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AGRICULTURAL LAND MANAGEMENT AND EVALUATION DIVISION

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

PROVINCE OF QUEZON

2020

TABLE OF CONTENTS

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.

QUEZON

I. SOIL/LAND PHYSICAL CHARACTERISTICS

A. General Description of Saline Affected Site

Quezon Province in the east of Metro Manila, is the largest province of Region IVA-CALABARZON (8,989.39 sq km) and 58% of which is categorized as agricultural land. Quezon is bordered, clockwise from the Northeast, by Philippine Sea, Lamon Bay, Camarines Norte, Camarines Sur, Ragay Gulf, Sibuyan Sea, Tayabas Bay, Batangas, Laguna, Rizal, and Bulacan. Because of this, majority of towns in the province have access to the sea. The province is said to be characterized by a rugged terrain with patches of plains, valleys and swamps. The major islands of Quezon are Alabat Island and Polillo Islands.

There are thirteen (13) coastal municipalities and thirty six (36) barangays susceptible to salinity, hence the sites for sampling are as follows:

Table 1.1. Coastal Areas and Municipalities in Quezon

No.	MUNICIPALITY	No. of Brgys.	No. of Sampling Sites	No. of Soil Samples Collected
1	Alabat	3	3	9
2	Burdeos	3	3	9
3	Calauag	2	2	6
4	Catanauan	1	1	3
5	General Luna	2	2	6
6	Guinayangan	3	3	9
7	Infanta	6	6	18
8	Lucena	1	1	3
9	Macalelon	3	3	9
10	Pagbilao	4	4	12
11	Polillo	3	3	9
12	Quezon	1	1	3
13	Tagkawayan	4	4	12
	TOTAL	**36**	**36**	**108**

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. It 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 also the building block of the pedo-ecological zone, which represents a broader landscape grouping such as lowland, upland, hilllyland and highland.

Table 1.2 shows the land management units of the sampling sites per coastal municipality.

Table 1.2 Land Management Units

Code	LMU	Description
01	Active tidal flats (Developed Fishponds)	Comprise the coastal, active tidal flat estuarine plain subject to constant tidal inundations. These are moderately deep to deep, very poorly drained, fine loamy to clayey textures saturated by saline water.
02	Active tidal flats (Mangrove/Nipa)	
04	Marshes (Grassy type)	Includes all the swampy depressions on the back plain, characterized by permanently water logged and poorly drained areas.
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.
12	Lower river terrace	Level to gently sloping. The soil are deep to very deep, loamy to fine loamy well drained, highly fertile and adoptable to wide range of crops. Subjected to slight to severe flooding.
16	Infilled valleys	Narrow and randomly occurring patches of nearly level to gently sloping intervening valleys. The soils are deep and dominantly fine textured with good drainage.
27	Piedmont Plains	Sloping areas (mostly 1-8%) around the base of the volcano. The compositions are generally of volcanic materials. Soils formed are medium to fine texture and are moderately deep. Slight to moderate erosion is widely observed.
180	Miscellaneous	Built-up areas (residentials, commercials, industrial, etc.)

C. Flooding

Flooding is a seasonal but recurring problem in Quezon. This is brought about by heavy rainfall that leads to river overflow during peak rain periods. Table 1.3 shows the area distribution of flooding by flooding class. (SLREP BSWM, 2008)

Table 1.3 Area Distribution of Flooding by Flooding Class

Mapping Symbol	Description	Municipality					
		Candelaria	Dolores	Lucena City	San Antonio	Sariaya	Tiaong
F0	No Apparent flooding	9,716	12,545	4,489	4,937	19,191	12,803
F1	Slight flooding	7,214		919	953	4,045	3,463
F2	Moderate flooding			514		115	
F3	Severe flooding			46		186	
Mc	Miscellaneous	586	236	2,349	108	993	572
Total		17,516	12,781	8,317	5,998	24,530	16,838

D. Elevation

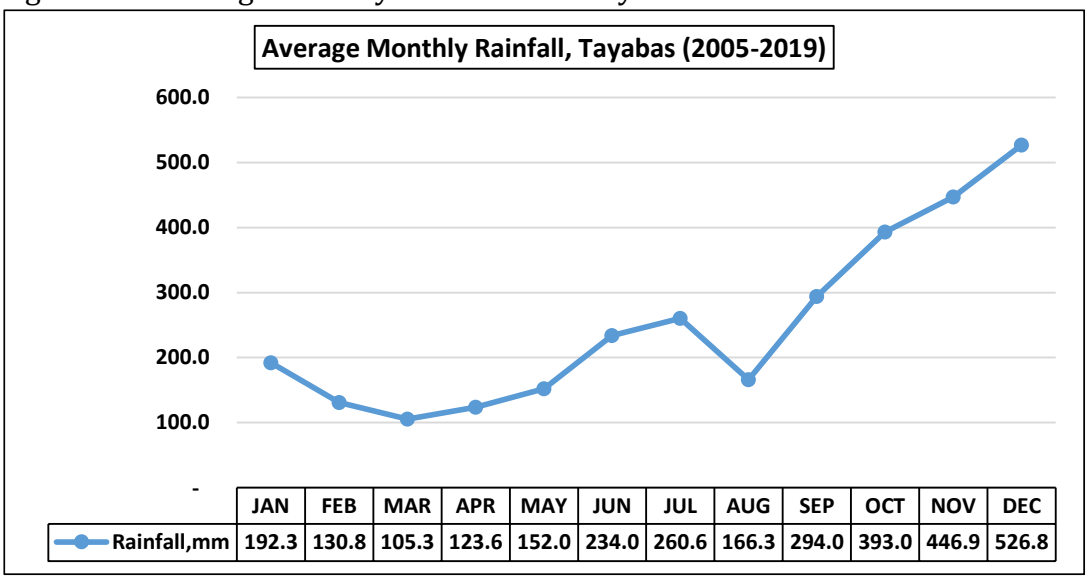
The elevation of a geographic location is the height above sea level (meters above sea level). Soil sampling points are taken from the following elevation that ranges from 0-5masl, 5-10masl and 10-15masl.

E. Agro-Climate

Because of the sheer size of Quezon, different areas have different climate patterns. Most of the province falls under Type IV Climate which means that rains are evenly distributed throughout the year. Polillo, Infanta and parts of Calauag fall under Type II climate which means that there are no dry seasons but there is a pronounced wet season from November to April. Parts of the western towns of Tiaong, San Antonio, Dolores and Candelaria as well as the tip of Bondoc Peninsula including parts of Mulanay, San Francisco, San Narciso and San Andres fall under Type III climate. This means that there is a relatively dry season from November to April. Although these are the patterns observed, it is important to note that with

climate change, these patterns have become more erratic. Typhoons have become stronger through the years, causing problems such as flashfloods and crop damages.

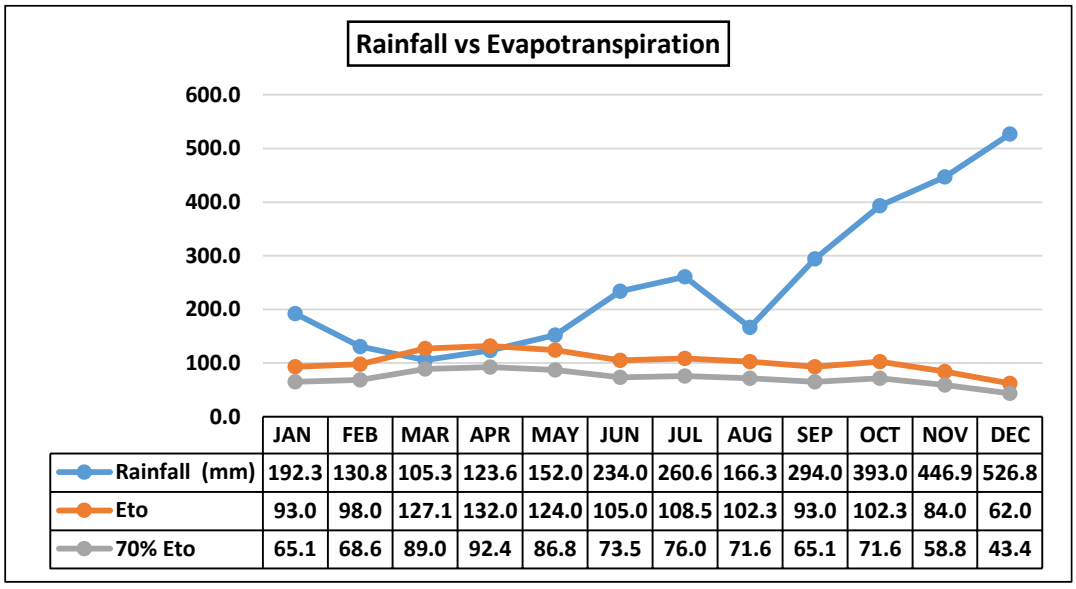
Figure 1.1 Average Monthly Rainfall from Tayabas PAGASA Station



	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
Rainfall,mm	192.3	130.8	105.3	123.6	152.0	234.0	260.6	166.3	294.0	393.0	446.9	526.8

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.

Figure 1.2 Comparison of the Average Rainfall and Evapotranspiration



	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
Rainfall (mm)	192.3	130.8	105.3	123.6	152.0	234.0	260.6	166.3	294.0	393.0	446.9	526.8
Eto	93.0	98.0	127.1	132.0	124.0	105.0	108.5	102.3	93.0	102.3	84.0	62.0
70% Eto	65.1	68.6	89.0	92.4	86.8	73.5	76.0	71.6	65.1	71.6	58.8	43.4

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 Quezon sampling sites are presented in Table 1.4. Some indicators of salinity per municipality are also indicated in this table.

Table 1.4 Land Use/Vegetation in Quezon sampling sites.

Municipality	Land Use/Vegetation	Some indicators of Salinity
Alabat	Irrigated paddy rice, rainfed rice, coconut, calamansi	mangrove/nipa, aster weeds, beard grass, poor yield productivity, wilting, empty panicle, reddish/yellowish leaves & stunted growth
Burdeos	Irrigated paddy rice, rainfed rice, fishing	mangrove/nipa, aster weeds, beard grass, white crust in soil surface, poor yield productivity, sedges, wilting, empty panicle, reddish/yellowish leaves & stunted growth
Calauag	Irrigated paddy rice	mangrove/nipa, aster weeds, beard grass, white crust in soil surface, poor yield/productivity, sedges, wilting, empty panicle, reddish/yellowish leaves & stunted growth
Catanauan	Rainfed rice	mangrove/nipa, aster weeds & beard grass
General Luna	Rainfed rice	mangrove/nipa, aster weeds, beard grass, poor yield productivity, sedges, wilting, empty panicle, reddish/yellowish leaves & stunted growth
Guinayangan	Rainfed rice, fishing	mangrove/nipa, aster weeds, beard grass, white crust in soil surface, poor yield/productivity, sedges, wilting, empty panicle, reddish/yellowish leaves & stunted growth

Infanta	Irrigated paddy rice, fishing	mangrove/nipa, aster weeds, beard grass, white crust in soil surface, poor yield/productivity, sedges, wilting, empty panicle, reddish/yellowish leaves & stunted growth
Lucena	Irrigated paddy rice, fishing	
Macalelon	Rainfed rice	mangrove/nipa, aster weeds, beard grass, white crust in soil surface, poor yield/productivity, sedges, wilting, empty panicle, reddish/yellowish leaves & stunted growth
Pagbilao	Irrigated paddy rice, fish pond	mangrove/nipa, aster weeds, beard grass, poor yield/productivity, wilting, empty panicle, reddish/yellowish leaves & stunted growth
Polillo	Irrigated paddy rice, rainfed rice	mangrove/nipa, aster weeds, beard grass, poor yield/productivity, sedges, wilting, empty panicle, reddish/yellowish leaves & stunted growth
Quezon	Rainfed rice	mangrove/nipa, aster weeds & beard grass
Tagkawayan	Rainfed rice	mangrove/nipa, aster weeds, beard grass, white crust in soil surface, poor yield/productivity, sedges, wilting, empty panicle, reddish/yellowish leaves & stunted growth

Figure 1.3 Auger/ Pit Boring and Soil Sampling

II. CROP PRODUCTION ON SALINE AFFECTED AREAS

A. Key Informant Profile

Based from the 87 farmer respondents, the average age of farmers is 53.5 years old, with an average of 28.9 years of experience in farming.

The farmer respondents are 17 female and 70 male. The 32% are the owner of their farm, and 68% are tenants to an average farm size of 1 hectare.

B. Farm Production

Table 2.1 Rice Production in Coastal Municipalities

No.	Coastal Municipality	Ave. Yield Irrigated Paddy Rice (kg/ha)
1	Alabat	2,744
2	Burdeos	2,673
3	Calauag	1,436
4	Catanauan	558
5	General Luna	2,242
6	Guinayangan	2,275
7	Infanta	2,932
8	Lucena	4,000
9	Macalelon	2,078
10	Pagbilao	2,453
11	Polillo	1,911
12	Quezon	1,650
13	Tagkawayan	3,491
		2,342

The seasonal crops in Quezon that contribute to agricultural productivity are the following: paddy rice (irrigated and non-irrigated), calamansi and vegetables, while the annual/ perennial crops are coconut and calamansi.

It has a total of 898,939 hectares provincial land area, with 513,618 hectares categorized as agricultural land area.

C. Farm Input

The project is limited to the coastal communities of the province, therefore the information on farm inputs are mainly based from the key informant interview.

Farmers usually use any commercially available seed variety of rice. The most common varieties are RC 18, RC 216 and any variety from “palit-palay”.

They usually use urea and complete (14-14-14) fertilizer.

D. Source of Irrigation

Based from the farmers’ interview, most of the rice area in Quezon Province is rainfed (55%), while irrigated rice assisted by the National Irrigation Administration (NIA) is 35%. Only 7% of them have shallow tubewell as irrigation, while the rest (3%) pump irrigation water from the creeks.

E. Period of Salinity Occurrence and Practices to Address Salinity

Generally, flooding is experienced in the province of Quezon during the months of November to December. Almost all of the farmers are not sure if flooding causes salinity in their farm.

On crop management, farmers practice proper timing in planting to increase crop productivity. On water management, they are either blocking the entrance of salt water during flooding; or flushing the field with fresh water.

Generally, they are not willing to adopt to other suitable crop considering salinity because they still want to plant rice in their farm.

Figure 2.1 Key Informant Interviews and Courtesy Call to Mayor

Figure 2.2 Onsite EC Testing

Figure 2.3 Soil Packaging

III. SOIL CHEMICAL CHARACTERISTICS

Soil 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, 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 Electrical Conductivity (EC) of Soil Samples at Different Depths

Auger Ref	Municipality	Barangay	EC (mS/cm) @0-30cm	EC (mS/cm) @30-60cm	EC (mS/cm) @60-90cm
1	Alabat	Gordon	0.229	0.140	0.140
2		Buenavista	2.063	1.072	0.923
3		Caglate	0.240	0.191	0.153
4	Quezon	Montaña	2.168	1.255	1.316
5	Burdeos	Caniwan	1.106	2.314	8.801
6		San Rafael	0.325	0.159	0.168
7		Butunan	0.907	1.446	13.390
8	Pollilo	Libjo	0.217	0.176	0.438
9		Anawan	2.368	16.850	26.730
10		Tamulayan	0.876	3.586	11.530
11	Infanta	Binulasan	2.674	3.456	2.568
12		Abiawin	6.632	13.040	11.230
13		Libjo	1.243	0.796	0.865
14		Cawayanin (Balobo)	4.240	3.342	2.569
15		Alitas	15.060	7.165	3.677
16		Binonoan	0.328	0.143	0.285
17	Calauag	Kinalin Ibaba	5.463	5.702	9.146
18		Biyan	3.003	1.930	1.286
19	Tagkawayan	Cabugwang	37.710	43.170	50.560
20		Katimo	0.741	0.169	0.158
21		Sabang	2.504	0.434	0.381
22		Laurel	0.620	0.505	0.440
23	Guinayangan	San Miguel	3.572	4.765	6.049
24		Danlagan Cabayao	8.160	11.050	13.920
25		Balinarin	12.350	31.620	42.910
26	Catanauan	Kawayanin Ibaba	6.489	8.524	8.509
27	General Luna	Poblacion	0.392	0.444	0.498
28		San Jose	0.647	0.704	0.584
29	Macalelon	Candangal	0.985	0.699	0.793
30		Taguin	1.638	2.503	4.286
31		Pinagbayanan	6.218	2.195	3.058
32	Pagbilao	Pinagbayanan	7.238	8.693	8.833
33		Ibabang Palsabangon	11.510	4.812	6.652
34		Binahaan	11.730	7.712	10.450
35		Silangang Malicboy	6.010	5.011	3.928
36	Lucena City	Mayao Castillo	1.205	6.518	7.452

The soil salinity maps at 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 (in hectares) per municipality at different degrees of salinity, as shown in Tables 3.3 – 3.5.

The Soil Salinity Map of Quezon at 0-30cm, and Table 3.3 show that the Municipalitys of Guinayangan, Pagbilao and Tagkawayan have severely saline to very severely saline soil. Infanta has the highest area for moderately saline soil at 5,369.06 hectares followed by Lopez.

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
Alabat	1,798.78	12.80			
Burdeos	2,788.91				
Calauag		417.02	3,210.12	151.31	
Candelaria	1,529.59				
Catanauan		560.99	2,962.96		
General Luna	1,985.30	131.12			
General Nakar		610.86	698.29		
Guinayangan		12.88	625.93	1,982.29	441.47
Gumaca		125.00	23.29		
Infanta	277.11	1,469.42	5,369.06	566.54	
Lopez			5,176.71		
Lucena City	3,409.86	174.77	11.84		
Macalelon	1,492.64	1,750.20	490.51		
Mauban			22.79		
Mulanay			692.87		
Padre Burgos			786.04		
Pagbilao		125.76	2,125.74	1,973.16	
Panukulan	16.29				
Perez	438.79				
Pitogo		463.53	7.84		
Polillo	4,815.09	106.91			
Quezon	41.79	692.55			
Real			1,477.32	0.07	
Sariaya	4,563.08				
Tagkawayan	2,142.81	877.20	169.21	621.56	1,609.78
Tiaong	376.23				
TOTAL	**25,676.29**	**7,531.01**	**23,850.53**	**5,294.93**	**2,051.26**

For Table 3.4 at 30-60cm depth, The Municipalities of Tagkawayan and Guinayangan still have the very severely saline soil, while the Municipality of Catanauan has the highest area for severely saline soil at 1,658.72 hectares. For moderately saline, the Municipality of Lopez has the highest area at 5,176.71 hectares.

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
Alabat	1,811.59				
Burdeos	1,691.69	1,097.21			
Calauag	34.19	415.96	3,067.98	260.33	
Candelaria			1,529.59		
Catanauan		457.61	1,407.62	1,658.72	
General Luna	1,979.10	137.31			
General Nakar		1,011.64	297.51		
Guinayangan			452.33	1,358.73	1,251.51
Gumaca		146.76	1.53		
Infanta	501.24	3,361.33	3,574.66	244.91	
Lopez			5,176.71		
Lucena City			3,596.47		
Macalelon	2,294.99	1,438.36			
Mauban			22.79		
Mulanay			692.87		
Padre Burgos			786.04		
Pagbilao			3,899.72	324.96	
Panukulan			16.29		
Perez	438.79				
Pitogo		471.36			
Polillo	1,248.61	2,640.54	732.00	241.95	58.90
Quezon	734.35				
Real		851.59	625.80		
Sariaya			4,563.08		
Tagkawayan	2,955.36	29.16	87.24	376.60	1,972.20
Tiaong			376.23		
TOTAL	**13,689.91**	**12,058.83**	**30,906.45**	**4,466.20**	**3,282.62**

For Table 3.5 at 60-90cm depth, the very severely saline area are still Tagkawayan and Guinayangan, while Lopez has the highest area for severely saline soil at 5,129.11 hectares.

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
Alabat	1,811.59				
Burdeos	237.04	263.64	620.87	1,667.35	
Calauag	133.35	289.95	1,138.48	2,169.13	47.55
Candelaria			1,529.59		
Catanauan		380.49	1,363.26	1,780.19	
General Luna	1,930.96	185.45			
General Nakar		1,309.16			
Guinayangan			57.91	1,126.70	1,877.96
Gumaca		146.76		1.53	
Infanta	1,101.93	4,501.73	1,932.00	146.48	
Lopez			47.60	5,129.11	
Lucena City			3,596.47		
Macalelon	1,028.35	2,655.71	49.28		
Mauban			22.79		
Mulanay			692.87		
Padre Burgos			786.04		
Pagbilao		19.37	2,855.56	1,349.74	
Panukulan				16.29	
Perez	438.79				
Pitogo		471.36			
Polillo	364.19	888.55	1,373.52	2,029.10	266.66
Quezon	734.35				
Real		1,090.08	387.31		
Sariaya			4,563.08		
Tagkawayan	1,485.50	439.65	1,107.72	145.46	2,242.24
Tiaong			376.23		
TOTAL	**9,266.04**	**12,641.90**	**22,500.59**	**15,561.08**	**4,434.40**

Table 3.6 summarizes the total coastal land area of Quezon per degree of salinity and the notable result is that at soil depth 60-90cm, 24.16% of the coastal land area is severely affected by salinity and 6.89% 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.

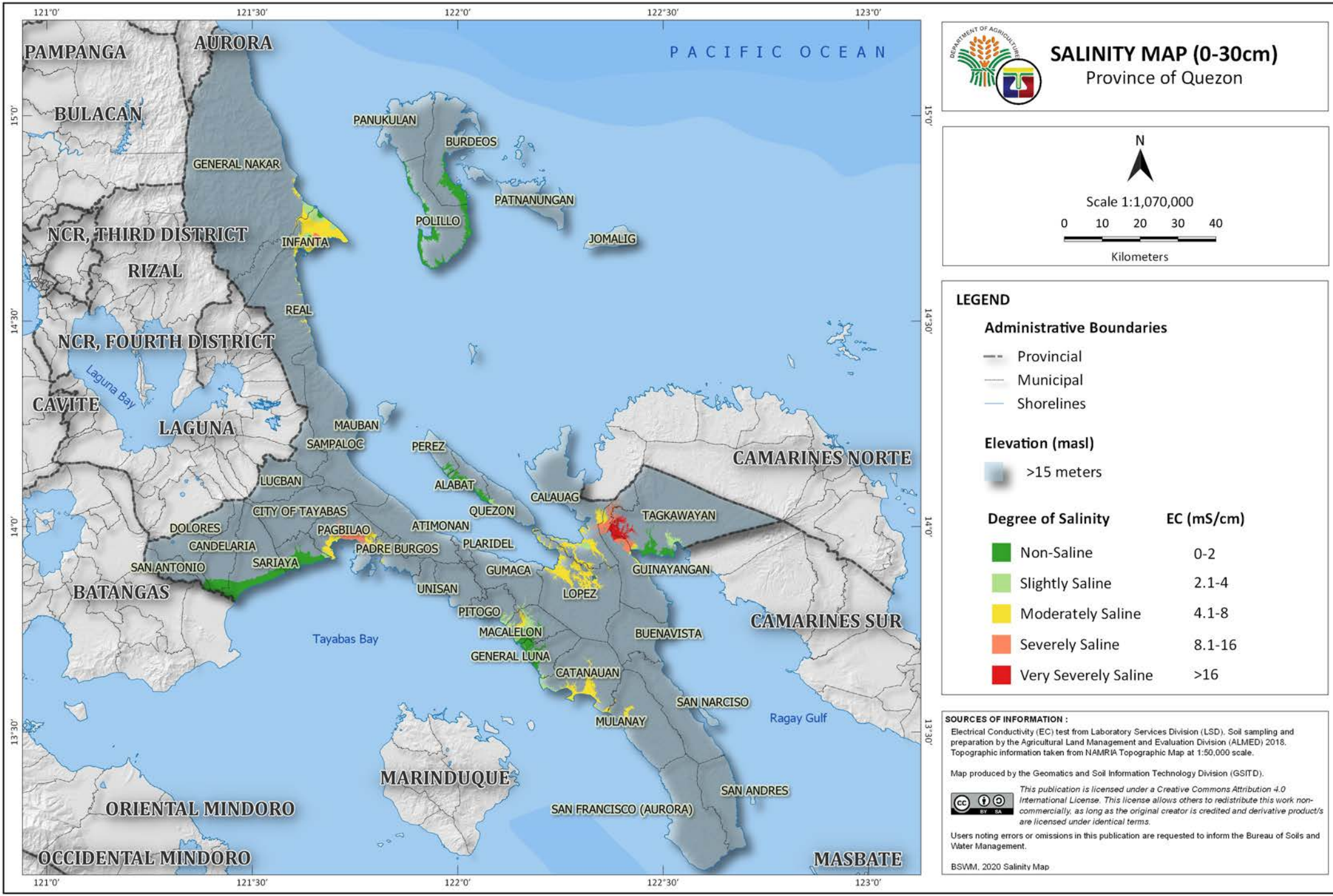
There is also a need to monitor the areas with moderate salinity at all three depths since it has the highest percentage of the coastal land area affected.

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

Salinity Class	Soil Depth (cm)					
	0-30		30-60		60-90	
	hectares	%	hectares	%	hectares	%
Non saline	25,676.29	39.87	13,689.91	21.26	9,266.04	14.39
Slightly saline	7,531.01	11.69	12,058.83	18.72	12,641.90	19.63
Moderately saline	23,850.53	37.03	30,906.45	47.99	22,500.59	34.94
Severely saline	5,294.93	8.22	4,466.20	6.93	15,561.08	24.16
Very Severely saline	2,051.26	3.18	3,282.62	5.10	4,434.40	6.89
TOTAL	**64,404.01**	**100**	**64,404.01**	**100**	**64,404.01**	**100**

B. Output Maps

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



SALINITY MAP (0-30cm)

Province of Quezon

N

Scale 1:1,070,000

0 10 20 30 40

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).

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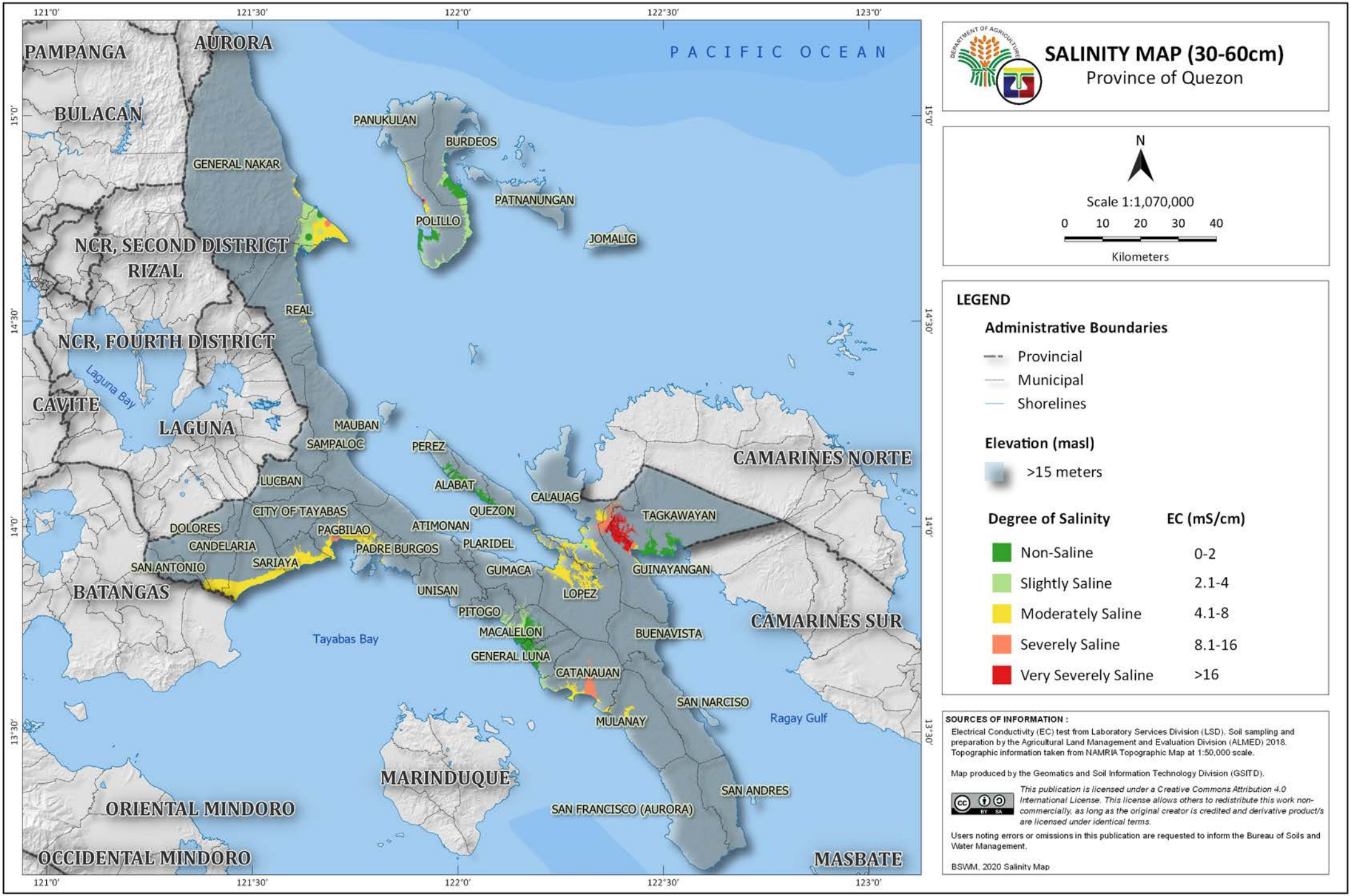
BSWM, 2020 Salinity Map



SALINITY MAP (30-60cm)

Province of Quezon

N

Scale 1:1,070,000

0 10 20 30 40

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).

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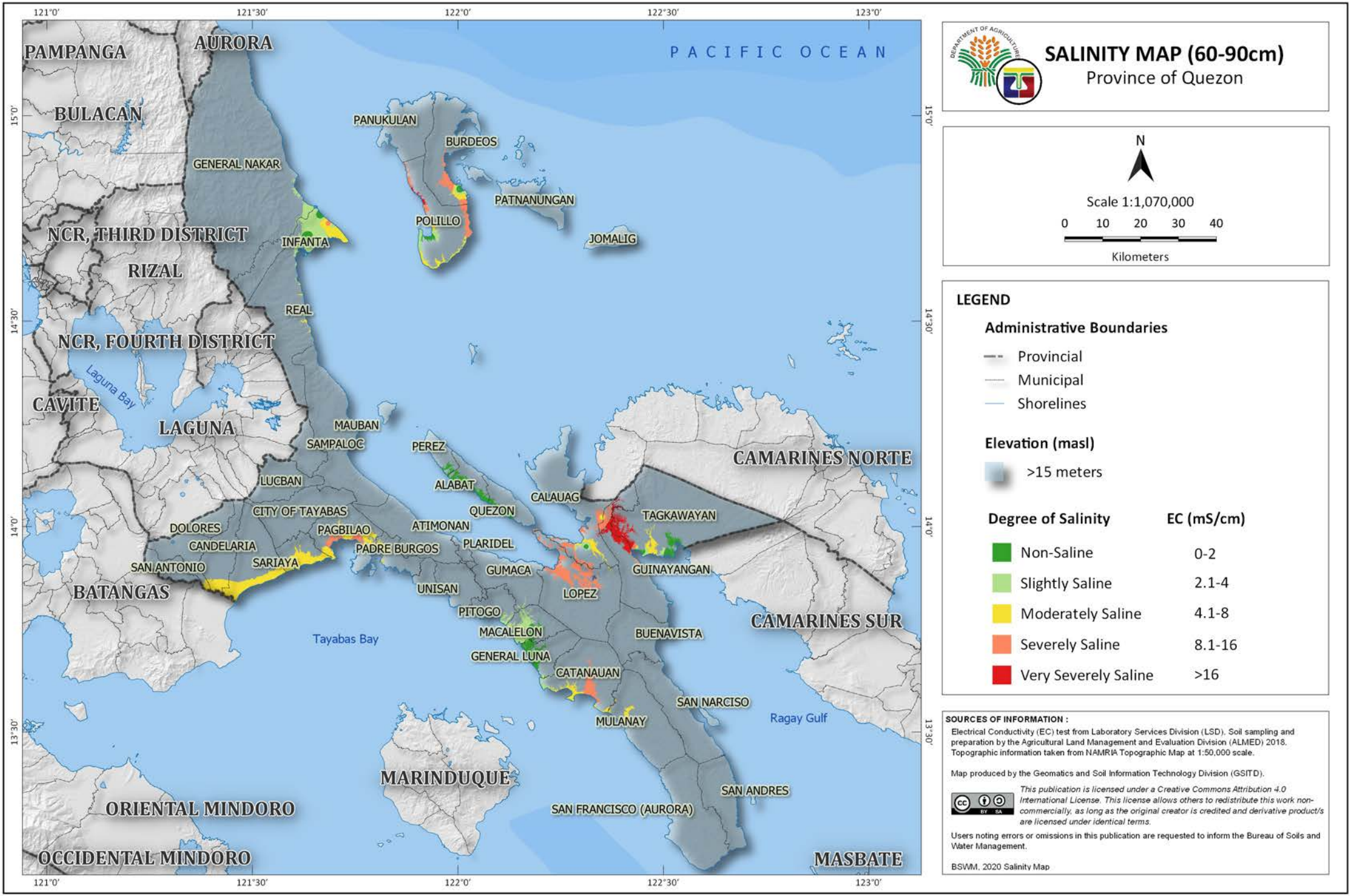
BSWM, 2020 Salinity Map



SALINITY MAP (60-90cm)

Province of Quezon

N

Scale 1:1,070,000

0 10 20 30 40

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, 2020 Salinity Map

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