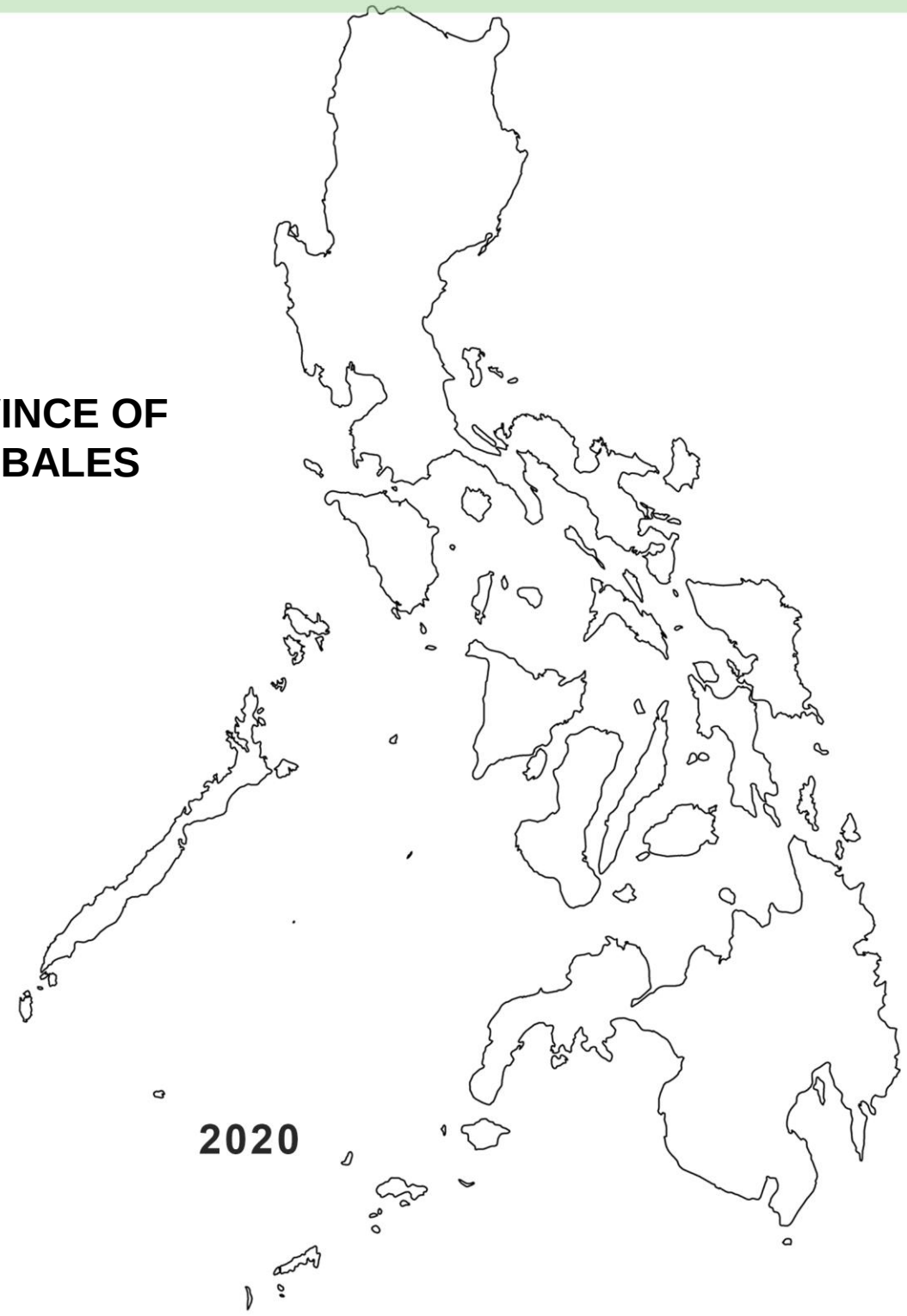
DEPARTMENT OF AGRICULTURE
Bureau of Soils and Water Management

Agricultural Land Management and Evaluation Division

National Mapping, Characterization and Development of Spatial Database for the Coastal Areas Affected by Salinity

PROVINCE OF ZAMBALES



2020

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RATIONALE

Salinity is long time known as one of the problem soils. It directly affects the agriculture and fishery sector in terms of productivity and income. Seriously salt-affected soils result to a total crop failure. The reasons for salinity are 1) increasing trend in sea level rise, 2) over pumping of the aquifers, and 3) seepage along the river — that is, when seawater moves upstream into the river during periods of high tide and low river flow.

The Bureau of Soils and Water Management (BSWM) have initiated several studies regarding soil salinity, but a nationwide information system has never been developed for areas affected by salinity. A baseline information on salinity will be a significant input in infrastructure planning in agriculture and fishery, risk management — particularly disaster risk management and climate change adaptation, — and policy recommendations.

Based on BSWM Reconnaissance Survey in 1988, forty five (45) provinces are identified affected by salinity. They represent more than half of the country's provinces. However, the extent of this condition to Philippine soils is not yet established and thus the subject of this project.

This project generally aims to develop a national information system for the coastal areas affected by salinity. Specifically, it aims to:

1. describe the soil physico-chemical characteristics;

2. generate salinity maps;

3. develop spatial database on salinity for the coastal areas;

4. undertake suitability evaluation for agriculture and fisheries and prepare scenarios as input to policy.

ZAMBALES

I. SOIL/LAND PHYSICAL CHARACTERISTICS

A. General Description of Saline Affected Area

Zambales lies on the western shores of Luzon island along the West Philippine Sea. Its shoreline is rugged and features many coves and inlets. The Zambales Mountains in the eastern length of the province occupies about 60% of the total land area of Zambales. Subic Bay is at the southern end of the province that provides a natural harbor.

The summit and crater lake of Mount Pinatubo lies within Botolan, Zambales, near the tripoint of Zambales, Pampanga and Tarlac provinces. Lake Pinatubo is the deepest lake in the Philippines.

There are ten (10) coastal municipalities susceptible to salinity, hence the sites for soil sampling shown in Table 1.1

Table 1.1. Coastal Areas and Municipalities in Zambales

No.	Municipality	No. of Barangay	No. of Sampling Sites	No. of Soil Samples Collected
1	Botolan	31	5	15
2	Cabangan	16	7	21
3	Candelaria	16	9	26
4	Iba	14	5	15
5	Masinloc	14	4	12
6	Palauig	19	4	12
7	San Antonio	14	3	9
8	San Felipe	11	4	12
9	San Narciso	17	3	9
10	Sta. Cruz	25	9	25
	TOTAL	**177**	**53**	**156**

B. Land Management Unit (LMU)

Land Management Unit is a recurring pattern of land which possesses similar physical characteristics such as soil type associated with relatively uniform land use or vegetation cover and parent material. The land management unit is the basis for integration of various resource information in suitability rating for different crops wherein each suitability class can be fitted with specific sets of management requirements and input. It is the building block of the pedo -

ecological zone, which represents a broader landscape grouping such as lowland, upland, hillyland and highland. Table 1.2 shows the LMUs of the sampling sites per coastal municipality.

Table 1.2. Land Management Units of Sampling Sites

LMU	Description	Municipality	Pictures
01 Active Tidal Flat (developed fishpond/ salt beds)	Level to nearly level of the coastal landscape. The drainage was poor with partially to highly decomposed plant remnants found on all layers of the soil.	Sta. Cruz	
02 Active Tidal Flat (natural mangrove/ nipa)	The area is planted to mangrove /nipa usually submerged with sea water. Crab holes and mounds were observed on the soil surface.	Botolan Candelaria Masinloc Palauig	
08J Beach Ridges and Swales	Beach ridges are elongated ridges consisting of sandy materials formed by wave action.	Botolan Cabangan Iba San Felipe	
09 Broad Alluvial Plain	Generally flat low relief. The soil are very deep clay or heavy clay, moderately well drained to poorly drained, highly fertile and adaptable to wide range of crops dominated by paddy rice irrigated and non-irrigated.	Botolan Cabangan Candelaria Iba Masinloc Palauig San Antonio San Felipe San Narciso Sta. Cruz	 
12 Lower River Terraces (<100 masl)	Located in a lower broad alluvial plain above the active flood plains. The risk of seasonal flooding is more severe.	Cabangan Palauig Masinloc	

C. Flooding

The province has many rivers that drains on the shallow broad channels and wide flood plains. Majority of the farmer respondents observed flooding during the month of August, when the amount of rainfall is maximum. Severe flooding can be at an average depth higher than 1.0 m lasting for 1 day. It affects the agricultural land in low lying areas.

D. Elevation

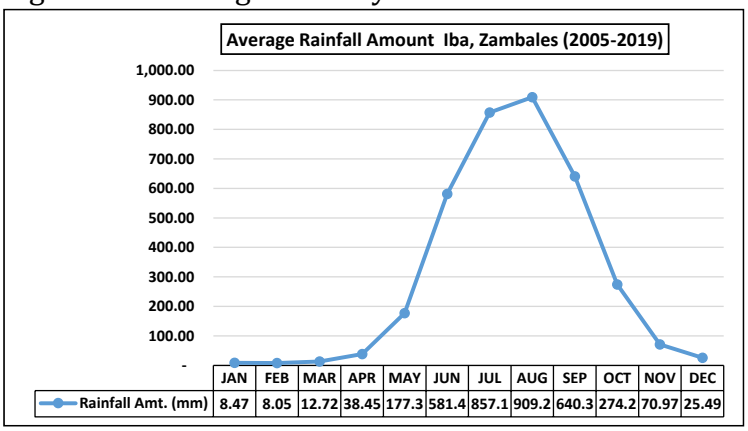
The elevation of a geographic location is the height above sea level (meters above sea level). Since the coastal areas are in the lowland pedo-ecological zone, soil sampling points are taken from elevations ranging from 0-5masl and 5-10masl.

E. Agro-Climate

Zambales belongs to Type 1 climate based on the Modified Corona's Classification of Climate. It is dry during November to April, and wet during the rest of the year as shown in Figure 1.1 the average monthly amount of rainfall from the Philippine Atmospheric, Geophysical and Astronomical Services Administration (PAGASA) station in Iba, Zambales.

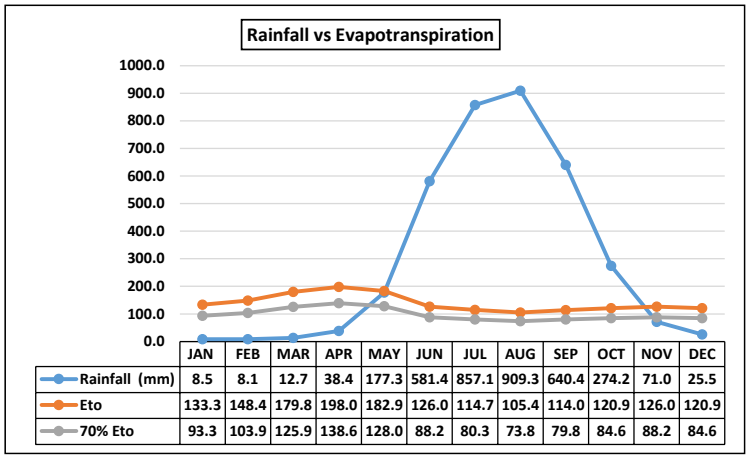
The hottest mean temperature is 29.25°C in May, while the coldest is 24.65°C in August.

Figure 1.1 Average Monthly Amount of Rainfall



	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
Rainfall Amt. (mm)	8.47	8.05	12.72	38.45	177.3	581.4	857.1	909.2	640.3	274.2	70.97	25.49

Figure 1.2 Comparison of the Average Rainfall and Evapotranspiration



	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
Rainfall (mm)	8.5	8.1	12.7	38.4	177.3	581.4	857.1	909.3	640.4	274.2	71.0	25.5
Eto	133.3	148.4	179.8	198.0	182.9	126.0	114.7	105.4	114.0	120.9	126.0	120.9
70% Eto	93.3	103.9	125.9	138.6	128.0	88.2	80.3	73.8	79.8	84.6	88.2	84.6

Evapotranspiration (Eto) is the sum of water transpired by the leaves of the crop and evaporation from the surrounding soil when water is not limited. Ideally, rainfall is considered to be sufficient if its amount is equal or higher than the potential evapotranspiration. In Figure 1.2 comparison of rainfall and evapotranspiration in Zambales, the average rainfall is relatively higher than the potential evapotranspiration from June to October. This means that soil moisture is sufficient to support crop cultivation. However, for the months of November to May, there is a need for supplemental irrigation.

F. Land Use/Vegetation

Land use involves the management and modification of natural environment. It also has been defined as "the total arrangements, activities, and inputs that people undertake in a certain land cover type." Land use and vegetation plays an important role in the identification of areas affected by salinity. It provides primarily indicative information on the physical and socio-economic activities prevailing in the area. On the other hand, salinity reduces the kinds of crops that can be grown for economic purposes due to chemical reactions between salt water and soil clay particles.

The common land use/vegetation in Zambales sampling sites are presented in Table 1.3. Some indicators of salinity per municipality are also indicated in this table.

Table 1.3 Land Use/Vegetation in Zambales Sampling Sites.

Municipality	Land Use/Vegetation	Some indicators of Salinity
1. Botolan	Paddy rice non irrigated	
2. Cabangan	Paddy rice non irrigated, fishpond	Mangrove/nipa
3. Candelaria	Paddy rice non irrigated, fishpond	Mangrove/nipa, aster weeds and sedges
4. Iba	Paddy rice non irrigated, fishpond	Mangrove/nipa
5. Masinloc	Paddy rice non irrigated, fishpond, cassava, mango	Mangrove/nipa, aster weeds and sedges
6. Palauig	Paddy rice non irrigated, cassava, mango	Aster weeds and sedges
7. San Antonio	Paddy rice non irrigated	
8. San Felipe	Paddy rice non irrigated, fishpond	
9. San Narciso	Paddy rice non irrigated	
10. Sta. Cruz	Paddy rice non irrigated, fishpond	Mangrove/nipa, stunted growth, aster weeds and sedges

Figure 1.3 Key Informant Interviews

II. CROP PRODUCTION ON SALINE AFFECTED AREAS

A. Key Informant Profile

Based on the 31 farmer respondents with 5:26 female-male ratio, the average age of farmers is 54. The eldest and youngest is 74 and 39 years old. Most of the farmer respondents are tenants (55%), the rest are the owners of their farm (45%). The average farm size is 1.24 hectares per farmer and their average farming experience is 17 years.

B. Farm Production

The seasonal crops in Zambales that contribute to agricultural productivity are rice, root crops, vegetables, corn and sugar cane. Table 2.1 shows that the area planted to rice as the highest (22,489 hectares), followed by root crops and vegetables.

For perennial crops, Carabao mango has the highest number of bearing trees (267,544 trees) followed by banana with 201,685 trees, while coconut have only 8,784 trees.

Table 2.1 Extent of Major Agricultural Crops in the Province of Zambales

CROP	AREA (hectares)	%
Rice	22,489.08	77.87
Irrigated	12,797.93	
Rainfed	9,288.25	
Upland	403.00	
Root crops	4,504.14	15.60
Vegetable	1,472.15	5.10
Corn	356.00	1.23
Sugarcane	57.00	0.20
TOTAL	**28,878.37**	**100**

Source: Provincial Agriculture Profile CY 2014

C. Farm Input

The study is limited to the coastal communities of the province, therefore, the information on farm inputs is mainly based on the key informant interviews. Farmer respondents usually use commercially available rice seed varieties as shown in Table 2.2.

Table 2.2 Rice Seed Varieties Commonly Used by Farmers in Zambales

Seed Variety	Description
NSIC Rc 160 (Tubigan 14)	Has intermediate reactions to two major rice diseases, blast and bacterial leaf blight
NSIC Rc218 SR (Mabango 3)	Susceptible to blight and tungro. Intermediate to bacterial leaf blight and brown planthopper. Moderately susceptible to green leafhopper and white stem borer.
PSB Rc18 (Ala)	Moderately susceptible to stem borer; intermediate reaction to blast, bacterial leaf blight, tungro, brown planthopper, and green leafhopper
NSIC 2014 Rc360 (Tubigan 31)	Resistant reaction to Stemborer. Susceptible to BLB, Blast,Sheath Blight, Tungro and BPH.
NSIC Rc508 (Tubigan 42)	Moderately resistant to Blast,BLB,BPH and GLH. Susceptible to Tungro and Sheath Blight.

For fertilizers, they use inorganic fertilizers like urea (46-0-0), complete (14-14-14), and ammonium phosphate (16-20-0). They also use chemical Vida herbicide, and insecticides like magnum and karate.

D. Source of Irrigation

Based on the 31 farmer respondents, all of their rice farms are rainfed, only 29% of them use water pumps to have supplemental irrigation from nearby creeks and springs during times when rainfall fails to provide sufficient moisture for normal plant growth.

E. Period of Salinity Occurrence and Practices to Address Salinity

Majority of the farmers said that they observed salinization in the soil during dry months, and they are willing to adopt saline resistant rice varieties and other suitable crops considering salinity. Their common practices to address this is to left the land idle during dry season and irrigate (by pumping water from nearby river) during time of low tide. In addition, based on observations during field work, the application of gypsum and organic materials to the soil can help neutralize the salt content of the soil.

Figure 2.1 Auger Boring and Pit Boring

Figure 2.2 Air Drying and Pulverizing of Soil Samples

Figure 2.3 Laboratory Analysis of the Soil Samples

III. SOIL CHEMICAL CHARACTERISTICS

Soil samples are brought to the BSWM Laboratory Services Division for the soil salinity/alkalinity test which includes pH (1:1) at 25^0C, Electrical Conductivity (EC) at 25^0C, Calcium (Ca), Magnesium (Mg), Sodium (Na), Potassium (K), Sum of Cations, Carbonate (CO_3), Bicarbonate (HCO_3), Chloride (Cl), Sulfate (SO_4), Sum of Anions, and Sodium Adsorption Ratio (SAR).

The EC test results are classified according to its salinity class and then used to map salinity in the coastal area. Other laboratory test results are gathered as input to the Saline-Affected Areas Database Information System (SADIS v1.1). This spatial database can be used as reference for future research studies on salinity.

A. Salinity Classification

The laboratory results for salinity testing, specifically the EC readings, are classified using Table 3.1 below, based on the BSWM/FAO Salinity Project in 1999. This salinity classification is rice-based and applicable to Philippine setting.

Table 3.1 Salinity Classification (Crop-based, Rice)

Electrical Conductivity *(mS/cm)*	Soil Salinity Class	Hazard for Crop Growth	Plant Response
0 - 2	Non Saline	Very low	Negligible
2.1 - 4	Slightly Saline	Low	Restricted yield of sensitive crops
4.1 - 8	Moderately Saline	Moderate	Restricted yield of many crops
8.1 - 16	Severely Saline	High	Only a few tolerant crops yield satisfactorily
>16	Very Severely Saline	Very high	Only a few tolerant forage grow satisfactorily

Table 3.2 shows the laboratory EC test results of soil samples per municipality. Each EC readings are further classified using Table 3.1 above. The Municipalities of Sta Cruz, Candelaria, Masinloc and Palauig have a very severely saline soil. The highest EC reading is observed in Barangay Baloganon in Masinloc and Barangay Sinabacan in Candelaria. At 0-30cm depth where most plant root system can be found, very severely saline soil are in Barangay Gamma in Sta. Cruz and Barangay Malimanga in Candelaria. These areas are very hazardous for crop growth and only a few tolerant forage can grow satisfactorily.

Table 3.2 Electrical Conductivity (EC) of Soil Samples at Different Depths

AUGER REF	BARANGAY	MUNICIPALITY	EC (mS/cm) @0 -30cm	EC (mS/cm) @30 -60cm	EC (mS/cm) @60 -90cm
AB1	Sabang	Sta . Cruz	1	0.3	0.4
AB2	Sabang	Sta . Cruz	1.6	0.6	3.8
AB3	Balitoc	Sta . Cruz	0.9		
AB4	Malabago	Sta . Cruz	0.4	0.1	0.1
AB5	Gamma	Sta . Cruz	33.5	8.1	8.5
AB6	Gamma	Sta . Cruz	8.6	0.1	0.2
AB7	Tubo-tubo North	Sta . Cruz	0.3	0.5	0.3
AB8	Tubo-tubo North	Sta . Cruz	0.1	11.3	12.8
AB9	Naulo	Sta . Cruz	0.4	0.1	0.1
AB10	Uacon	Candelaria	0.1	0.1	0.1
AB11	Sinabacan	Candelaria	0.2	0.1	0.1
AB12	Sinabacan	Candelaria	15.9	40.2	40.1
AB13	Sinabacan	Candelaria	0.2	0.1	0.1
AB14	Malimanga	Candelaria	0.2	0.8	0.6
AB15	Malimanga	Candelaria	23.2	22.9	23.7
AB16	Malimanga	Candelaria	2.6	2.9	
AB17	Binabalian	Candelaria	0.3	0.1	0.3
AB18	Dampay	Candelaria	0.2	0.3	0.1
AB19	Baloganon	Masinloc	11.5	50.62	59.63
AB20	Taltal	Masinloc	0.15	0.16	0.12
AB21	Bani	Masinloc	0.12	0.3	35.49
AB22	Sto. Rosario	Masinloc	0.1	0.6	0.4
AB23	Liozon	Palauig	0.1	0.1	0.1
AB24	San Juan	Palauig	0.18	0.2	0.31
AB25	Lipay	Palauig	15	12.6	16.2
AB26	Sto. Tomas	Palauig	2.63	6.94	0.8
AB27	San Agustin	Iba	0.4	0.1	0.1
AB28	San Agustin	Iba	0.6	0.3	0.7
AB29	Amungan	Iba	0.2	0.1	0.2
AB30	Palanginan	Iba	5.4	1.8	2.1
AB31	Palanginan	Iba	1.6	0.8	0.2
AB32	Bancal	Botolan	2.3	1.3	0.4
AB33	Parel	Botolan	1.6	1.8	14.9
AB34	Danacbunga	Botolan	1.5	1.9	0.8
AB35	Danacbunga	Botolan	0.1	0.1	0.1
AB36	Carael	Botolan	0.2	0.1	0.1
AB37	Tondo	Cabangan	0.12	0.27	2.19
AB38	Tondo	Cabangan	0.5	0.2	0.3
AB39	Camiing	Cabangan	3.63	0.2	0.3
AB40	San Isidro	Cabangan	0.65	0.5	0.2
AB41	San Isidro	Cabangan	0.21	0.3	0.3
AB42	Arew	Cabangan	0.19	1.04	0.94
AB43	Felmida	Cabangan	1.8	0.44	0.28
AB44	San Rafael	San Felipe	0.2	0.2	0.3
AB45	Farañal	San Felipe	1.3	0.1	
AB46	Sindol	San Felipe	0.1	0.1	
AB47	Maloma	San Felipe	0.1	0.67	0.66
AB48	La Paz	San Narciso	0.1	0.1	1
AB49	La Paz	San Narciso	0.1	0.4	2.7
AB50	Beddeng	San Narciso	0.7	0.1	0.1
AB51	San Miguel	San Antonio	0.79	0.6	0.4
AB52	West Dirita	San Antonio	0.24	0.5	0.2
AB53		San Antonio	0.6	0.4	0.3

Soil Salinity Maps for three different depths (0-30cm, 30-60cm, and 60-90cm) are delineated using the corresponding coordinates of the sampling sites and the EC readings. These maps interpret the land area per municipality at different degrees of salinity, as shown in Tables 3.3 – 3.5.

Table 3.3 shows the land area (in hectares) affected by salinity for 0-30cm depth. Very severely saline is 211 hectares, mostly in Santa Cruz. Severely saline is 2,295.39 hectares, also mostly in Sta. Cruz. Moderately saline is 5,351.94 hectares, mostly in Candelaria, Santa Cruz and Palauig. These areas have moderate to very high hazard to crop growth and only a few tolerant crops can yield satisfactorily.

Table 3.3 Coastal Land Area (in hectares) per Municipality at Different Degrees of Salinity (0-30 cm depth)

Coastal Municipality	Non Saline	Slightly Saline	Moderately Saline	Severely Saline	Very Severely Saline
BOTOLAN	4,582.14	99.63			
CABANGAN	2,662.16	166.19			
CANDELARIA	968.51	1,129.43	1,759.74	152.00	29.58
CASTILLEJOS	1.72				
IBA (Capital)	2,917.87	995.04	204.60		
MASINLOC	1,425.95	500.00	989.59	416.52	
PALAUIG	1,072.32	1,326.99	1,026.42	334.06	
SAN ANTONIO	3,214.43				
SAN FELIPE	4,020.00				
SAN NARCISO	3,042.52				
SANTA CRUZ	3,644.31	879.57	1,371.59	1,392.81	181.42
TOTAL	**27,551.93**	**5,096.85**	**5,351.94**	**2,295.39**	**211.00**

On Table 3.4 at 30-60cm depth, the land area affected by salinity is higher than at 0-30cm depth. Very severely saline is 1,487.57 hectares, from Masinloc and Candelaria. Severely saline is 1,550.97 hectares, mostly Candelaria. Moderately saline is 5,356.92 hectares, mostly Candelaria and Palauig. These areas have moderate to very high hazard to crop growth and only a few tolerant crops can yield satisfactorily.

Table 3.4 Coastal Land Area (in hectares) per Municipality at Different Degrees of Salinity (30-60 cm depth)

Coastal Municipality	Non Saline	Slightly Saline	Moderately Saline	Severely Saline	Very Severely Saline
BOTOLAN	4,681.77				
CABANGAN	2,828.35				
CANDELARIA	641.48	417.81	2,182.84	701.32	95.83
CASTILLEJOS	1.72				
IBA (Capital)	4,117.51				
MASINLOC	567.51	671.68	305.37	395.75	1,391.74
PALAUIG	943.40	650.49	1,905.02	260.88	
SAN ANTONIO	3,214.43				
SAN FELIPE	4,020.00				
SAN NARCISO	3,042.52				
SANTA CRUZ	2,226.81	4,086.17	963.69	193.02	
TOTAL	**26,285.51**	**5,826.15**	**5,356.92**	**1,550.97**	**1,487.57**

Table 3.5 shows the largest area affected by salinity. Very severely saline area (2,761.56 ha.) is almost the same with the severely saline area (2,502.67 ha). These areas are mostly Masinloc and Candelaria. Moderately saline is 5,356.92 hectares, mostly Candelaria and Palauig. These areas are moderate to very hazardous to crop growth.

Table 3.5 Coastal Land Area (in hectares) per Municipality at Different Degrees of Salinity (60-90 cm depth)

Coastal Municipality	Non Saline	Slightly Saline	Moderately Saline	Severely Saline	Very Severely Saline
BOTOLAN	2,495.87	1,798.17	274.03	113.69	
CABANGAN	2,821.62	6.73			
CANDELARIA	219.50	241.52	1,432.52	1,829.41	316.32
CASTILLEJOS	1.72				
IBA (Capital)	3,206.91	817.60	93.00	0.002	
MASINLOC	229.09	489.30	160.02	268.73	2,184.91
PALAUIG	818.29	450.79	2,230.36	0.03	260.33
SAN ANTONIO	3,214.43				
SAN FELIPE	4,020.00				
SAN NARCISO	2,993.57	48.95			
SANTA CRUZ	1,066.21	4,531.98	1,580.70	290.80	
TOTAL	**21,087.23**	**8,385.02**	**5,770.62**	**2,502.67**	**2,761.56**

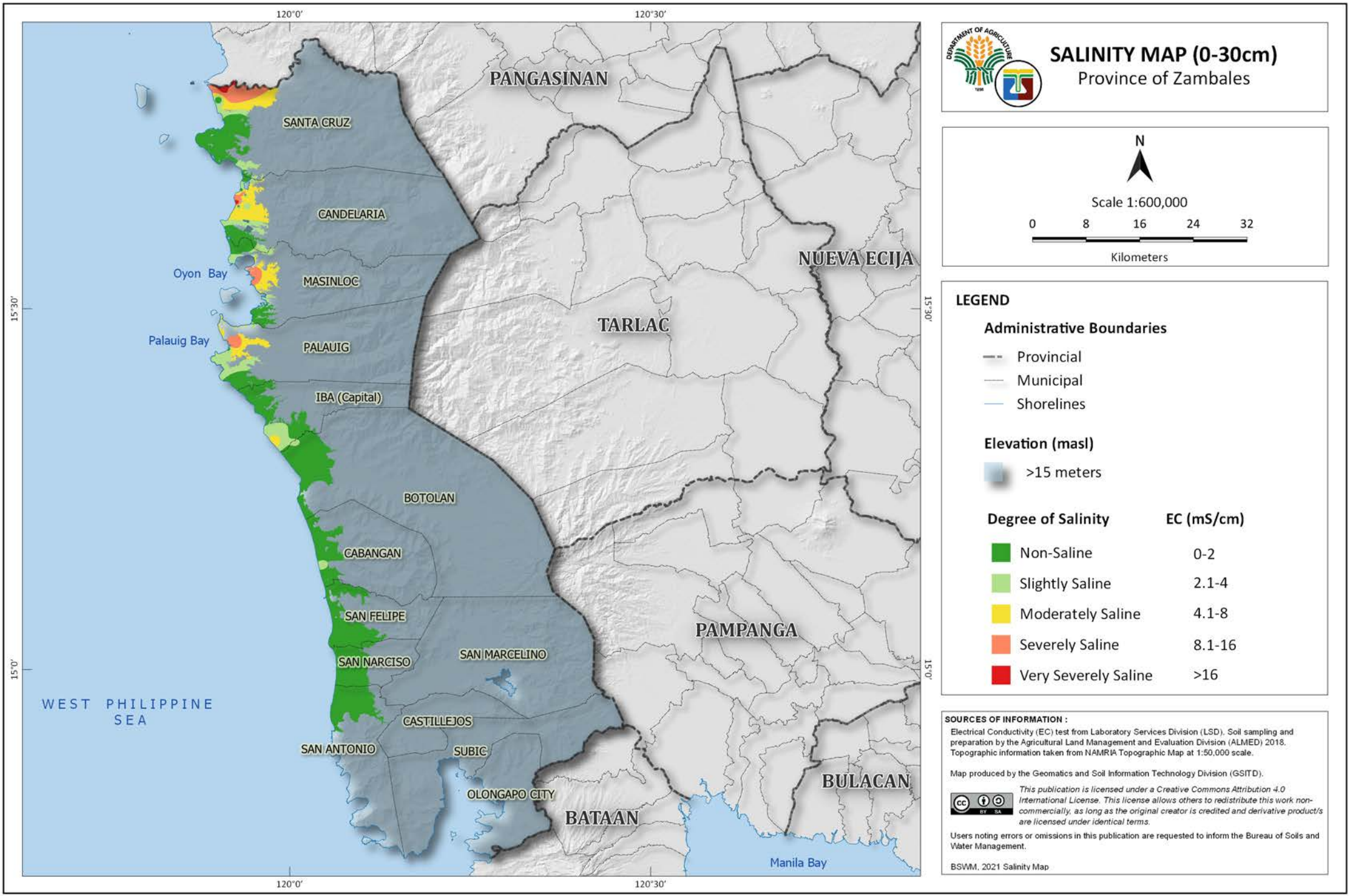
Table 3.6 Distribution of Coastal Land Area at Different Degrees of Salinity, Zambales Province

Salinity Class	Soil Depth (cm)					
	0-30		30-60		60-90	
	hectares	%	hectares	%	hectares	%
Non saline	27,551.93	68.02	26,285.51	64.89	21,087.23	52.06
Slightly saline	5,096.85	12.58	5,826.15	14.38	8,385.02	20.70
Moderately saline	5,351.94	13.21	5,356.92	13.22	5,770.62	14.25
Severely saline	2,295.39	5.67	1,550.97	3.83	2,502.67	6.18
Very Severely saline	211.00	0.52	1,487.57	3.67	2,761.56	6.82

Table 3.6 summarizes the total coastal land area of Zambales per degree of salinity. Notable observation is at 60-90cm depth wherein 6.82% of the coastal land area is very severely saline. Although only very few plants have root system that can reach this depth, there are chances that during dry months, salts will accumulate at the surface of the soil and thus, can be moderately to highly hazardous to crop growth.

B. Output Maps

The following are the output maps of the project: the Soil Salinity Maps of the Province of Zambales at 0-30cm; 30-60cm; and 60-90cm depths.



SALINITY MAP (0-30cm)

Province of Zambales

N

Scale 1:600,000

0 8 16 24 32

Kilometers

LEGEND

Administrative Boundaries

- Provincial
- Municipal
- Shorelines

Elevation (masl)

- >15 meters

Degree of Salinity	EC (mS/cm)
Non-Saline	0-2
Slightly Saline	2.1-4
Moderately Saline	4.1-8
Severely Saline	8.1-16
Very Severely Saline	>16

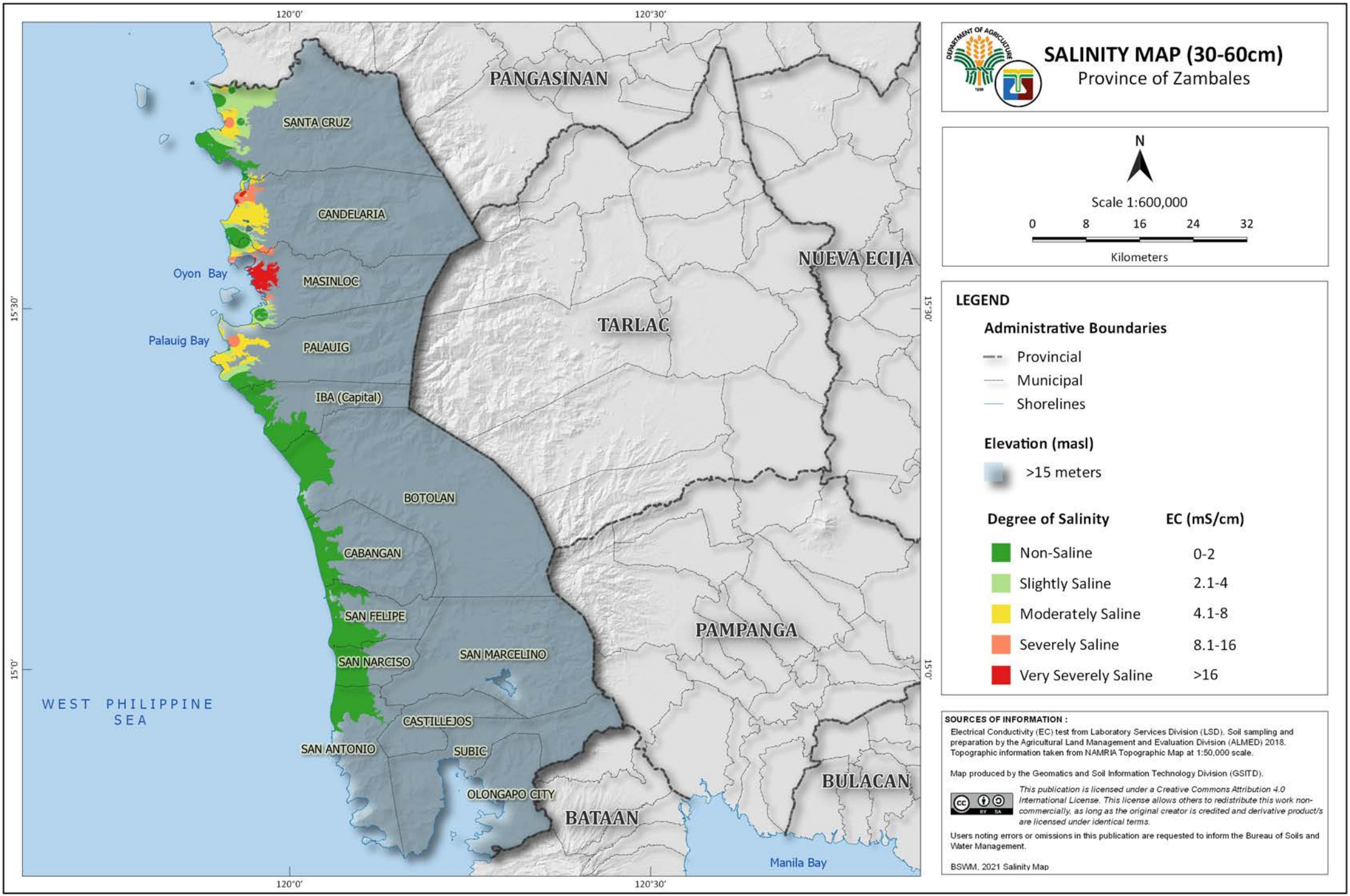
SOURCES OF INFORMATION :

Electrical Conductivity (EC) test from Laboratory Services Division (LSD). Soil sampling and preparation by the Agricultural Land Management and Evaluation Division (ALMED) 2018. Topographic information taken from NAMRIA Topographic Map at 1:50,000 scale.

Map produced by the Geomatics and Soil Information Technology Division (GSITD).

Users noting errors or omissions in this publication are requested to inform the Bureau of Soils and Water Management.

BSWM, 2021 Salinity Map



SALINITY MAP (30-60cm)

Province of Zambales

N

Scale 1:600,000

0 8 16 24 32

Kilometers

LEGEND

Administrative Boundaries

- Provincial
- Municipal
- Shorelines

Elevation (masl)

- >15 meters

Degree of Salinity	EC (mS/cm)
Non-Saline	0-2
Slightly Saline	2.1-4
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Severely Saline	8.1-16
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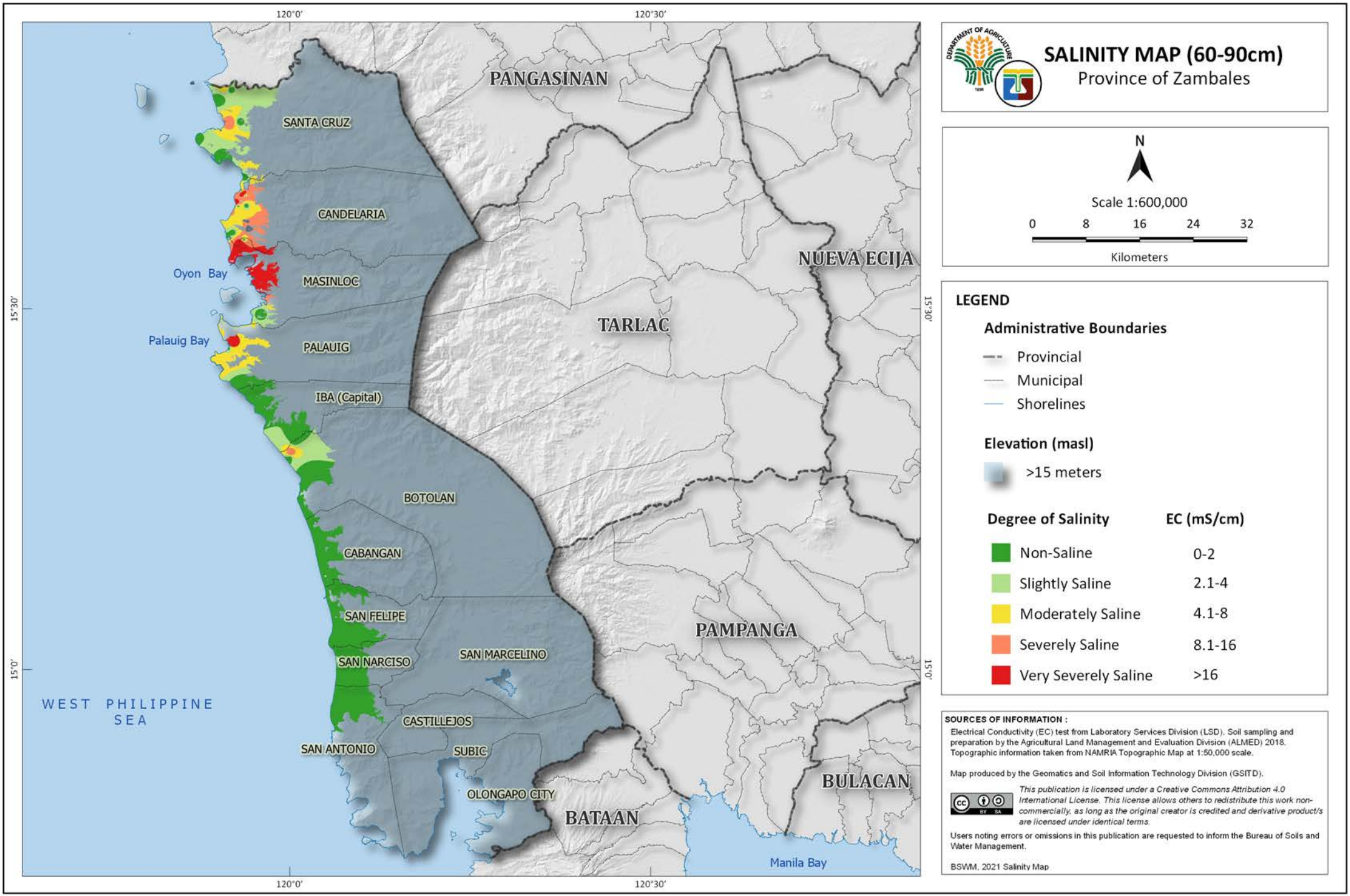
BSWM, 2021 Salinity Map



SALINITY MAP (60-90cm)

Province of Zambales

N

Scale 1:600,000

0 8 16 24 32

Kilometers

LEGEND

Administrative Boundaries

- Provincial
- Municipal
- Shorelines

Elevation (masl)

- >15 meters

Degree of Salinity	EC (mS/cm)
Non-Saline	0-2
Slightly Saline	2.1-4
Moderately Saline	4.1-8
Severely Saline	8.1-16
Very Severely Saline	>16

SOURCES OF INFORMATION :

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BSWM, 2021 Salinity Map

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