1, QpF
- C2, Ri
- C2, Rs
- C2, pEG
- C3, pEG
- Lake
- Falha geológica
- Provincia
- Distrito
- SWL Corrour 2m

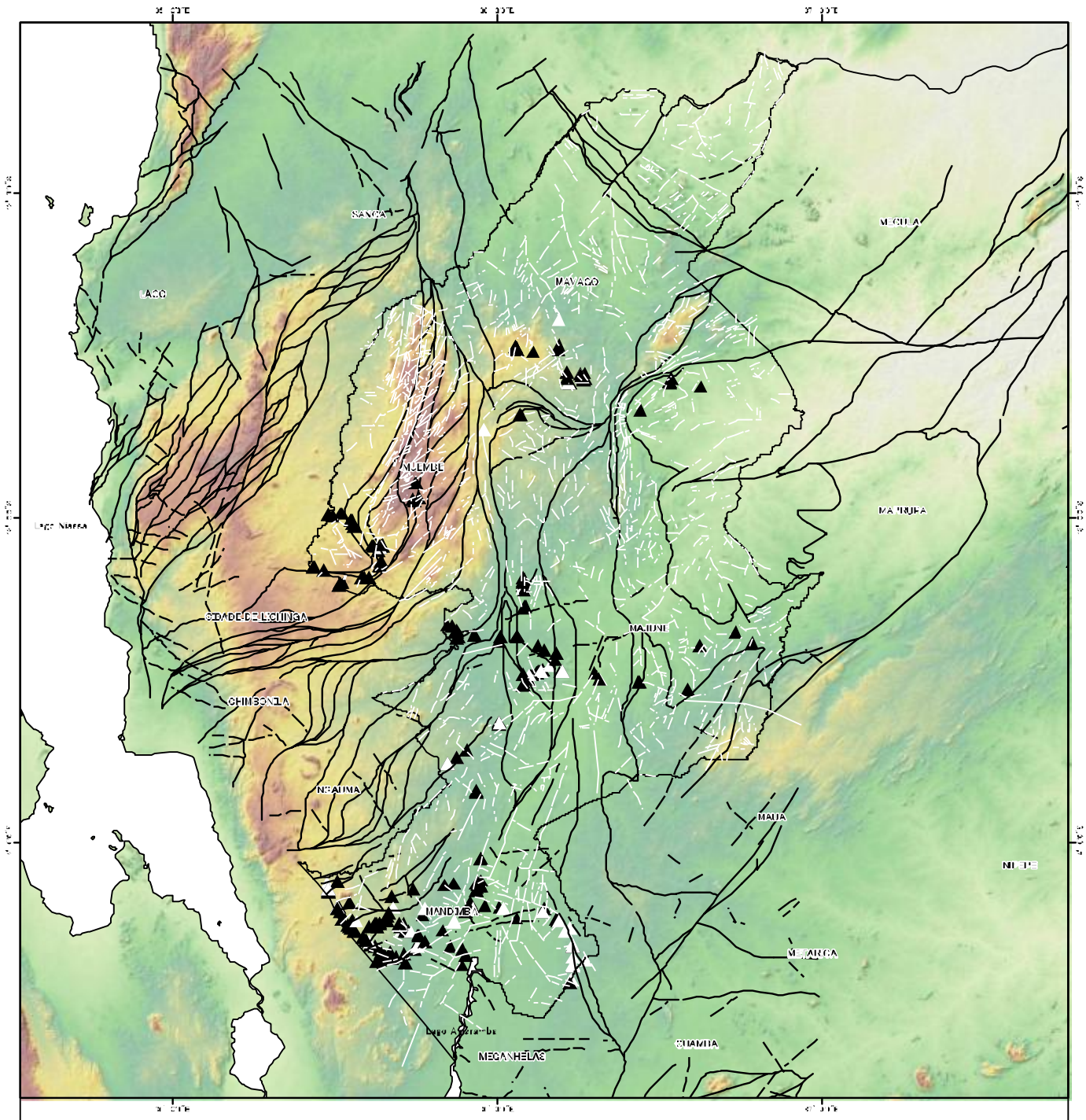
1:1,700,000

0 20 40 80 120 160 km

PROSUAS, 2016

A1	Highly productive aquifers (Q > 50 m3/h)	Qal	Sandy alluvium, including gravel, silt and clay layers
A3	Moderately productive aquifers (Q = 3 - 10m3/h)	Qal	Clayey alluvium with interstratified sandy layers, locally including calcretes
		Qc	Colluvium associated to mountainous areas and escarpments
C1	Areas with continuous or discontinuous local aquifers of limited productivity (generally Q < 5 m3/h). On the Basement Complex the groundwater occurrence is related to the weathering mantle or to fracture zones (medium-wet horizon thickness 20-50 m)	Qal	Clayey alluvium including sand layers
		Qp	Loose, fine textured clayey sands or sandy clays over sedimentary rocks
		QpE	Eluvial cover over crystalline rocks of the Basement Complex
C2	Areas with limited groundwater occurrence (generally Q < 3m3/h). On the Basement Complex the existence of outcrops and a poorly developed weathering mantle are limiting factors for groundwater occurrence (weathering thickness generally less than 20 m). Positive exceptions can be found in fault zones and alluvial valleys.	Ri	Compact schistose sandstones, marlstones, mudstones and carbonaceous shales, including coal beds and diorite intrusions
		Rs	Compact schistose sandstones, marlstones, mudstones and carbonaceous shales, including coal beds and diorite intrusions
		pEG	Crystalline rocks of the Gneiss Migmatite Complex, including metasediments, charnockites and granites
C3	Mountainous areas without a significant weathering mantle and almost without any groundwater resources (generally Q <1 m3/h). Ground water frequently appears in spring zones. More productive exceptions can be found along fault zones and talus slopes.	pEG	Crystalline rocks of the Gneiss Migmatite Complex, including metasediments, charnockites and granites

A1	Aquíferos muito produtivos (Q > 50 m3/h)	Qal	Depósitos arenosos, de origem fluvial incluindo, por vezes, calhaus, sites ou leitos argilosos
A3	Aquíferos moderadamente produtivos (Q = 3 - 10m3/h)	Qal	Argilas com interestratificação arenosas, de origem aluvial, esporadicamente com níveis de calcário lacustre
		Qc	Coluvião relacionado com zonas montanhosas ou escarpas
C1	Áreas com aquíferos locais contínuos ou descontínuos de produtividade limitada (geralmente Q < 5 m3/h). Nas áreas de rochas cristalinas, a ocorrência de água está limitada às zonas de alteração ou fracturação das rochas duras subjacentes (espessura de alteração geralmente entre 20-50 m).	Qal	Depósitos argilosos incluindo por vezes, areias
		Qp	Areias finas mais ou menos soltas e argilosas, formando coberturas residuais, sobre rochas sedimentares
		QpE	Eluviões relacionadas com a zona de alteração e/ou fracturação de rochas do Complexo Cristalino
C2	Áreas com ocorrência de água subterrânea limitada (geralmente Q < 3m3/h). Nas áreas de rochas cristalinas a existência de afloramentos ou a pequena espessura de alteração limita a ocorrência de água subterrânea (alteração geralmente inferior a 20 m). Zonas de falhas e aluviões podem corresponder a zonas de excepção geralmente mais produtivas	Ri	Grés compactos, xistóides, margas e xistos carbonosos, incluindo barreiras de carvão e intrusões dioríticas-Karroo
		Rs	Grés compactos, xistóides, margas e xistos carbonosos, incluindo barreiras de carvão e intrusões dioríticas Karroo
		pEG	Rochas do Complexo gnaisso-migmatítico, s.l. incluindo a Série Metassedimentar, o Complexo granito-gnáissico-migmatítico e a Série Charnoquítica
C3	Áreas montanhosas, sem manto de alteração significativo e praticamente desprovidas de águas subterrâneas (geralmente Q <1 m3/h). O seu aparecimento está relacionado, em geral, com nascentes. Zonas de falhas e cones de vertentes podem corresponder a zonas de excepção geralmente mais produtivas.	pEG	Rochas do Complexo gnaisso-migmatítico, s.l. incluindo a Série Metassedimentar, o Complexo granito-gnáissico-migmatítico e a Série Charnoquítica



Mapa de Lineaments

Legenda

Lineament clear
Lineament unclear

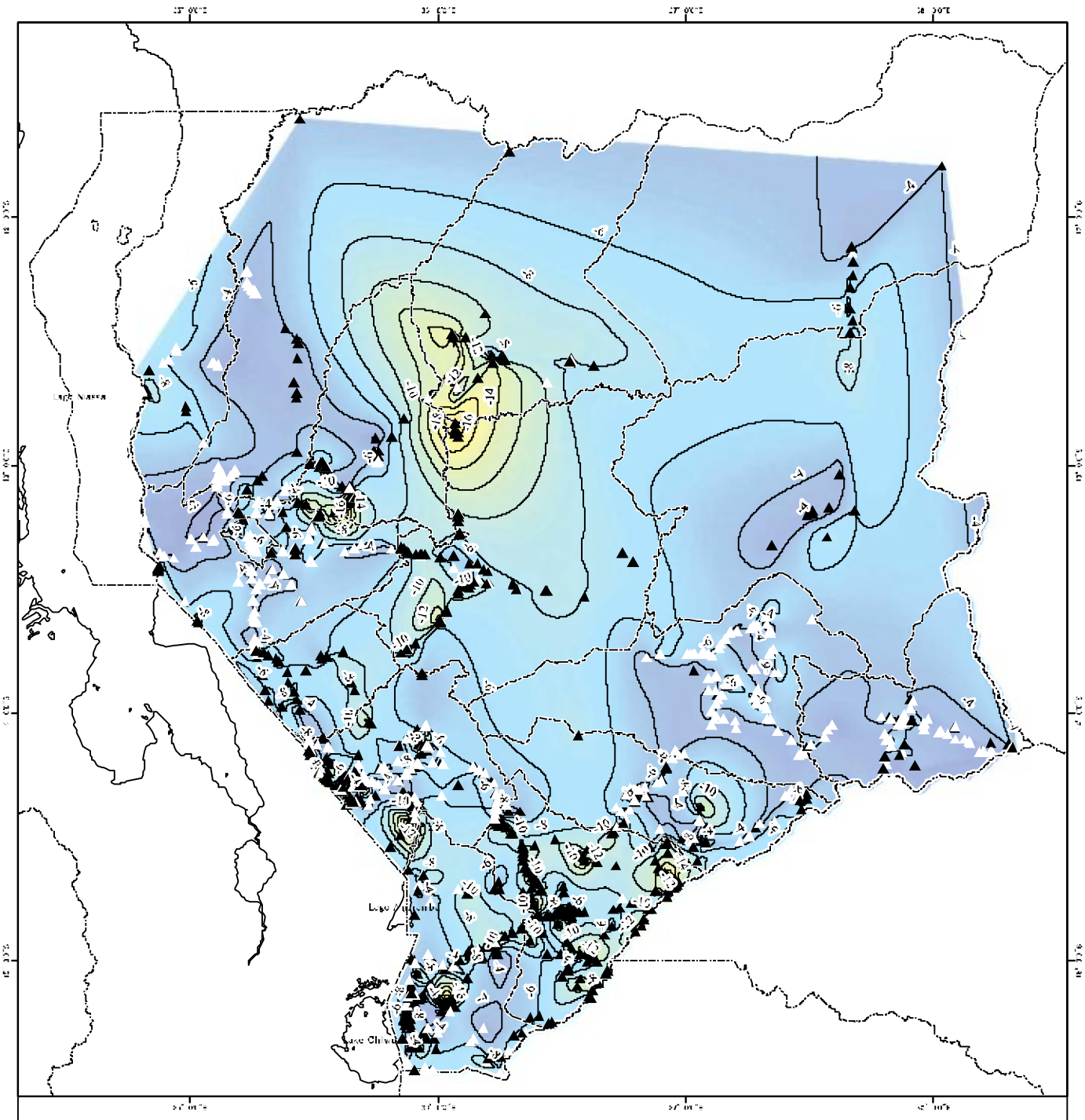
Fault (DNG, 2008)
Fault Inferred
Fault Observed
Unknown Fault type

PROSUAS Área de estudo
Lakes

Fontes
SINAS 2016 Jun
Furo Mecanico (273)
Poço (59)
Não identificado (1)

1:1,300,000
0 15 30 60 90 120 km

PROSUAS, 2016



Mapa de Static Water Level (GL- m)

Legenda

Tipo Fonte

- Furo
- Poço
- Outros
- Provincia
- Distrito

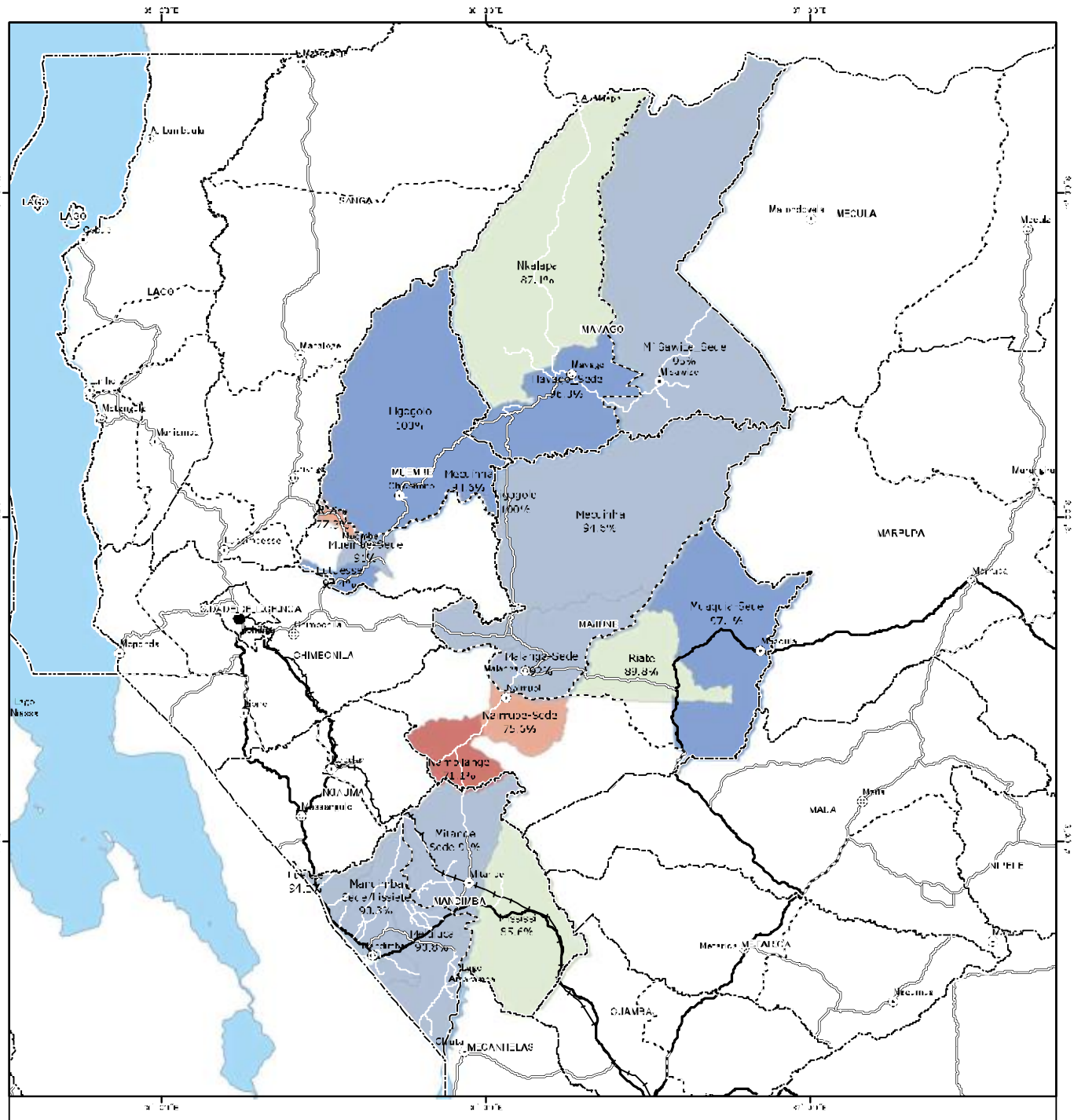
Static Water Level GL-(m)

SWL Contour 2m

1:1,700,000

0 20 40 80 120 160 km

PROSUAS, 2016



Mapa de agregados familiares com latrinas

Legenda

Taxa de penetração de latrina

- 70.1 – 75.0 %
- 75.1 – 80.0 %
- 80.1 – 85.0 %
- 85.1 – 90.0 %
- 90.1 – 95.0 %
- 95.1 – 100.0 %

- Capital Provincial
- Capital Districtal
- Capital do PA
- Outras

- Província
- Distrito
- PA
- Lagos

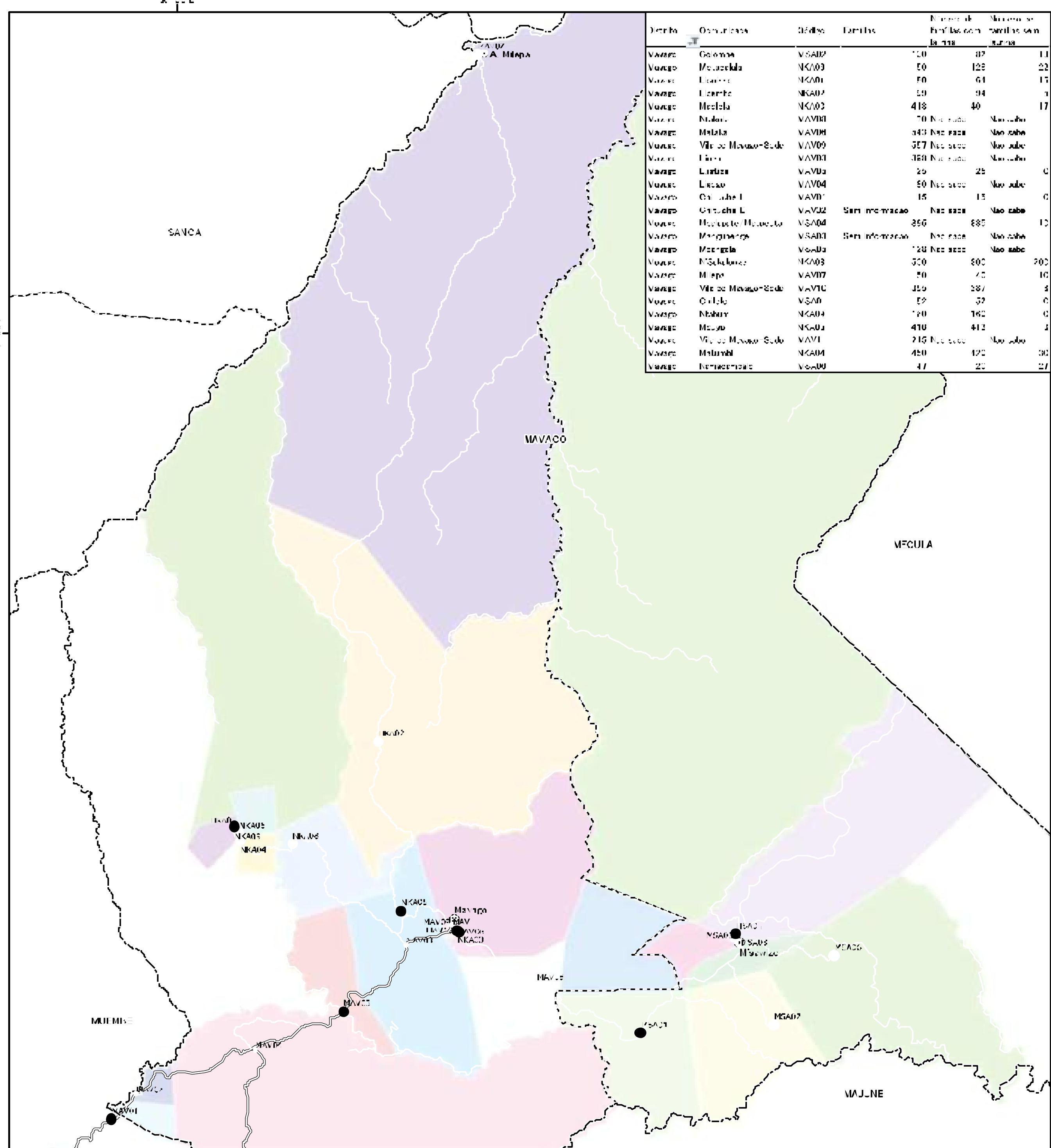
Estradas

- Estrada principal
- Estrada secundaria
- Outras
- Linha ferrea

* Fonte: Estudo de Base do PROSUAS, 2013

* Recomendação:
Prestar atenção na fiabilidade dos dados quando usar este Mapa, uma vez que já passa algum tempo após a realização do Estudo de Base. Além disso, existe uma possibilidade de os resultados do Estudo de Base conterem alguns erros nos dados devido a limitação dos métodos de pesquisa

PROSUAS, 2013



Distrito	Comunidade	Código	Famílias	Número de famílias com latrina	Número de famílias sem latrina
Mavago	Colomba	MSA02	110	87	11
Mavago	Metacolola	NKA00	50	129	22
Mavago	Lihanhe	NKA01	50	64	17
Mavago	Licamba	NKA02	59	94	1
Mavago	Meclela	NKA03	418	40	17
Mavago	Ntakula	MAV08	70	Nao sabe	Nao sabe
Mavago	Malaka	MAV06	343	Nao sabe	Nao sabe
Mavago	Vila de Mavago-Sede	MAV09	557	Nao sabe	Nao sabe
Mavago	Lirem	MAV03	368	Nao sabe	Nao sabe
Mavago	Luatize	MAV05	25	25	0
Mavago	Liecao	MAV04	60	Nao sabe	Nao sabe
Mavago	Chiuluche I	MAV01	15	15	0
Mavago	Chiuluche II	MAV02	Sem informacao	Nao sabe	Nao sabe
Mavago	Mecupete/Metueuto	MSA04	896	885	10
Mavago	Marguinenge	MSA03	Sem informacao	Nao sabe	Nao sabe
Mavago	Macngala	MSA05	128	Nao sabe	Nao sabe
Mavago	N'Sakalunez	NKA08	500	300	200
Mavago	Milepa	MAV07	50	40	10
Mavago	Vila de Mavago-Sede	MAV10	395	387	8
Mavago	Chilolo	MSA01	52	52	0
Mavago	Ntaburi	NKA09	160	160	0
Mavago	Mauyo	NKA05	416	413	3
Mavago	Vila de Mavago-Sede	MAV11	215	Nao sabe	Nao sabe
Mavago	Malumbi	NKA04	450	420	30
Mavago	Namacomba	MSA00	47	20	27

Mapa de agregados familiares com latrinas (Mavago)

Legenda

Taxa de penetração de latrina

- 0.0% - 25.0% (0)
- 25.1% - 60.0% (2)
- 60.1% - 80.0% (2)
- 80.1% - 95.0% (1)
- 95.1% - 100.0% (8)
- Sem informação (5)

Capital Provincial
Capital Distrital
Capital do PA
Outras

Provincia
Distrito
PA
Lagos
Rio

Estradas
Estrada principal
Estrada secoundaria
Outras
Linha ferrea

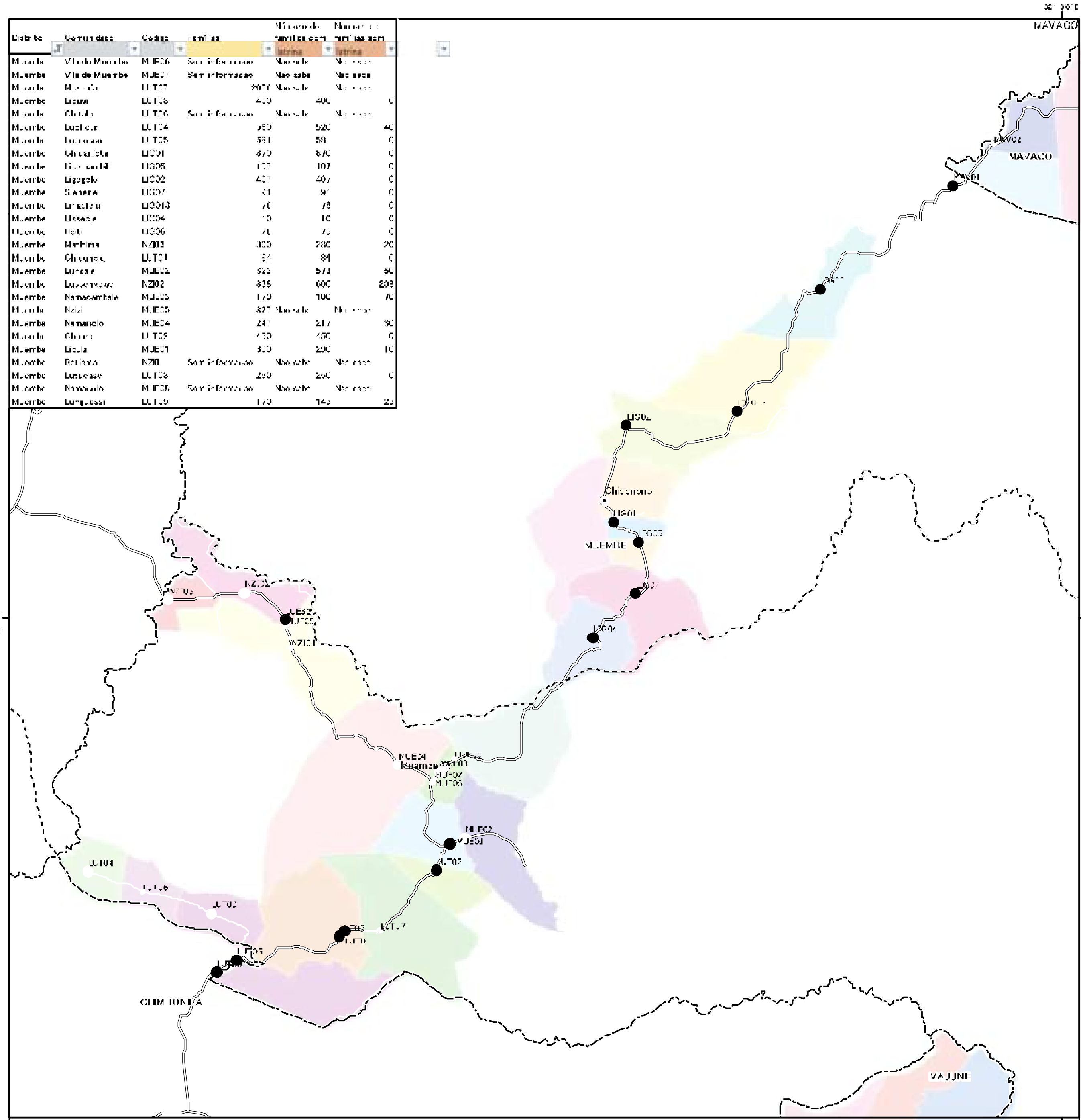
* Fonte: Estudo de Base do PROSUAS, 2013

* Recomendação:
Prestar atenção na fiabilidade dos dados quando usar este Mapa, uma vez que já passa algum tempo após a realização do Estudo de Base. Além disso, existe uma possibilidade de os resultados do Estudo de Base conterem alguns erros nos dados devido à limitação dos métodos de pesquisa.

1:400,000

0 5 10 20 30 40 km

PROSUAS, 2013



Distrito	Comunidade	Codigo	Famílias	Número de famílias com latrina	Número de famílias sem latrina
Muembe	Vila de Muembe	MUE06	Sem informacao	Nao sabe	Nao sabe
Muembe	Vila de Muembe	MUE07	Sem informacao	Nao sabe	Nao sabe
Muembe	[illegible]	LUT07	2050	Nao sabe	Nao sabe
Muembe	Licuvi	LUT03	400	400	0
Muembe	Chitula	LUT06	Sem informacao	Nao sabe	Nao sabe
Muembe	Lucheta	LUT04	560	520	40
Muembe	[illegible]	LUT05	581	58	0
Muembe	Chicaneta	LIG01	870	870	0
Muembe	[illegible]	LIG05	107	107	0
Muembe	Ligogolo	LIG02	407	407	0
Muembe	Sienene	LIG07	91	91	0
Muembe	Linkelelu	LIG013	70	78	0
Muembe	Lissaje	LIG04	10	10	0
Muembe	[illegible]	LIG06	70	75	0
Muembe	Manhimu	NZI03	300	280	20
Muembe	Chicumelo	LUT01	84	84	0
Muembe	Lunhale	MUE02	622	573	50
Muembe	Lussenhevo	NZI02	809	600	209
Muembe	Namacambale	MUE03	170	100	70
Muembe	Nzizi	MUE05	327	Nao sabe	Nao sabe
Muembe	Namancilo	MUE04	247	217	30
Muembe	Chiuna	LUT02	450	450	0
Muembe	Licula	MUE01	300	290	10
Muembe	Bellenda	NZI01	Sem informacao	Nao sabe	Nao sabe
Muembe	Lumbease	LUT08	250	250	0
Muembe	Namaculo	MUE05	Sem informacao	Nao sabe	Nao sabe
Muembe	Lunguessi	LUT09	170	145	25

Mapa de agregados familiares com latrinas (Muembe)

Legenda

Taxa de penetração de latrina
- 0.0% - 25.0% (0)
- 25.1% - 60.0% ( )
- 60.1% - 80.0% ( )
- 80.1% - 95.0% (5)
- 95.1% - 100.0% (13)
- Sem informação (8)

- Capital Provincial
- Capital Districtal
- Capital do PA
- Outros

- Provincia
- Distrito
- PA
- Lagos
- Rio

Estradas
- Estrada principal
- Estrada secundaria
- Outras
- Linha ferrea

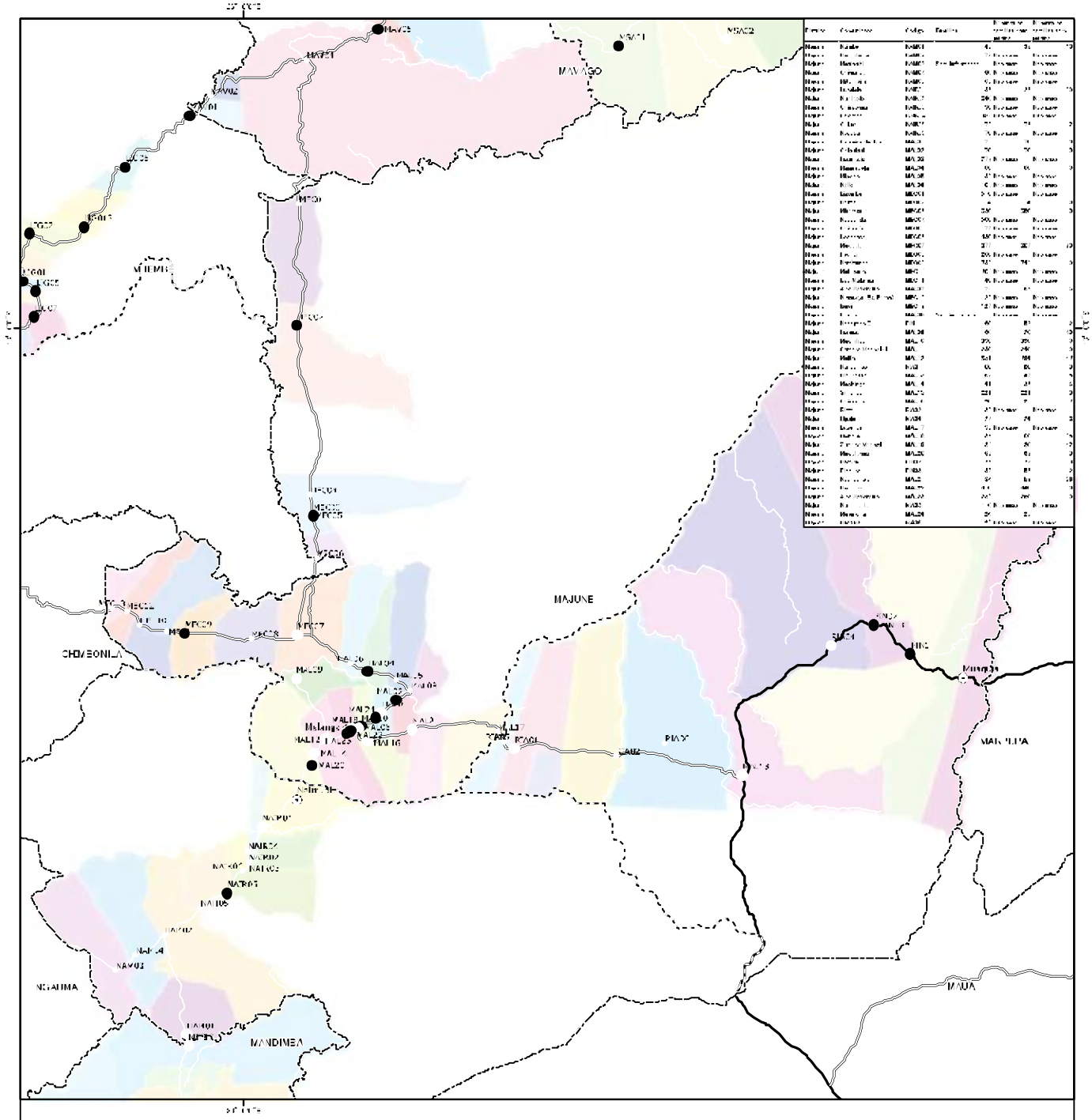
* Fonte: Estudo de Base do PROSUAS, 2013

* Recomendação:
Prestar atenção na fiabilidade dos dados quando usar este Mapa, uma vez que já passa algum tempo após a realização do Estudo de Base. Além disso, existe uma possibilidade de os resultados do Estudo de Base conterem alguns erros nos dados devido a limitação dos métodos de pesquisa.

PROSUAS, 2013

1:250,000

0 3 6 12 18 24 km



Mapa de agregados familiares com latrinas (Majune)

Legenda

Taxa de penetração de latrina

- 0.0% – 25.0% (3)
- 25.1% – 60.0% (7)
- 60.1% – 80.0% (6)
- 80.1% – 95.0% (10)
- 95.1% – 100.0% (21)
- Sem informação (27)

- Capital Provincial
- Capital Districtal
- Capital do PA
- Outras

- Provincia
- Distrito
- PA
- Lagos
- Rio

Estradas
- Estrada principal
- Estrada secundaria
- Outras
- Linha ferrea

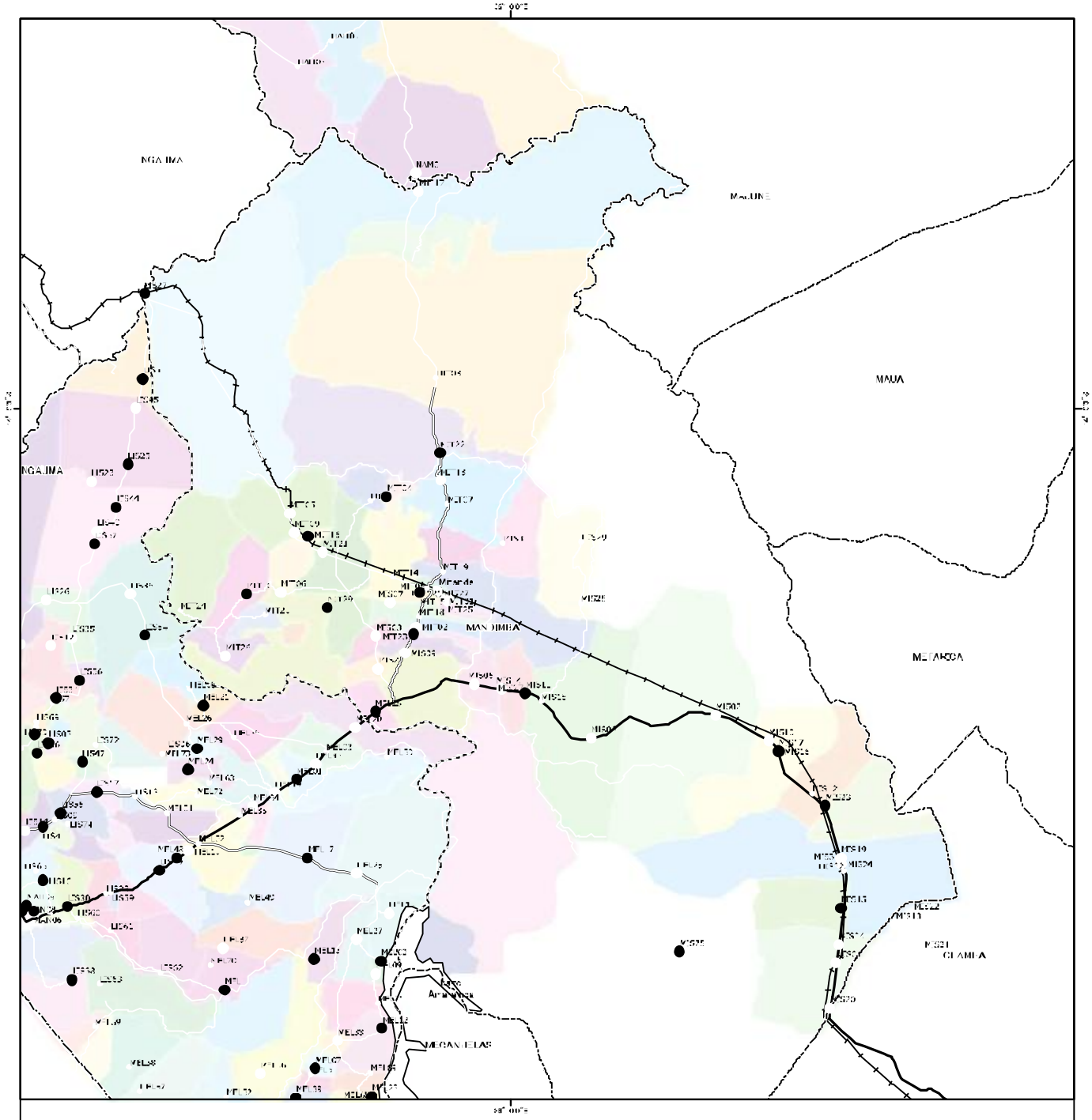
* Fonte: Estudo de Base do PROSUAS, 2013

* Recomendação:
Prestar atenção na liabilidade dos dados quando usar este Mapa, uma vez que já passa algum tempo após a realização do Estudo de base. Além disso, existe uma possibilidade de os resultados do Estudo de Base conterem alguns erros nos dados devido a limitação dos métodos de pesquisa.

PROSUAS, 2013

1:500,000

0 5 10 20 30 40 km



Mapa de agregados familiares com latrinas (Mandimba)

Legenda

Taxa de penetração de latrina
- 0.0% – 25.0% (2)
- 25.1% – 60.0% (6)
- 60.1% – 80.0% (15)
- 80.1% – 95.0% (27)
- 95.1% – 100.0% (47)
- Sem informação (61)

- Capital Provincial
- Capital Distrital
- Capital do PA
- Outras

- Provincia
- Distrito
- PA
- Lagos
- Rio

Estradas
- Estrada principal
- Estrada secundaria
- Outras
- Linha ferrea

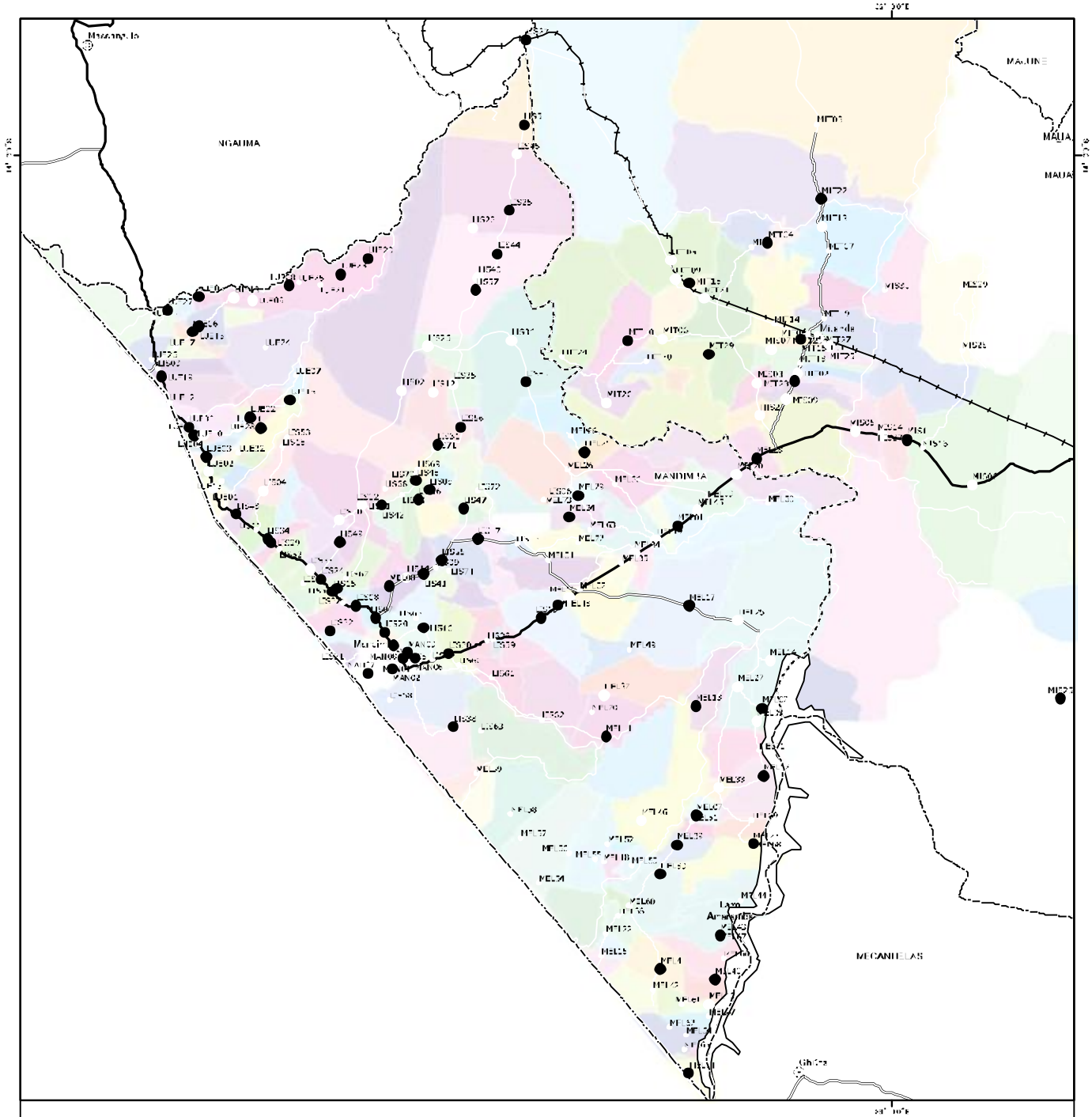
* Fonte: Estudo de Base do PROSUAS, 2013

* Recomendação:
Prestar atenção na liabilidade dos dados quando usar este Mapa, uma vez que já passa algum tempo após a realização do Estudo de base. Além disso, existe uma possibilidade de os resultados do Estudo de Base conterem alguns erros nos dados devido a limitação dos métodos de pesquisa.

PROSUAS, 2013

1:300,000

0 3.25 6.5 13 19.5 26 km



Mapa de agregados familiares com latrinas (Mandimba)

Legenda

Taxa de penetração de latrina
- 0.0% – 25.0% (5)
- 25.1% – 60.0% (6)
- 60.1% – 80.0% (15)
- 80.1% – 95.0% (28)
- 95.1% – 100.0% (75)
- Sem informação (99)

- Capital Provincial
- Capital Distrital
- Capital do PA
- Outras

- Provincia
- Distrito
- PA
- Lagos
- Rio

Estradas
- Estrada principal
- Estrada secundaria
- Outras
- Linha ferrea

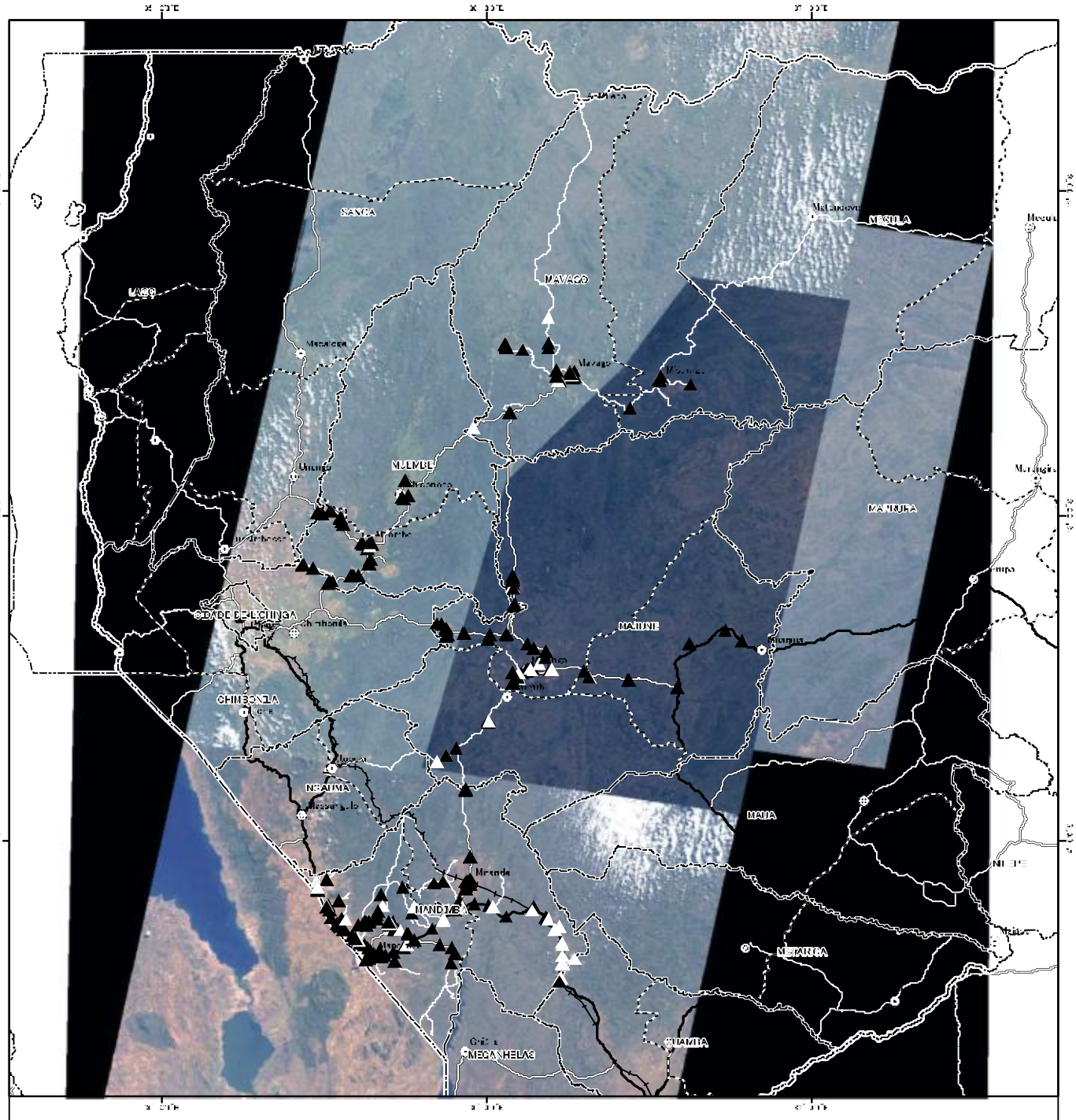
* Fonte: Estudo de Base do PROSUAS, 2013

* Recomendação:
Prestar atenção na liabilidade dos dados quando usar este Mapa, uma vez que já passa algum tempo após a realização do Estudo de base. Além disso, existe uma possibilidade de os resultados do Estudo de Base conterem alguns erros nos dados devido a limitação dos métodos de pesquisa.

PROSUAS, 2013

1:300,000

0 3.25 6.5 13 19.5 26 km



Landsat Imagem de Satélite, PROSUAS_Área de Estudo

Legenda

Fontes

SINAS 2016 Jun

- Furo Mecanico (273)
- Poço (59)
- Não identificado (1)

- Capital Provincial
- Capital Distrital
- Capital do PA
- Outras

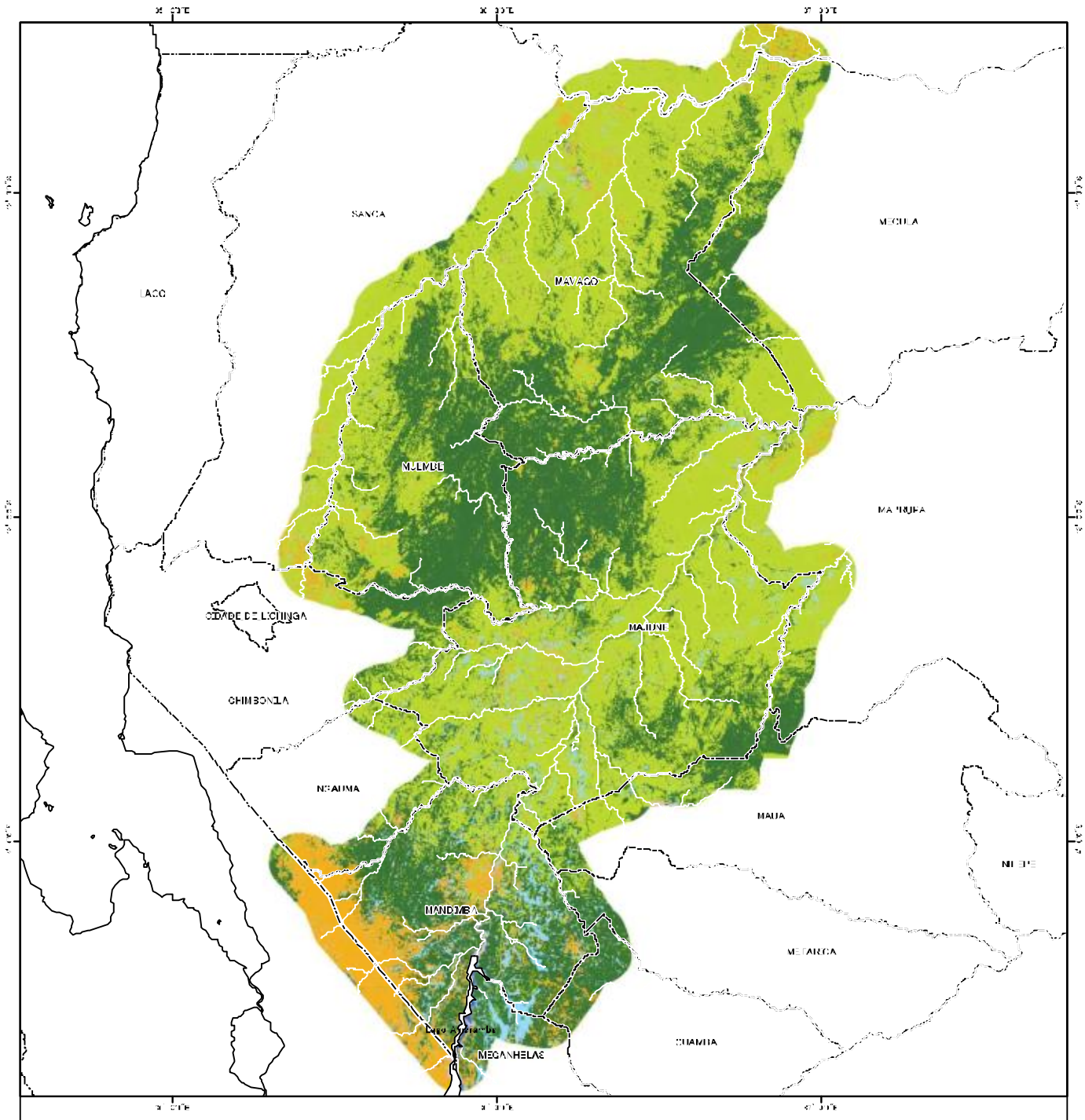
- Provincia
- Distrito
- PA

- Estrada principal
- Estrada secundaria
- Outras
- Linha Ferrea

1:1,300,000

0 15 30 60 90 120 km

PROSUAS, 2016



Cobertura de Terra

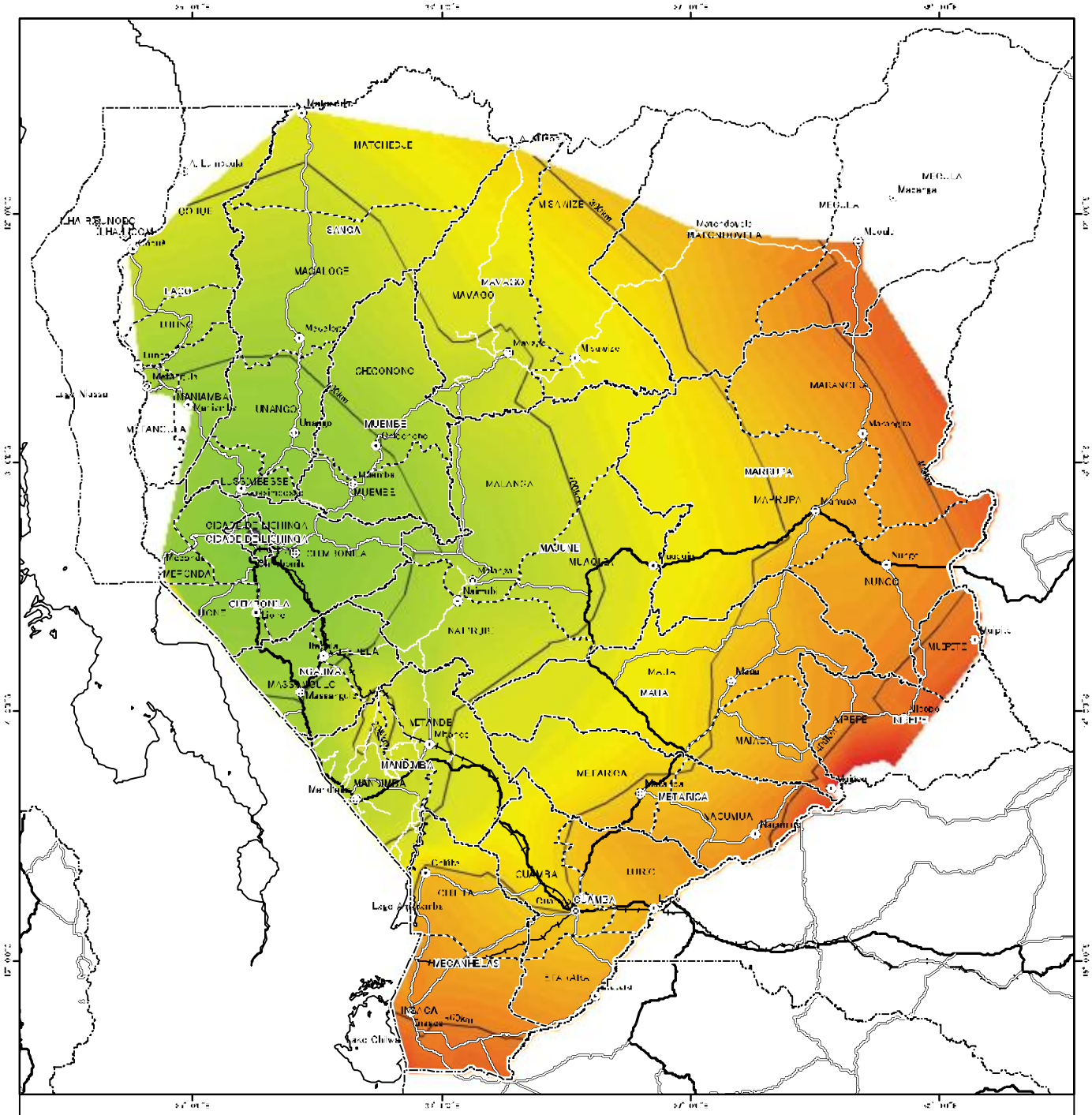
Legenda

- Provincia
- Distrito
- Lagos
- Rio
- Massa de água
- Vegetação fraca (mainly alluvium)
- Vegetação fraca (mainly dry river bed)
- Vegetação Sazonal
- Vegetação sempre verde
- Bare Land

1:1,300,000

0 15 30 60 90 120 km

PROSUAS, 2016



Mapa do Niassa (Distancia a partir de Lichinga)

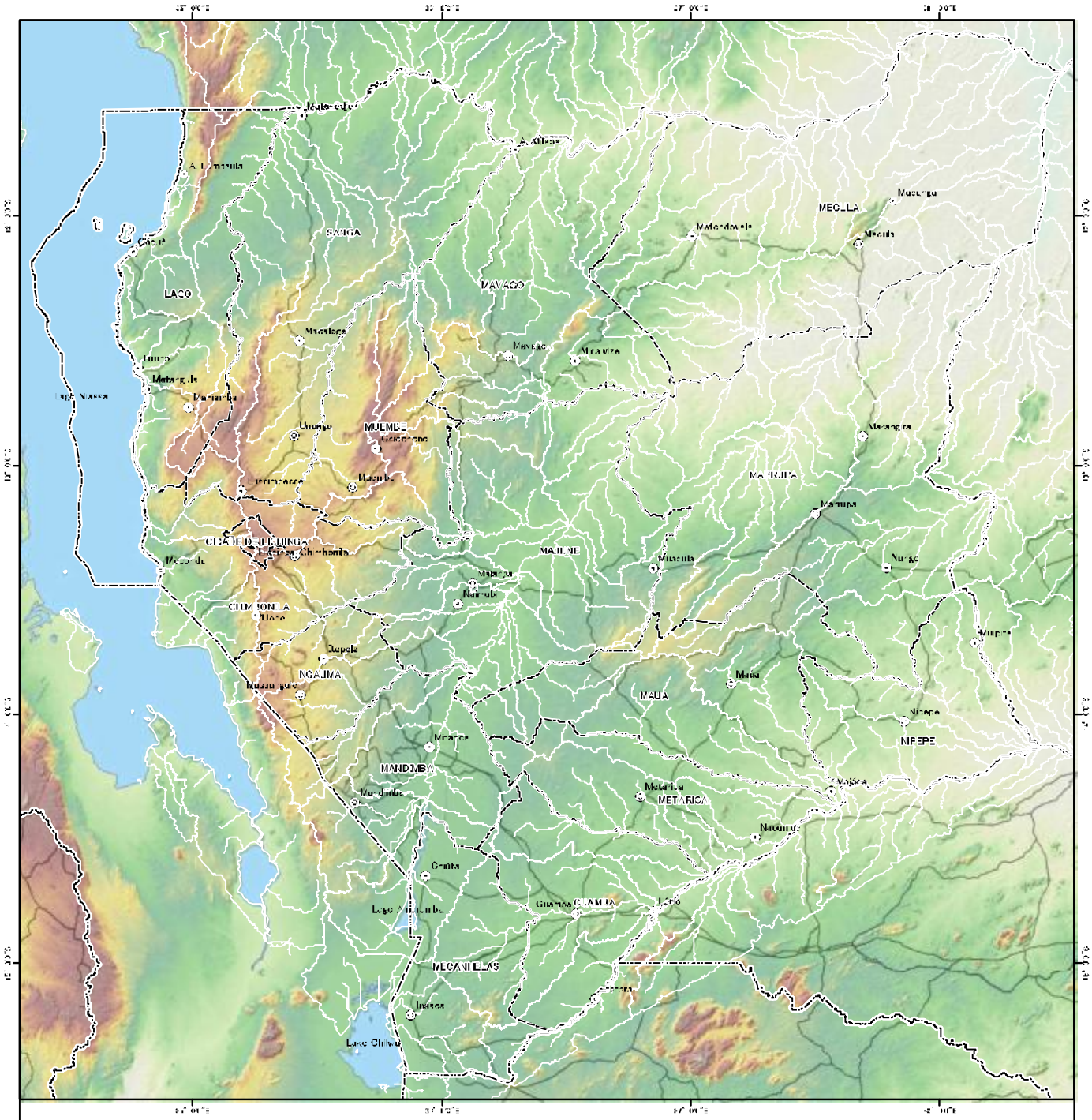
Legend

- Capital Provincial
- Capital Districtal
- Capital do PA
- Outras
- Provincia
- Distrito
- PA
- Estradas
- Estrada principal
- Estrada secundaria
- Others
- Linha ferrea
- Lagos
- Distance from Lichinga (km)
- High : 500
- Low : 0

1:1,700,000

0 20 40 80 120 160 km

PROSUAS, 2013



Mapa de Niassa (Sub-bacia)

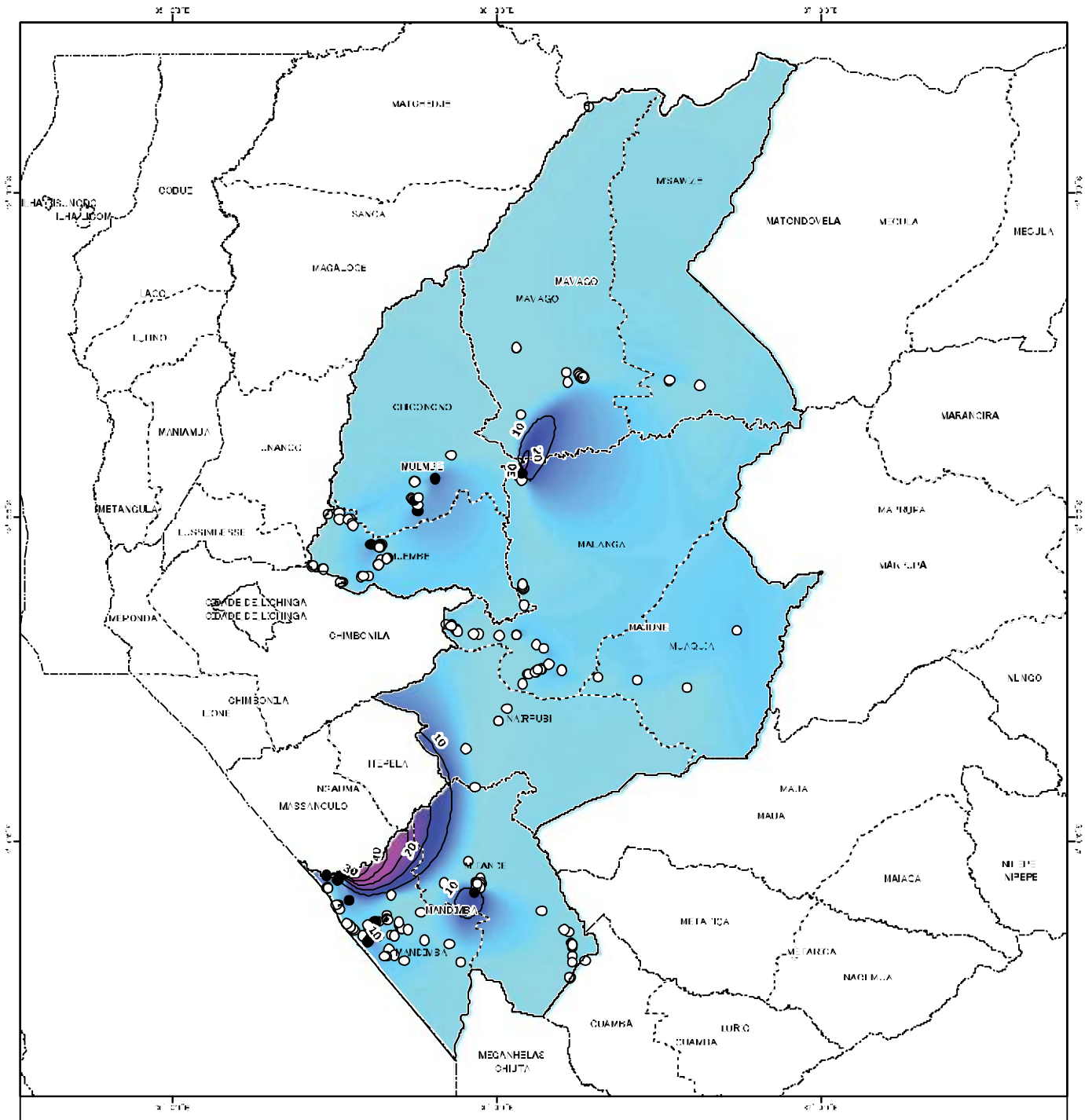
Legenda

- Bacia hidrográfica
- Rio
- Lagos
- Capital Provincial
- Capital Districtal
- Capital do PA
- Outras
- Provincia
- Distrito
- Estradas
- Elevação
  - High : 2500
  - Low : 0

1:1,700,000

0 20 40 80 120 160 km

PROSUAS, 2015



Map of Water Quality (Bacteria)

Legend

Bactéria
- 0 (119)
- 1 – 5 (59)
- 6 – 10 (14)
- 11 – 15 (1)
- 16 – 20 (0)
- 21 – 25 (1)
- 26 – 30 (0)
- 31 – 35 (2)
- 36 – 100 (3)

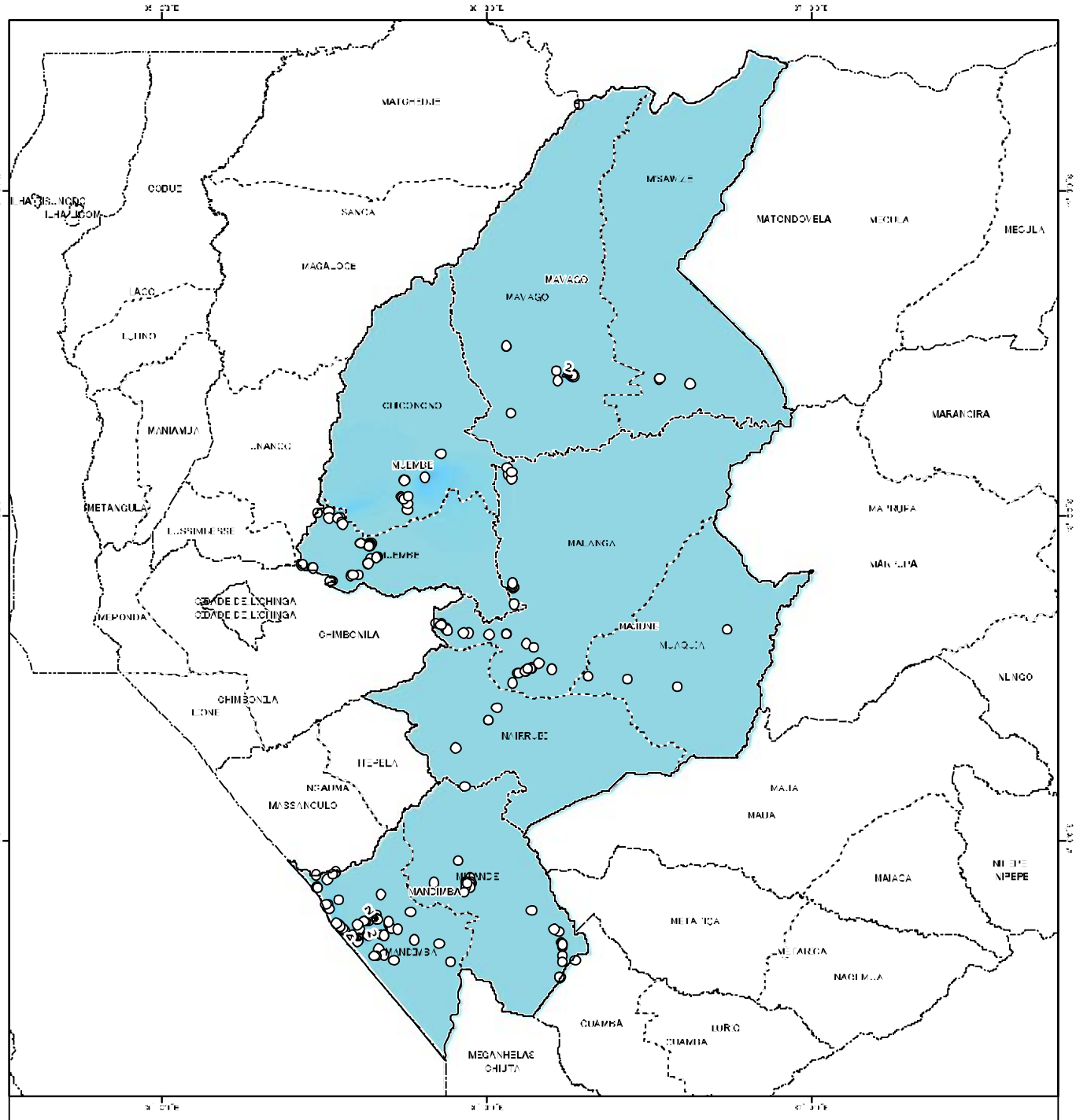
Província
Distrito
PA

* Based on PROSUAS baseline survey, 2013
* This map contains some errors because of limitation on accuracy of water quality test

PROSUAS, 2015

1:1,300,000

0 15 30 60 90 120 km



Mapa de Qualidade de Água (Coliformes)

Legenda

Coliformes

- 0 (182)
- 1 – 2 (8)
- 3 – 4 (1)
- 5 – 6 (1)
- 7 – 8 (0)
- 9 – 10 (0)
- 11 – 12 (2)
- 13 – 14 (0)
- 15 – 16 (1)

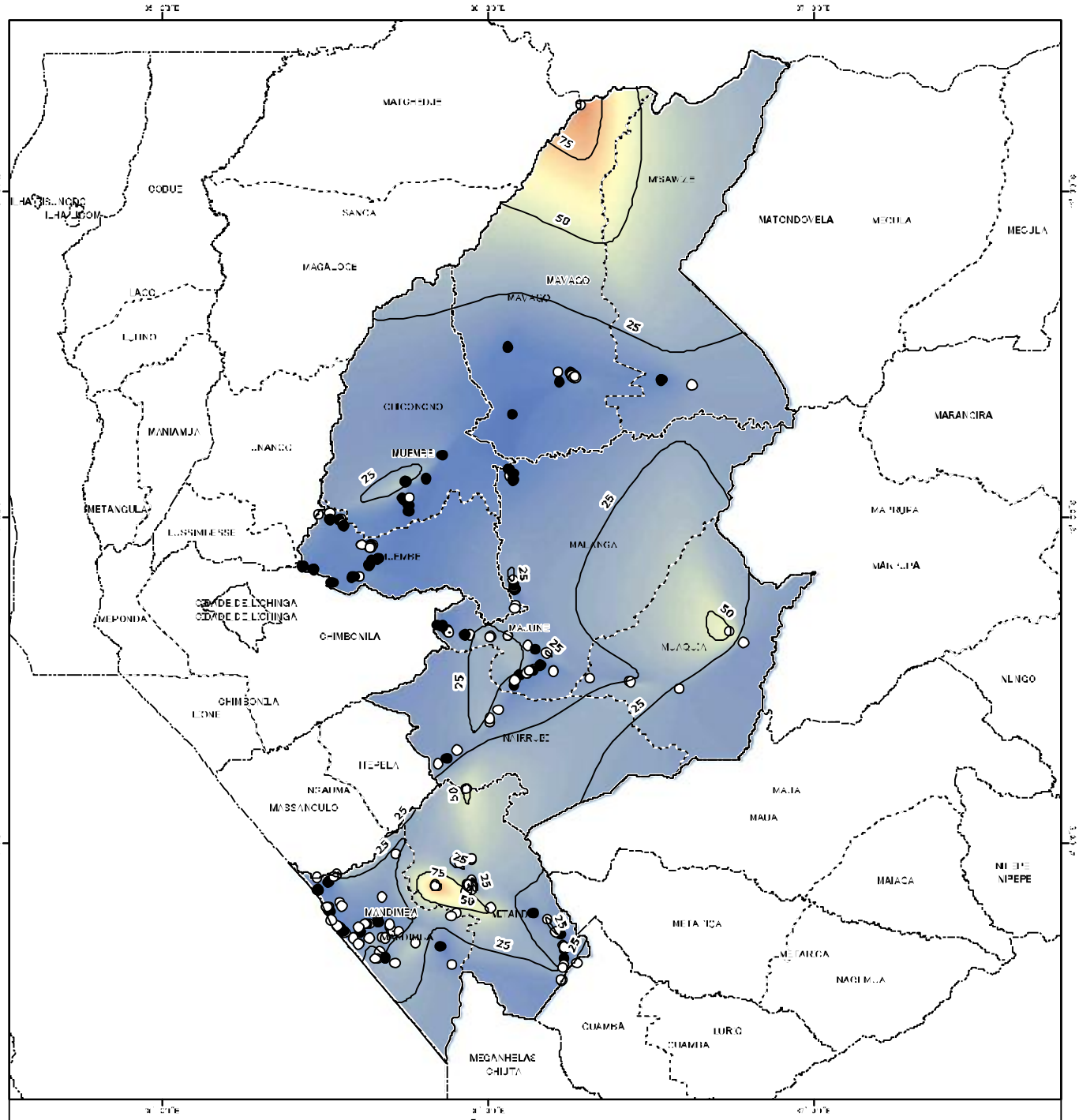
Provincia
Distrito
PA

* Based on PROSUAS baseline survey, 2013
* This map contains some errors because of limitation on accuracy of water quality test

PROSUAS, 2015

1:1,300,000

0 15 30 60 90 120 km



Mapa de Qualidade de Água (Conductividade Eléctrica)

Legenda

EC (mS/m)

- 0.00 – 10.00 (81)
- 10.01 – 20.00 (77)
- 20.01 – 30.00 (36)
- 30.01 – 40.00 (11)
- 40.01 – 50.00 (8)
- 50.01 – 60.00 (3)
- 60.01 – 70.00 (0)
- 70.01 – 80.00 (1)
- 80.01 – 90.00 (1)
- 90.01 – 100.00 (1)
- 100.01 – 110.00 (0)
- 110.01 – 120.00 (0)

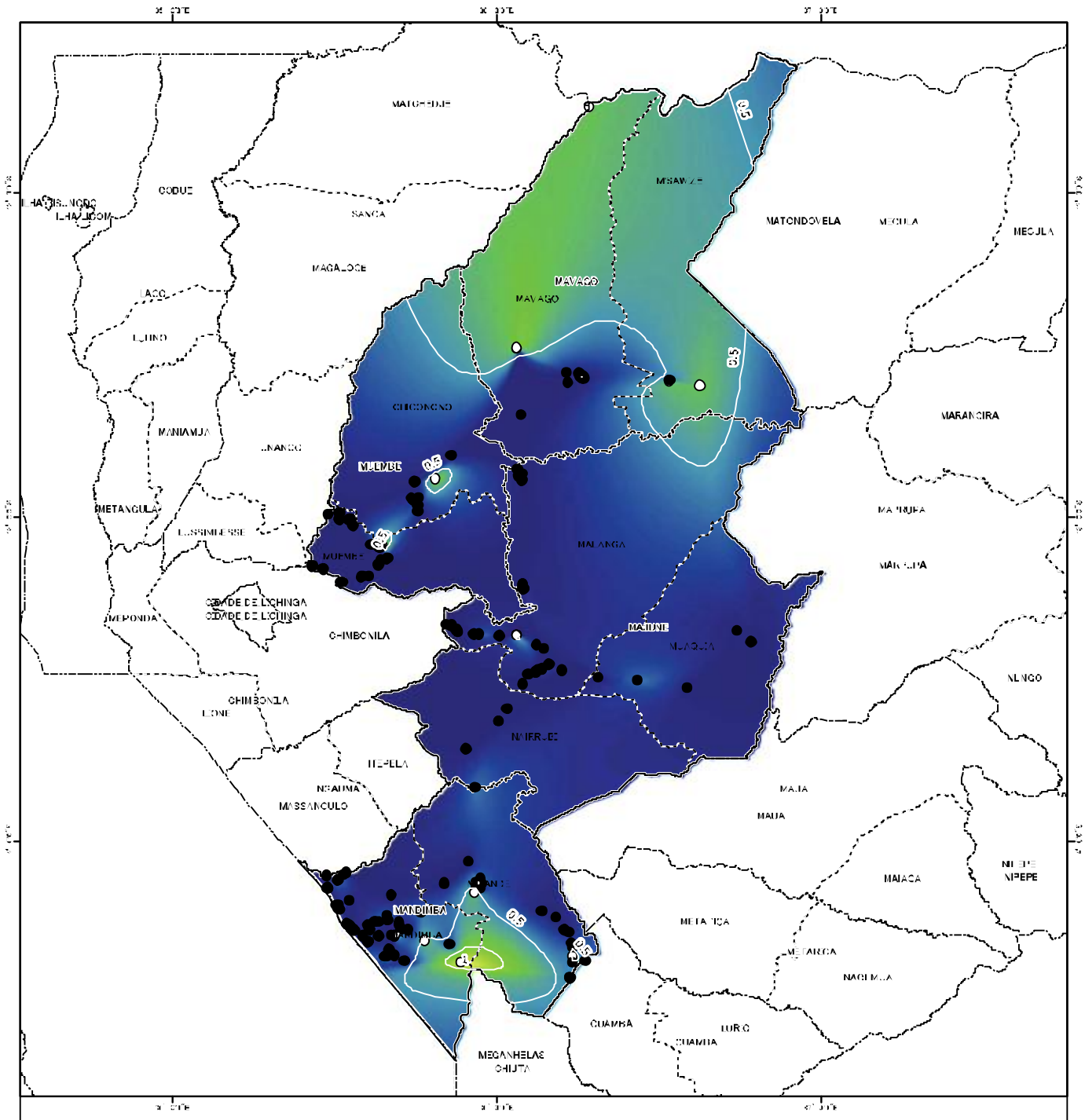
Provincia
Distrito
PA

* Based on PROSUAS baseline survey, 2013
* This map contains some errors because of limitation of water quality test

PROSUAS, 2015

1:1,300,000

0 15 30 60 90 120 km



Mapa de Qualidade de Água (Fluoreto)

Legenda

F (mg/L)

- 0.0 – 0.3 (146)
- 0.4 – 0.6 (34)
- 0.7 – 0.9 (12)
- 1.0 – 1.2 (3)
- 1.3 – 1.5 (1)

Provincia

Distrito

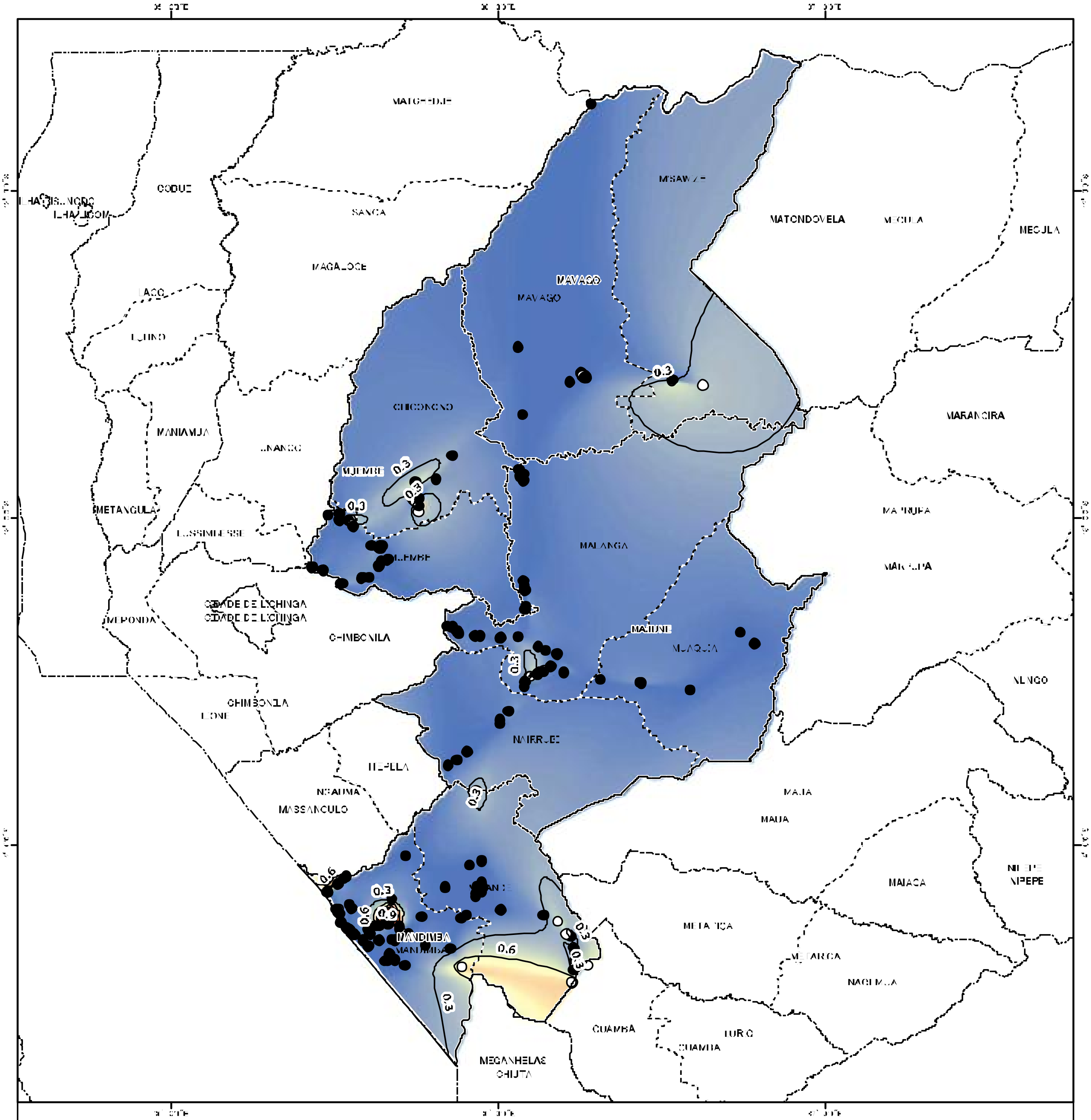
PA

* Based on PROSUAS baseline survey, 2013
* This map contains some errors because of limitation of accuracy of water quality test

1:1,300,000

0 15 30 60 90 120 km

PROSUAS, 2015



Mapa de Qualidade de Água (Fe)

Legenda

Fe (mg/L)

- ● 0.0 – 0.3 (184)
- ○ 0.4 – 0.6 (26)
- ○ 0.7 – 1.2 (5)
- ● 1.3 – 45.0 (3)

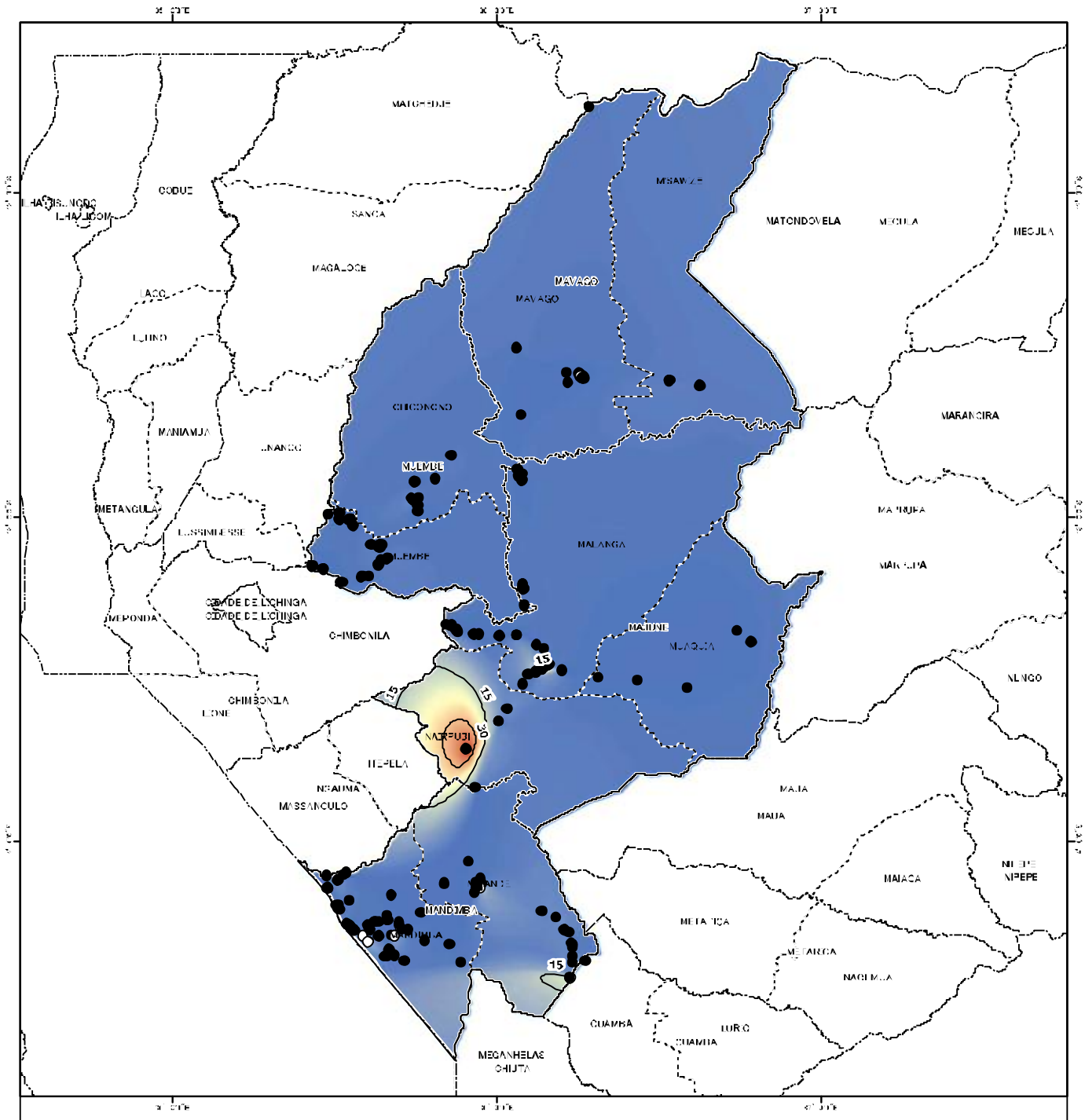
- Provincia
- Distrito
- PA

* Based on PROSUAS baseline survey, 2013
* This map contains some errors because of limitation on accuracy of water quality test

PROSUAS, 2015

1:1,300,000

0 15 30 60 90 120 km



Mapa de Qualidade de Água (NO3)

Legenda

NO3 (mg/L)

- 0.0 – 5.0 (185)
- 5.1 – 10.0 (2)
- 10.1 – 15.0 (0)
- 15.1 – 20.0 (7)
- 20.1 – 25.0 (0)
- 25.1 – 30.0 (0)
- 30.1 – 35.0 (0)
- 35.1 – 40.0 (0)
- 40.1 – 45.0 (3)

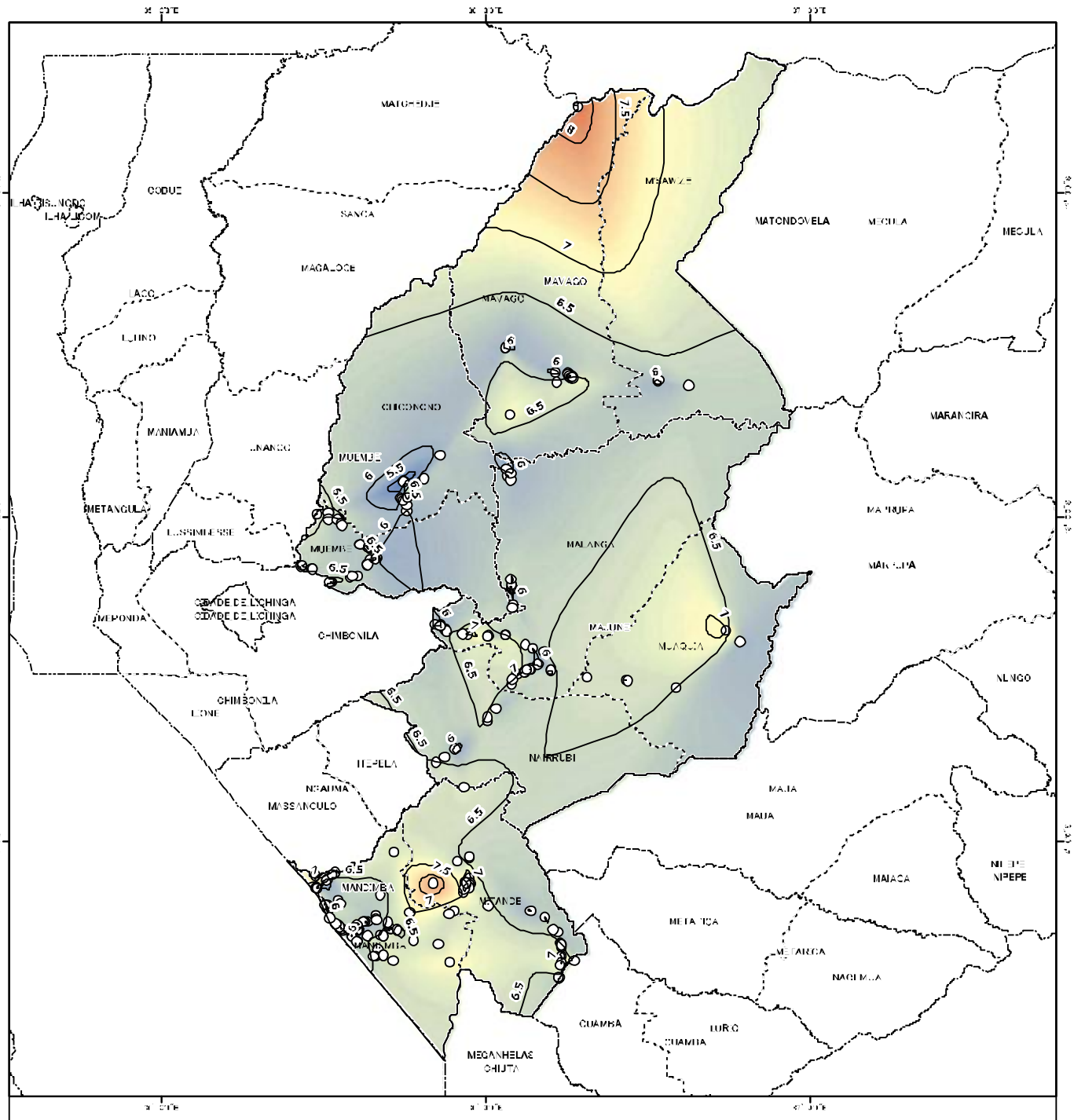
Provincia
Distrito
PA

* Based on PROSUAS baseline survey, 2013
* This map contains some errors because of limitation of accuracy of water quality test

1:1,300,000

0 15 30 60 90 120 km

PROSUAS, 2015



Mapa de Qualidade de Água (pH)

* Based on PROSUAS baseline survey, 2013
* This map contains some errors because of pollution on accuracy of water quality

1:1,300,000

0 15 30 60 90 120 km

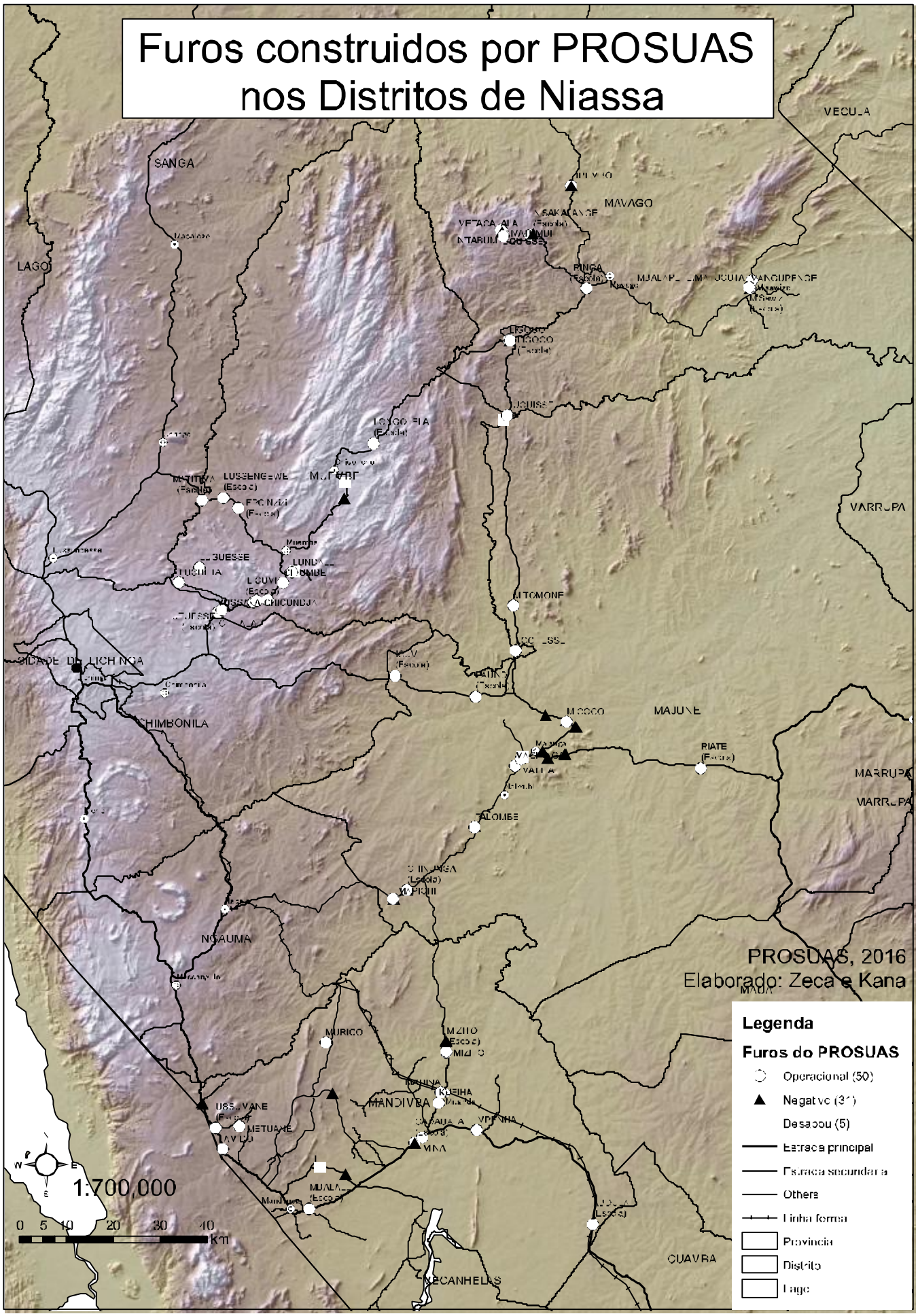
PROSUAS, 2015

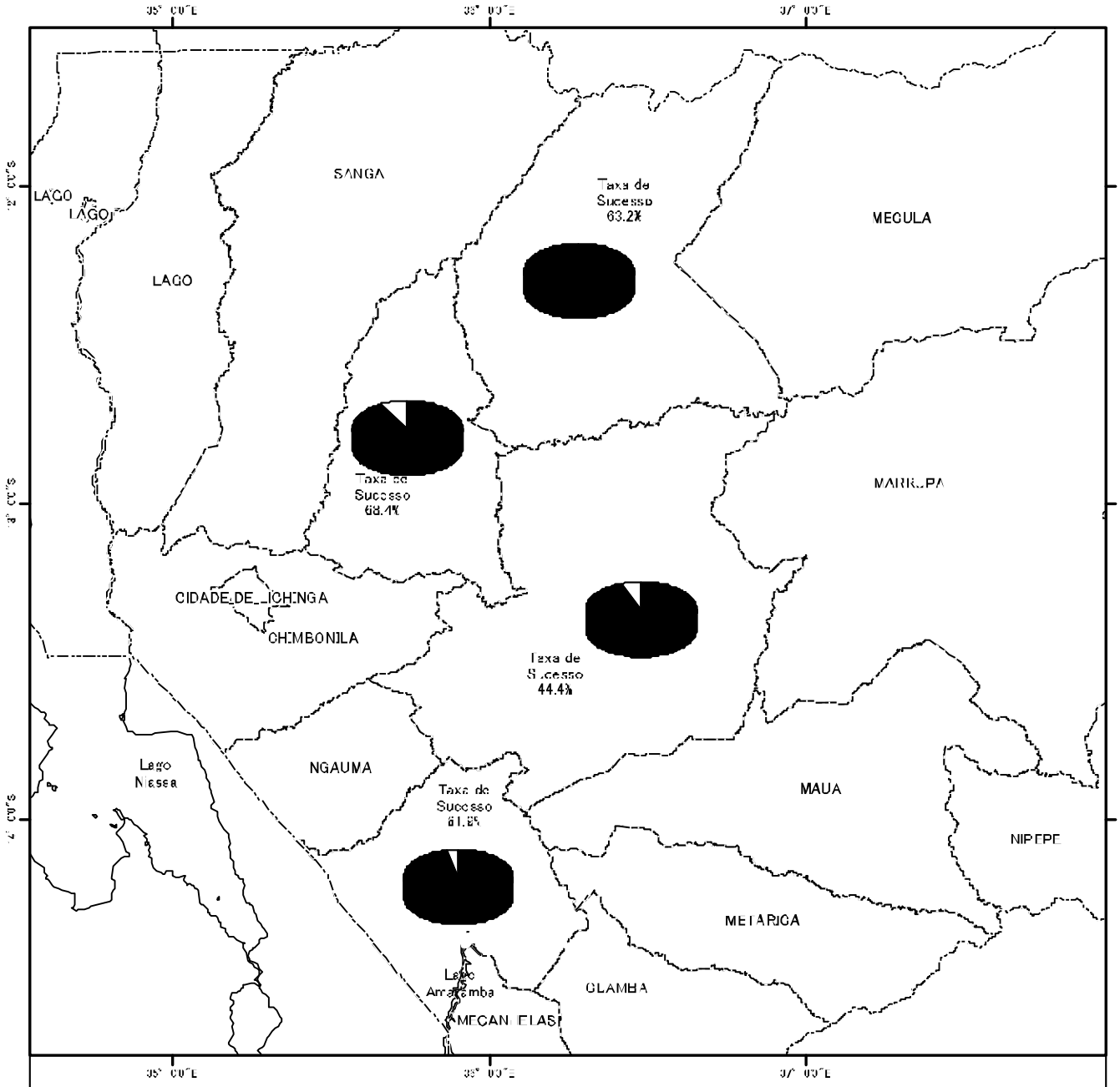
pH

- 5.01 – 5.25 (1)
- 5.26 – 5.50 (3)
- 5.51 – 5.75 (9)
- 5.76 – 6.00 (26)
- 6.01 – 6.25 (29)
- 6.26 – 6.50 (58)
- 6.51 – 6.75 (60)
- 6.76 – 7.00 (17)
- 7.01 – 7.25 (9)
- 7.26 – 7.50 (1)
- 7.51 – 7.75 (1)
- 7.76 – 8.00 (4)
- 8.01 – 8.25 (0)
- 8.26 – 8.50 (1)
- 8.51 – 8.75 (0)
- 8.76 – 9.00 (0)

Legenda

- Provincia
- Distrito
- PA


Furos construidos por PROSUAS nos Distritos de Niassa
VECULA
SANGA
MAVAGO
LAGO
VARRUPA
MAJUNE
CHIMBONILA
NSAUMA
MURICO
MANDIMBA
CUAVRA
MECANHELAS
PROSUAS, 2016
Elaborado: Zeca e Kana
1:700,000
0 5 10 20 30 40
KM
Legenda
Furos do PROSUAS
Operacional (50)
Negativo (31)
Desactivou (5)
Estrada principal
Estrada secundaria
Others
Linha ferrea
Provincia
Distrito
Lago



Mapa de Furos do PROSUAS (taxa de sucesso)

Legend

Operacional

Collapsed

Negativo

PROSUAS, 2016

N

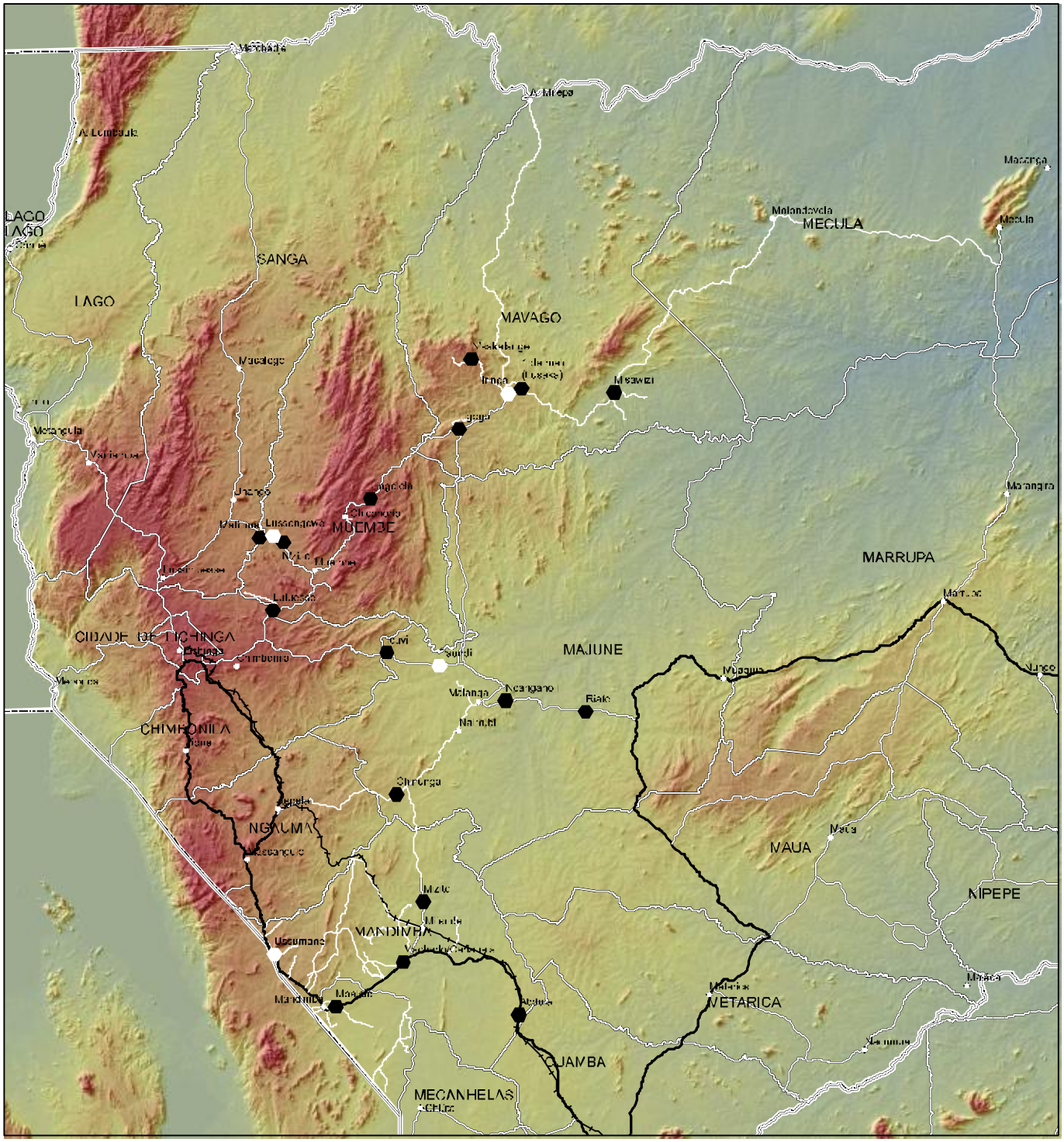
W E

S

1:2,000,000

0 15 30 60 90 120

km



Mapa de Latrinas do PROSUAS

N

1:1 200 000

0 12.5 25 50 75 100 km

Legenda

Latrinas do Prosuas

Ano

2014

2015

Provincia

Cidades

Distrito

Estrada principal

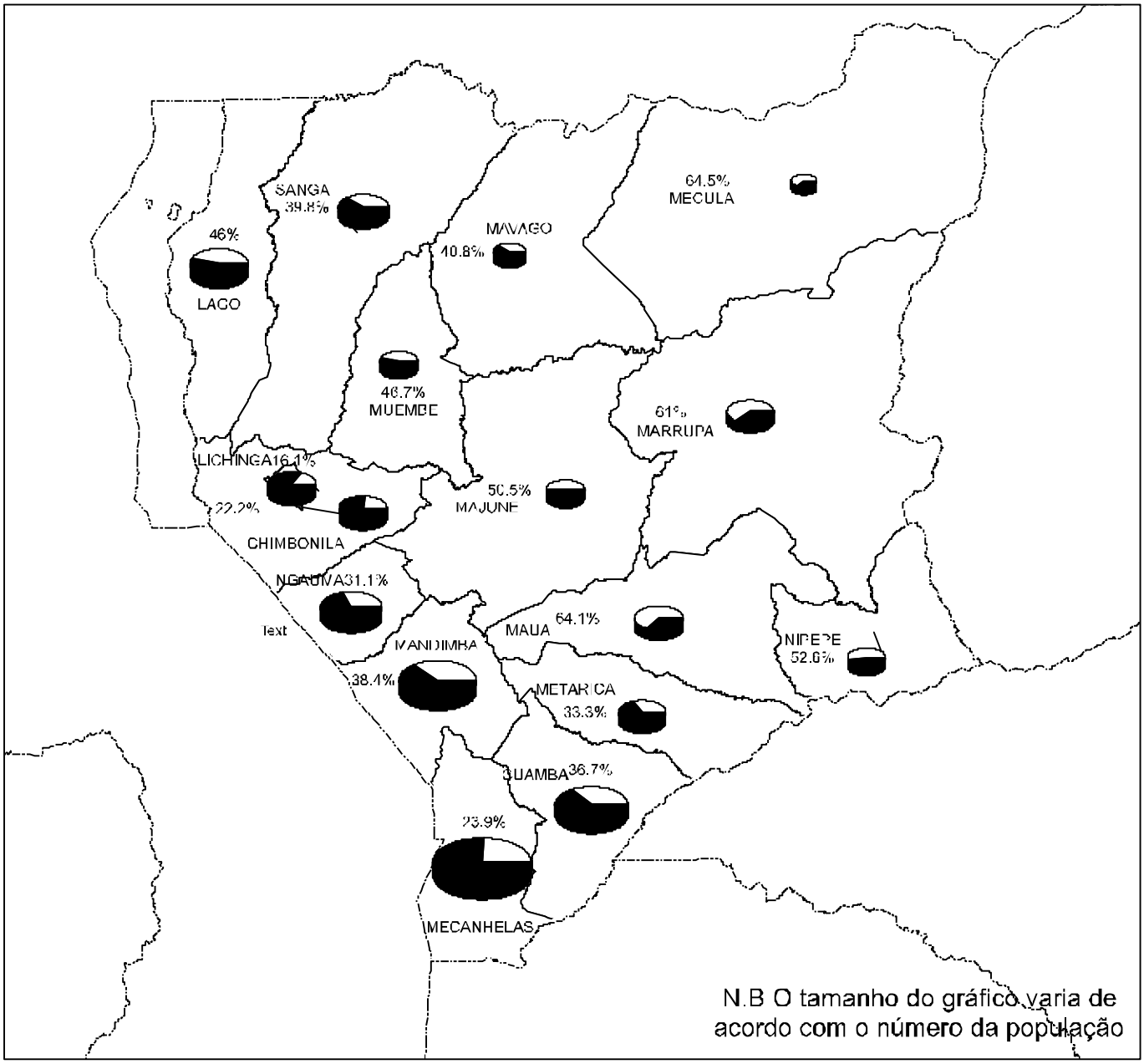
Estrada secundaria

Others

Linha ferrea

PROSUAS, 2016

Elaborado Por Zeca Carlos



Mapa de Cobertura sobre Abastecimento de Agua na Provincia do Niassa

2016

N

1:2 000 000

0 40 80 160 240 320 km

Elaborado por: Zeca Carlos, DAS, PROSUAS

Legenda

distrito_cobertura_2016

cobertura

- 0.0 % - 20.0%
- 20.1% - 30.0%
- 30.1% - 40.0%
- 40.1% - 50.0%
- 50.1% - 60.0%
- 60.1% - 100.0%

distrito_cobertura_2016

população rural

- 55 000
- população servida
- população não servida

ANEXO 8: Sumário da Avaliação Final do Projecto

Summary of the Results of Terminal Evaluation Survey

I. Outline of the Project	
Country : Republic of Mozambique	**Project Title** : The Project for Sustainable Rural Water Supply, Sanitation and Hygiene Promotion in Niassa Province
Sector : Water Resources Management	**Cooperation Scheme** : Technical Cooperation Project
Department in Charge : Global Environmental Department	**Cooperation Amount** (At the time of evaluation) : Approximately 918million yen (1US$=\103.4 as of June 30, 2016)
Cooperation Duration : January 2013 – February 2017	**Counterpart Organizations** : MOPH (Ministry of Public Works and Housing) / DNAAS (National Directorate of Water Supply and Sanitation), formerly called DNA DPOPHRH (Provincial Directorate of Public Works, Housing and Water Resources), formally called DPOPH SDPI (District Infrastructure and Planning Service) in 4 Districts (Mavago, Mandimba, Majune, Muembe) *The names of counterpart organizations were changed due to organization reform in December 2015.
	Relevant Japanese Organizations : Japan Techno Co., Ltd.
	Relevant Assistances : N/A

1-1 Background and Outline of the Project

Mozambique has shown political stability since the end of sixteen years' civil war in 1992 and has seen steady economic growth, with annual economic growth rate of more than 6% since 2000. The Government of Mozambique and development partners have been engaged in the reconstruction of the basic infrastructures that were devastated during the civil war but the development of social infrastructure is still one of priority areas in Mozambique. Niassa Province, the target area of the Project, is located in the north west of Mozambique and the largest province in the country, with 129,000km^2 area and 1,170,000 of population, equivalent to 5.8% of the total population (Census 2007). In the rural area of Niassa Province, the rate of population with access to safe water is 36.45% (2014), far below the national average, 52%. In addition, Niassa province has not been implemented large-scale assistance by development partners and the Province is the solitary region out of ten that shows downtrend in the rate of drinking water coverage. The needs for rural water supply and sanitation is still high.

In Nacala Corridor, which passes from the Nacala Port in northern Mozambique to Malawi and Zambia via Nampula and Niassa Provinces, is expected that the development of economic growth and distribution. The support for the development of Nacala Corridor is the highest priority in the Japanese assistance policy toward Mozambique. Major development partners, such as the World Bank, the African Development Bank, and UNICEF, have been implementing assistance programs in Nampula Province, while large-scale assistance is limited in Niassa Province.

With this backdrop, the Government of Mozambique asked the Government of Japan for Technical Cooperation Project on water supply and sanitation in Niassa Province with four districts (Mavago, Mandimba, Majune, and Muembe) as target area. The Project aims for improvement of water and sanitation through development of institutional capacity in planning, operation, and monitoring of related organizations of Mozambique.

1-2 Contents of Cooperation

The Project is implemented in four target districts (Mavago, Mandimba, Majune, Muembe) in Niassa Province to realize sustainable improvement of water and sanitation through technical assistance such as design and construction of water supply and sanitation facilities and sanitary education using local resources as well as institutional capacity development of province and districts.

(1) Overall Goal: Improve the situation of water supply and sanitation in Niassa Province.

(2) Project Purpose: Improve the situation of water supply and sanitation in target districts through institutional capacity building of DPOPH/DAS and SDPIs.

(3) Outputs :

Output 1: Improve the capacity of planning and preparation for water supply, sanitation and hygiene activities in the target districts.

Output 2: Construct new water points and latrines for school in the target district

Output 3: Enhance the capacity of operation and maintenance (O & M) of water points in the target Districts

Output 4: Improve hygiene behavior of the local residence in the target Districts.

Output 5: Disseminate and share the know-how and the lessons learned from the project with stakeholders of provincial and national level.

(4) Inputs

Japanese side: Total cost approximately 918 million yen

Equipment: 27.4 million yen;

Long-term Expert: 0; Short-term Expert: 10 (92.2 MM, as of August 2016);

Trainees received: 7; Local Cost: 412 million yen (planned at the time of terminal evaluation)

Mozambican side

Counterpart: 29 (cumulative total);

Office space for the Project;

Cost for project: Transportation/per diem of C/P and fuel for motorbikes, and other activity cost

II. Evaluation Team

Members of Evaluation Team	**Japanese side** 1. Mr. Akihiro MIYAZAKI	Director, Water Resources Team 2, Water Resources Group, Global Environment Department, JICA
	2. Mr. Yousuke SASAKI	Senior Consultant, SOWA Consultants Inc.
	3. Mr. Yukihiro AIZAWA	Special Advisor, Water Resources Team 2, Water Resources Group, Global Environment Department, JICA
	4. Ms. Erika TANAKA	Senior Researcher, Global Link Management, Inc.
	5. Mr. Alves Magassela	Interpreter
	Mozambican side Mr. Zacarias Rafael MANGUELLE	Lawyer
Period of Evaluation	19 July 2016 – 6 August 2016	**Type of Evaluation** : Terminal Evaluation

III. Evaluation

3-1 Project Performance

(1) Project Purpose

Project Purpose: Improve the situation of water supply and sanitation in target districts through institutional capacity building of DPOPH/DAS and SDPIs.

(Indicator)

1) Reduction by 10% of the number of people affected by waterborne diseases in the target Districts.

2) Increase of 33,600 beneficiaries with access to water supply in the target Districts.

3) Improve capacity of DPOPH/DAS and SDPIs in evaluation test.

(Achievement)

At the time of the terminal evaluation, there is not much effect observed in the statistical data in the Provincial Directorate of Health, as PEC activities were launched just after the completion of sanitation facilities. The repair of water points has not been completed. Therefore, the Project Purpose has not been achieved yet. However, the interview with the target communities confirmed that waterborne disease is decreasing. Also the population with access to water points is estimated to 34,500 if all the planned water points are constructed and repaired. The Project Purpose is expected to be achieved by the end of the Project.

1) According to the data on the number of patients who go to health center provided by the Provincial Directorate of Health, the number of patients of waterborne diseases decreased from 2013 to 2014 but increased again from 2014 to 2015. Therefore, the Indicator has not been achieved at the time of the terminal evaluation. In the target communities visited during the terminal evaluation, there is information of reduction of waterborne diseases. Water points and sanitation facilities were constructed in December 2015, so it is expected that effects of the Project will be more visible from the next year on.
2) After the completion of the construction and repair of water points in the target Districts, 22,500 people have newly obtained access to water supply at the time of the terminal evaluation. When all the repair work is completed, it is expected that 34,500 people will be benefitted in total.
3) The capacity of the staff of DPOPHRH/DAS and SDPI is evaluated based on pre-defined capacity check list. In the mid-term assessment, it is considered that 80% of the targeted level has been achieved.

(2) Output

Output 1: Improve the capacity of planning and preparation for water supply, sanitation and hygiene activities in the target districts.

(Indicator)

1-1) Periodical Provincial GAS meetings are held on a quarterly basis.
1-2) Water and sanitation issues are addressed in regular sessions of the Governments of target Districts on a quarterly basis.
1-3) 15 staff members of the Social Consultants who complete the training obtain the certificate.
1-4) SDPI in target districts receive the report from the social consultants.
1-5) Reports of baseline survey on conditions of water supply, sanitation and hygiene of local residents are prepared in the target Districts.
1-6) Hydrogeological map is updated.

(Achievement)

The Indicators of Output 1 have been achieved. It is evaluated that Output 1 has been achieved.

1-1) Provincial GAS meetings are held monthly. Participants at DPOPHRH (formerly called DPOPH), SDPI, development partners, and NGOs attend the meetings. Issues on water and sanitation are discussed.
1-2) Regular sessions of the target District Government were held periodically. At the regular District Government sessions, issues on water and sanitation are often discussed among topics in other sectors such as health and education.
1-3) Training for PEC activities was conducted for Social Consultants together with government staff and NGO staff. A total of 41 participants were provided with the certificate. Among them, 27 were Social Consultants and NGO staff members.
1-4) Each SDPI receives the report from the Social Consultants regularly.
1-5) The baseline survey report was completed in 2014.
1-6) The GIS database on water points, including hydrogeological data, has been update regularly.

Output 2: Construct new water points and latrines for school in the target district
(Indicator)

2-1) 50 new water points are constructed in the targeted Districts.
2-2) Supervision is conducted by SDPIs monthly.

(Achievement)
At the time of the terminal evaluation, the repair of water points (Indicator 2-1) is not completed and it is considered that the Output 2 has not been achieved yet. However, the repair is planned to be completed by the end of August and Output 2 is expected to be achieved by the end of the Project.

2-1) The construction of 50 water points is completed at the time of the terminal evaluation. A part from the construction of water points, 65 water points are repaired by the Project and total 20 school latrines were constructed in four target Districts. All the planned repair of water points will be concluded by the end of August 2016.
2-2) SDPI conducts regular supervision of water points.

Output 3: Enhance the capacity of operation and maintenance (O & M) of water points in the target Districts
(Indicator)

3-1) At least the recommended amount of MZN 2000 is saved by the water committee of each water point of the target communities by the end of the Project period.
3-2) The down time of water points per breakdown is reduced to less than 14 days in the target communities.
3-3) The annual implementation plan is prepared every year by DPOPH/DAS - NIASSA and District Governments/SDPIs in target Districts. .
3-4) 11 DPOPH/DAS Staff obtain a certificate after completion of training
3-5) DPOPH/DAS receive the report on water and sanitation, supervision, monitoring and assessment from the 4 SDPIs on a quarterly basis.

(Achievement)
All Indicators are achieved at the time of the terminal evaluation. It is evaluated that Output 3 has been achieved.

3-1) At the time of the terminal evaluation, the Project conducted a survey on the amount of contribution for operation and maintenance of water point. The average amount saved by the water committee in 4 Districts is 2365.3 MZN, which is enough to usual repair. The target of the Indicator is achieved.
3-2) The Project conducted a survey on the down time of water points in the case of breakdown. The average down time of water points per breakdown is 2.2 days in 4 Districts, well below the indicator.
3-3) At DPOPHRH and SDPI, the annual implementation plan is prepared every year.
3-4) The Project organized a variety of training courses conducted by lecturers at CFPAS (Centro de Formação Profissional de Agua e Saneamento) on the topics such as groundwater management, GIS, PEC (Community participation and education, original in Portuguese) activities. An average of 20 staff members at DPOPHRH and SDPI attended each course and obtained the certificates.
3-5) DPOPHRH/DAS regularly receives the report on water and sanitation from the 4 SDPIs. In Niassa, a set of necessary equipment for SINAS (National water sector information management system) was provided by DNAAS in September 2015 and the Project has been supporting capacity development on data collection and data entry. SINAS has not been fully functioning yet as expected since some computers and softwares are still under setting by DNAAS, but the reports on water and sanitation using SINAS format are regularly sent from SDPI in 4 target Districts to DPOPHRH/DAS.

Output 4: Improve hygiene behavior of the local residence in the target Districts.
(Indicator)
At the time of the terminal evaluation, the number of communities that achieved ODF is 15 and

the Indicator is not achieved yet. However, as support toward achievement of ODF is continuously implemented by consultants and PEC Activistas, there is a good prospect of achievement of this Output if the procedure of ODF evaluators is standardized.

4-1) At least 50 % of people who defecate in the open air in each target community abandon open defecation.

4-2) At least 50 % of people who do not practice appropriate hand washing in each target community practice appropriate hand washing after defecation.

4-3) 60 communities reach Open Defecation-Free Status (declared as ODF).

(Achievement)

4-1) During the baseline survey conducted in 2013, it was observed that 49 people had practiced open air defecation. In November 2015, it was confirmed that people abandoned open defecation practice in 22 communities. Also the result showed that about 29% of those 49 people belong to the above mentioned 22 communities. In the communities visited during the terminal evaluation, all the households have latrine, and there is not open defecation any more.

4-2) The survey in November 2015 confirmed that in 18 communities all the households had hand washing facility and soap (or ash) near the latrine. During the visit of the terminal evaluation, it is also confirmed that they had hand washing facility and soap near the latrine.

4-3) In the ODF evaluation conducted in November 2015, 15 target communities achieved ODF status. In the ODF evaluation conducted in November 2015, it was pointed out that the evaluation procedure was not fully understood by the evaluators. Due to this problem, it is probable that some communities which fulfilled the criteria was not declared as ODF due to the unclear procedure.

Output 5: Disseminate and share the know-how and the lessons learned from the project with stakeholders of provincial and national level.

(Indicator)

5-1) 3 types of manual / guidelines are prepared and shared with all districts in Niassa province.

5-2) The progress of the project is presented more than 3 times in National GAS (Group of water and sanitation) meetings.

5-3) 10 Technicians from other Provinces visit Niassa Province to see the Project activities.

5-4) Web site of Provincial GAS is updated more than once a month.

(Achievement)

A part of manuals has not been approved and the Indicator in regard to the presentation at the National GAS meeting has not been achieved. The manuals will be soon approved, but the National GAS meeting had not been held just before the terminal evaluation due to organizational reform, therefore, there has not been an opportunity of presentation. During the terminal evaluation, it was confirmed that the National GAS meeting was resumed but it seems difficult to achieve the Indicator, presentation more than three times, given the remaining project period. Thus, it is suggested, in Recommendation, that the Project utilize national-level occasions such as national GAS to promote the effects of the Project.

5-1) The Project is developing three manual/guidelines, namely, the Manual on Operation and Maintenance of School Latrine, the Manual on Establishment and Management of Spare Parts Supply Chain, and the Manual on Supervision of Construction of Water Points. Drafting has been finished for all three Manuals. The Manual on Establishment and Management of Spare Parts Supply Chain and the Manual on Operation and Maintenance of School Latrine are currently under verification by stakeholders such as C/P organizations and other development partners for comments. The remaining one (Manual on Supervision of Construction of Water Points) is expected to be presented to the stakeholders soon.

5-2) The National GAS of October 2015 was held in Niassa Province and the Project made

presentation and received visits from participants all over the nation. After the National GAS in 2015, the National GAS was not organized for a while due to some coordination matter and there was no opportunity for presentation.

5-3) Nine officials of Maputo Province visited the Project in 2013 and more than 20 officials visited the Province in 2015 at the National GAS. At these occasions, the progress of the Project was shared among those concerned.

5-4) Web site is updated regularly. It is expected that more information will be uploaded and updated in the web site regularly in near future.

3-2 Summary of Evaluation Results

(1) Relevance

Relevance of the Project is high.

In Mozambique, the needs of provision in safe water and sanitation are high and the Project is in line with the policy of the Mozambican government. The Project is also in accordance with the Japanese assistance policy toward Mozambique. For example, Nacala Corridor Development and human development for local resources are implemented.

(2) Effectiveness

Effectiveness is relatively high.

Indicators of the Project Purpose are partially achieved. Out of three indicators of the Project Purpose Indicator 2 and Indicator 3 are expected to be achieved by the end of the Project period. In regard to Indicator 1, it is not very clear if the Indicator is achieved by the end of the Project. The number of waterborne diseases decreased from 2013 to 2014 but increased from 2014 to 2015. Water points and sanitation facilities were constructed in December 2015, so it is probable that benefits of the Project have not been fully reflected in the statistics. Moreover, the incidence of waterborne diseases depends not only on water and sanitation but on other factors as well. These issues should be taken into consideration. Interview with target community people disclosed that there is clear decrease in waterborne diseases in the community after the construction of water points and PEC activities. Given these situations, it is considered that the Project have a certain level of effect on the reduction of waterborne disease in the target communities.

Logic from Output to the Project Purpose is appropriate in general. Five Outputs are logically related to the Project Purpose, improvement of the situation of water and sanitation. Regarding the Important Assumptions described in PDM, there was not a major change of personnel on either Mozambican or Japanese sides.

(3) Efficiency

Efficiency is high.

Outputs are expected to be achieved by the end of the project period. The inputs of the Japanese side were implemented without major problem. In regard to the Mozambican inputs, at least 2 members are assigned at each District. With this allocation, it is expected that activities are continuously implemented by the C/Ps even if one of them is transferred to some other workplace. All the inputs on both sides are appropriately utilized and contributed to the achievement of Outputs. Thus efficiency is high.

(4) Impact

The prospect of achieving impact is relatively high. As to the waterborne diseases, it may take a certain period of time to have clear impacts.

Overall Goal is likely to be achieved. One of the Indicators of the Overall Goal, that is, increase of the number of population with access to water supply, is likely to be achieved in near future, when more water points are constructed by the Districts and other development partners. Also the expansion of the spare parts supply chain established by the Project may contribute to increase number of the people with access to water points. As for the other Indicator of the

Overall Goal, reduction of the number of waterborne diseases, statistically, there is no clear tendency of the reduction at the time of the terminal evaluation. However, in the target communities the incidence of waterborne diseases is clearly reduced and it is considered that after a certain period of time, it may be likely that waterborne diseases will be reduced in the Province in the future. It should be noted, however, that there are many factors affecting the incidence of waterborne diseases other than availability of water points and sanitation facilities.
Dissemination of the Project benefit is important to achieve the Overall Goal. As a part of efforts for dissemination, the Project conducted training on SINAS in 5 non-target Districts based on the request of DPOPHRH. The Project also provided support on establishment of the spare parts supply chain to 3 additional Districts where no other development partners assistance. In addition, Swiss Agency for Development and Cooperation is considering introducing school latrines with the same specifications as those of the Project and applying the manuals for the spare parts supply chain to the target area.
As to the logic from the Project Purpose to the Overall Goal, in the Overall Goal, it is expected that the reduction of waterborne diseases and the increase of population with access of safe water be achieved at provincial level. This is appropriate in terms of logic of expansion of the Project benefits. In the evaluation of the achievement of Indicators, careful consideration is necessary. In regard to the first indicator, there are various external conditions affecting the number of waterborne diseases. As to the second Indicator, the increase of population with access to safe water, it is difficult to say how much the Project contribute to the increase as each District constructs water points on their own initiative and has support from other development partners.
Several positive impacts are observed. One example is school building repair as a result of collaboration promoted by the Project. In August 2016, government staff and development partners from Nampula and Cabo Delgado Provinces are planning to visit the Project. It is expected that the visit may be an opportunity to expand the Project benefits to other Provinces. In Muembe District, there was a strong wind in 2015 and three school buildings were seriously damaged. At one Project target school, where water point and school latrine were constructed and PEC activities were implemented by the Project, the constructing companies, District, and community people contributed materials and they repaired the school building among themselves.
No negative impacts were reported so far.

(5) Sustainability
Sustainability is expected if budget is secured to continue the activities introduced by the Project.

1) Policy sustainability
   The Mozambican policy on water and sanitation will not be changed and the support by development partners, including support through PRONASAR (National program of water and sanitation) in collaborations among development partners, is expected to continue. Sustainability of policy aspect is expected.
2) Organizational sustainability
   The institutional capacity of the C/P organizations has been improved through the Project. The monitoring system for water and sanitation, i.e., SINAS, is functioning as well as spare parts supply chain. Financial sustainability
3) Financial sustainability
   The C/P organizations have disbursed necessary cost for the Project without problem during the Project period. Also, the C/P organizations are planning to secure the budget for the next fiscal year, requesting the budget in the annual implementation plan. However, due to some problem in fund utilization (interview by JICA experts), a part of development partners are suspending financial support for the common basket fund of PRONASAR. Therefore, there is possibility that activities such as PEC and spare parts supply chain monitoring may be stagnated.

4) Technical sustainability

The capacity of C/P personnel is improved although further technical improvement is necessary, for example, on GIS. The technicians at C/P organizations frequently exchange knowledge and techniques among them. Sometimes they teach each other as “peer training”, which shows technical sustainability of C/P.

5) Promoting and inhibiting factors of sustainability

As a promoting factor of sustainability, continuous improvement of the capacity of C/P personnel is pointed out. One possible inhibiting factor is the shortage of fund of C/P organizations and stakeholders such as water committee.

3-3 Factors Promoting Better Sustainability and Impact

(1) Factors Concerning to Planning

To promote involvement of farmers, the project adjusted the schedule of PEC activities to be off in the farming season.

(2) Factors Concerning to Implementation Process

To continuously improve capacity of the District technicians, the Project promoted peer training, where they share and teach each other knowledge and techniques among them. Another promoting factor is capacity development of local human resources in private sector, such as constructing companies, PEC consultant, and PEC volunteers called Activistas.

3-4 Factors Inhibiting Better Sustainability and Impact

(1) Factors Concerning to Planning

Nothing special.

(2) Factors Concerning to Implementation Process

If water and sanitation committees fail to collect fund from the community people, there is possibility that operation and maintenance of water points is not appropriately conducted. In Mozambique, there is an increase in prices caused by change of exchange rate. It may be possible that communities will not be able to purchase spare parts due to price increase.

3-5 Conclusion

The Project is in line with the needs of the target area, the Mozambican policy on water and sanitation, and the Japanese assistance policy toward Mozambique, therefore, relevance is high. The Project Purpose is partially achieved. Out of three Indicators of the Project Purpose, two have been achieved already. As to the other Indicator, the incidence of waterborne diseases depends on several factors other than water and sanitation. Therefore, effectiveness is relatively high. As inputs were appropriately implemented and expected Outputs are achieved, efficiency is high. One of the Indicators of the Overall Goal is already achieved but it will take some time to have impacts on the incidence of waterborne disease as there are various factors affecting waterborne diseases. Thus, impact is relatively high. Sustainability is expected if the budget to continue the project activities is constantly secured. As planned Outputs are expected to be achieved and the Project Purpose is being achieved in general, the Project will be terminated as planned.

3-6 Recommendations

(1) Through PEC activities, water committees have been activated in target communities but it is observed that some water committees in non-target communities still have difficulties in smooth operation. It is recommendable that the Districts support activation of the water committees, including the fund management, in non-target communities of the Project in the target Districts.

(2) After the project, it is important to conduct the activities introduced by the Project with the initiative of DPOPHRH and collaboration among District. The SDPI technicians trained by

the Project are expected to conduct technical transfer to other technicians in non-target Districts.

(3) It is expected that DPOPHRH and SDPI to continue implementation of project activities. To realize this, it is necessary for DPOPHRH and SDPI to secure the necessary budget in their annual implementation plan.

(4) In regard to monitoring of water and sanitation, DPOPHRH and SDPI should further promote the utilization of SINAS.

(5) DPOPHRH is advised to effectively use the vehicles supplied by JICA to continuously conduct monitoring for water points, water committees and spare parts supply chain.

(6) To continuously promote activities in communities, it is expected that Activistas will continue to improve water and sanitation conditions in communities.

3-7 Lessons Learned

(1) The Project contains a variety of components such as construction of water points, establishment of spare parts supply chain, activation of water committee, and promotion of hygiene and sanitation. Through the comprehensive process related to water and sanitation, in all the stages from planning, implementation, and monitoring, technical transfer was implemented. All the components, including construction and sanitation activities, are related to each other and necessary to produce the expected benefits. It can be said that the comprehensive project design is effective to produce benefits.

(2) In the Project, local construction companies were hired to construct water points and school latrines. The Project managed the construction work of the contracted companies with local supervisors. Through the collaboration with local contractors and local supervisors, the Project contributed to the improved quality of construction works in the Province. It is effective to manage the construction process by the Project, with supervision by local experts.

(3) The Project hired private consultant organizations and NGOs in the Province in PEC activities and conducted training for the hired social consultants. The consultants are familiar with the local situations and they conducted PEC activities very effectively. Collaboration with local private consultants with appropriate training is effective in community activities.

(4) In regard to PEC activities, consultant teams were hired by the Project, and the consultant teams trained Activistas, who work with the team in the communities on a voluntary basis. The capacity of Activistas has been improved and they are willing to work with the community after the completion of the Project. Capacity development of volunteer activistas will contribute to continuous implementation of activities after the project. To realize this, it is necessary to conduct effective activities during the Project period to get the activistas motivated.

(5) The Project promotes peer training where technicians learn each other. Peer training is effective in capacity building of C/P personnel and this will enhance sustainability after the project period.

(6) In the Project, at least two technicians are allocated to each organization and the allocated technicians constantly share information and work together. Even if one personnel leaves the position, the remaining personnel will be able to implement project activities and the knowledge and skills transferred through the Project are sustained at the organization. Allocation of more than one personnel as C/P would be helpful in technical transfer and sustainability.

(7) In the spare parts supply chain established by the Project, existing local shops are included in the chain as a key collaborator. The shops are already well known among the local community and they are willing to continue the collaboration after the Project. For sustainable spare parts supply, it is effective to involve existing local shops in the spare parts supply chain.

(8) In the Project, various activities have been conducted, for example construction of water

points, revitalization of water committee, and establishment of spare parts supply chain. These activities were completed at the time of the terminal evaluation, and District technicians are conducting monitoring to review if these activities are appropriately implemented. In activities where some organizational structure is established, it is desirable to develop the monitoring system at the early stage of the project period and to allocate a certain time for monitoring before the end of the Project. This allows the Project to review the established system, to make modification, if necessary, and thus, to strengthen the system.