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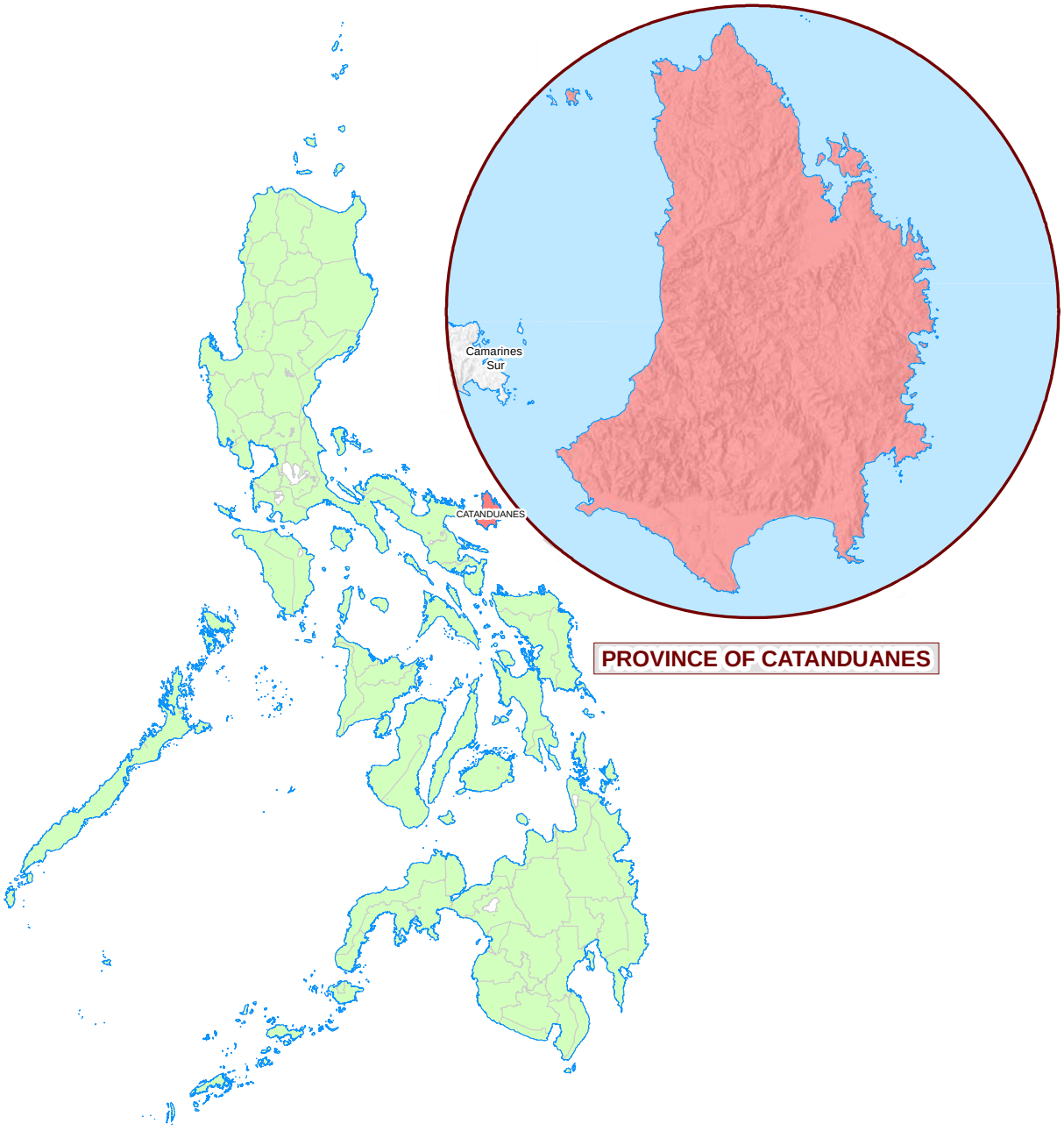
AGRICULTURAL LAND MANAGEMENT AND EVALUATION DIVISION

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



PROVINCE OF CATANDUANES

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.

CATANDUANES

I. SOIL/LAND PHYSICAL CHARACTERISTICS

A. General Description of Saline Affected Area

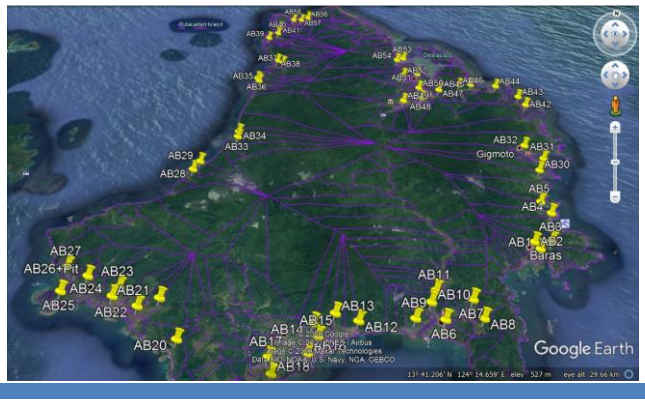
Catanduanes is an island province located in the Bicol Region of Luzon. It is bounded on the west by the Maqueda Channel, on the south by Lagonoy Gulf, and on the north and east by the Philippine Sea. Several small islands comprise the province, namely: Catanduanes Island (also called Virac Island), Panay Island, Lete Island, Palumbanes group of islands (Porongpong, Tignob and Calabagio) and a few other minor surrounding islets and rocks. Its aggregate land area totals approximately 1,492.16 square kilometres. The coastlines, that stretch to almost 400 km, are jagged with many bays.

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

Table 1.1. Coastal Areas and Municipalities in Catanduanes

No.	Municipality	No. of Barangay	No. of Sampling Sites	No. of Soil Samples Collected
1	Bagamanoc	18	3	9
2	Baras	29	5	15
3	Bato	27	6	18
4	Caramoran	27	11	31
5	Gigmoto	9	4	8
6	Pandan	26	3	9
7	Panganiban	23	3	9
8	San Andres	38	6	18
9	Viga	31	6	18
10	Virac	63	11	33
	TOTAL	**291**	**58**	**168**

Figure 1.1 Map of Soil Sampling Sites



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. Land Management Units of Sampling Sites

LMU	Description	
01 Active Tidal Flats (Fishpond)	Comprise the coastal, active tidal flat estuarine plain subject to constraint tidal inundations. These are moderately deep to deep, very poorly drained, fine loamy to clayey textures saturated by saline water.	
02 Active Tidal Flats, Natural (Mangrove/ Nipa)		
08 Beach, Ridges and Swales	Elongated ridges of sandy materials formed by the action of waves affected by tidal flooding, characterized by medium to coarse textured soils, shallow and well drained.	

09 Broad Alluvial Plains	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.	
10 Former Tidal Flats	Formed on level to gently sloping landscape between the tidal flats and alluvial plains near the coastal shore. The soil is deep to very deep, medium textured, well drained and very low fertility	
16 Infilled/ Localized 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.	
19 Narrow Alluvial Plains	Mapped in minor alluvial plain situated in a small strip of long and narrow alluvial landscape with less than 500 meters in width. The soils are generally deep; slightly stony, heavy or clayey textured and well drained.	
180 Miscellaneous / Built-up Areas	Built-up areas are those that are occupied by settlement or residential, institutional (schools, chapels, church and cemeteries, etc.) frastructure (road, bridges) and other similar structures.	

C. Flooding

Flooding happens on flat or low-lying areas when the soil is saturated by water or when the rate of rainfall exceeds the drainage capacity of the area and water remain on the surface for the certain period of time.

Based on Virac, Catanduanes 5 Year Flood Hazard Map, there is a 20% probability of a flood with five- year return period occurring in a single year. The Rainfall Intensity Duration Frequency is 297 mm.

D. Elevation

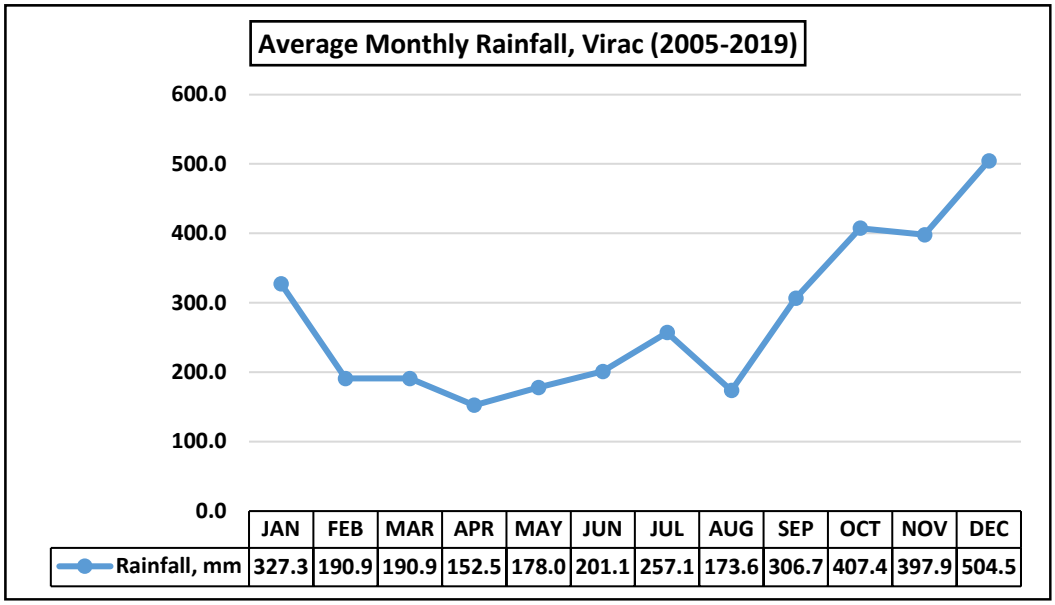
The elevation of a geographic location is the height above sea level (meters above sea level). Since the coastal areas are in the lowland pedo-ecological zone, soil sampling points are taken from elevations ranging from 0-5masl, 5-10masl and 10-15masl.

E. Agro-Climate

Catanuanes belongs to Type 2 climate based on the Climate Map of the Philippines by the Philippine Atmospheric, Geophysical and Astronomical Services Administration (PAGASA). It is characterized by having no pronounced dry season, precipitation is distributed fairly well throughout the year becoming wetter in the last quarter into the early months of the first quarter, when tropical disturbances and monsoon winds especially the Northeast Monsoon (Amihan) bring in heavy rains. Other months are characterized by short periods of dryer days and fine weather, except in July and August when the dry and gusty southwest monsoon winds intensify. Figure 1.2 shows the average monthly amount of rainfall taken from Virac Synoptic Weather Station from 2005-2019.

Catanduanes' geographical position has it lying completely exposed to the Philippine Sea. Therefore, it is known as "Land of the Howling Winds" because it is frequently visited by tropical cyclones.

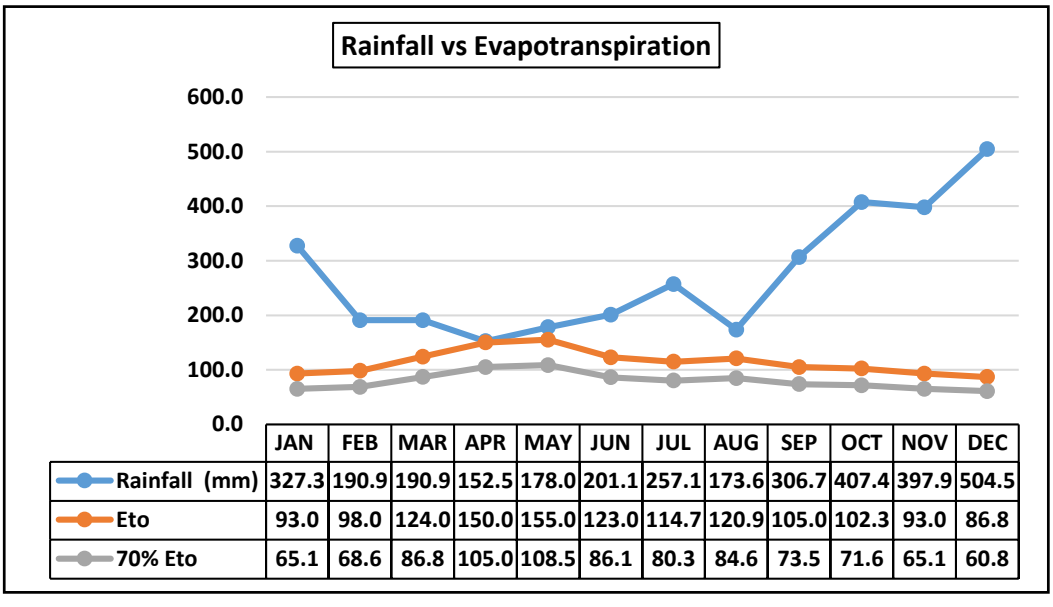
Figure 1.2 Average Monthly Amount of Rainfall



	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
Rainfall, mm	327.3	190.9	190.9	152.5	178.0	201.1	257.1	173.6	306.7	407.4	397.9	504.5

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 1.3 comparison of rainfall and evapotranspiration in Catanduanes, the average rainfall is relatively higher than the potential evapotranspiration from May to March. This means that soil moisture is sufficient to support crop cultivation. However, for the month of April, there is a need for supplemental irrigation.

Figure 1.3 Comparison of the Average Rainfall and Evapotranspiration



	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
Rainfall (mm)	327.3	190.9	190.9	152.5	178.0	201.1	257.1	173.6	306.7	407.4	397.9	504.5
Eto	93.0	98.0	124.0	150.0	155.0	123.0	114.7	120.9	105.0	102.3	93.0	86.8
70% Eto	65.1	68.6	86.8	105.0	108.5	86.1	80.3	84.6	73.5	71.6	65.1	60.8

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 Catanduanes 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 Catanduanes Sampling Sites.

Municipality	Land Use/Vegetation	Some indicators of Salinity
Bagamanoc	Paddy Rice	Mangrove, Poor Yield, Wilting Plant, Yellowish Leaves and Stunted Growth
Baras	Paddy Rice Irrigated, Paddy Rice, Coconut, Abaca and Banana	Mangrove, Wilting Plant, Yellowish Leaves, White Crust in Soil Surfaces, Poor Yield and Empty Panicle
Bato	Paddy Rice Irrigated, Paddy Rice, Nipa and Vegetables	Mangrove, White Crust in Soil Surfaces, Poor Yield, Sedges, Wilting Plant, Yellowish Leaves, Empty Panicle and Stunted Growth
Caramoran	Paddy Rice, Nipa and Abaca	Mangrove, White Crust in Soil Surfaces, Poor Yield, Wilting Plant, Empty Panicle, Yellowish Leaves and Stunted Growth
Gigmoto	Paddy Rice Irrigated and Paddy Rice	Mangrove, Poor Yield, Sedges, Wilting Plant, Empty Panicle, Yellowish Leaves and Stunted Growth
Pandan	Paddy Rice	
Panganiban	Paddy Rice	Mangrove, Poor Yield, Sedges, Wilting Plant, Yellowish Leaves and Stunted Growth
San Andres	Paddy Rice Irrigated, Nipa, Paddy Rice, Corn and Eggplant	Mangrove, Aster Weeds, White Crust in Soil Surfaces, Poor Yield, Sedges, Wilting Plant, Empty Panicle, Yellowish Leaves and Stunted Growth
Viga	Paddy Rice and Abaca	Mangrove, Poor Yield, Wilting Plant, Yellowish Leaves and Stunted Growth
Virac	Paddy Rice Irrigated, Paddy Rice, Eggplant, Coconut and Corn	Mangrove, White Crust in Soil Surfaces, Poor Yield, Wilting Plant, Empty Panicle, Yellowish Leaves and Stunted Growth

Figure 1.4 Key Informant Interview

II. CROP PRODUCTION ON SALINE AFFECTED AREAS

A. Key Informant Profile

Based on the 58 farmer respondents with 11 female and 47male ratio, the average years of age is 57. The eldest and youngest is 85 and 28 years old. Majority of the farmer respondents are tenants (84%), the rest are owners of their farm (16%). The average farm size is 1 hectare per farmer and their average farming experience is 26 years.

B. Farm Production

The main products of Catanduanes that contribute to agricultural productivity are abaca, coconut, rice, peanut, lowland vegetables and mud crabs. Table 2.1 shows the Special Area for Agricultural Development in Catanduanes.

Table 2.1 Special Area for Agricultural Development in Catanduanes

Municipality	Agricultural Production
Bagamanoc	Rice, vegetables, organic agriculture, chicken, high value crops
Baras	Rice, vegetables, organic agriculture, goat, duck, high value crops
Bato	Rice, vegetables, organic agriculture, swine, high value crops
Gigmoto	Rice, vegetables, organic agriculture, goat, duck, high value crops
Panganiban	Rice, vegetables, organic agriculture, chicken, high value crops
San Miguel	Rice, vegetables, organic agriculture, chicken. high value crops, swine

C. Farm Input

The study is limited to the coastal communities of the province therefore, the information on farm inputs are 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

Seed Variety	Description
NSIC Rc222	Long maturing rice variety
Bigante (Hybrid rice)	Tolerant to bacterial leaf blight
PSB Rc18	Non flooded condition
Inbred rice	

For fertilizers, they use inorganic fertilizers like urea (46-0-0), and complete fertilizer (14-14-14).

D. Source of Irrigation

Table 2.3 Source of Irrigation for Paddy Rice

Source of Irrigation for Paddy Rice	**%**
National Irrigation Administration	40
Communal	3
Shallow Tubewell	3
Rainfed	34
Creeks, river, spring	20

Based on the 58 farmer respondents, 40% of them have irrigation system assisted by NIA and the communal irrigation system is only 3%. Others are mostly rainfed (34%), while supplemental irrigation from shallow tubewell is only 3% and others are mostly from creeks, rivers and spring (20%).

E. Period of Salinity Occurrence and Practices to Address Salinity

Half of the farmer respondents (52%) said that salinity affects their rice farms during the months of August to December, but they still want to continue planting rice as their main crop.

Most of the farmer-respondents' practices to address salinity are the following: 1) proper timing for planting, 2) not applying fertilizer to the soil, and 3) flushing saline water with fresh water.

Figure 2.1 Auger Boring and Soil Sampling

Figure 2.2 Air Drying of 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 Baras (Bagong Sirang), Caramoran (Dariao, Paniqui & Libod), and Viga (Villa Aurora) have very severely saline soil. These areas have very high hazard for crop growth and only a few tolerant forage can grow satisfactorily. In

San Andres (Manambrag) and Virac (Ibong Sapa) the soils are severely saline. These areas are also hazardous for crop growth. Moderately saline soils are in some areas in Bagamanoc, Baras, Pandan, San Andres and Viga. These are moderately hazardous for crop growth that will result to restricted yield for many crops.

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

AUGER No.	BARANGAY	MUNICIPALITY	EC (mS/cm) @0-30cm	EC (mS/cm) @30-60cm	EC (mS/cm) @60-90cm
AB1	Quezon	Bagamanoc	1.039	0.220	0.141
AB2	Quezon	Bagamanoc	0.155	0.243	0.153
AB3	Sta. Teresa	Bagamanoc	5.514	4.912	4.171
AB4	Paniquihan	Baras	3.99	6.078	2.919
AB5	Benticayan	Baras	0.179	0.181	0.151
AB6	Bagong Sirang	Baras	25.240	20.500	17.030
AB7	Sagrada	Baras	0.585	0.197	0.164
AB8	J.M. Alberto	Baras	0.135	0.127	0.188
AB9	Banawang	Bato	0.175	0.171	0.162
AB10	Batalay	Bato	0.190	0.120	0.225
AB11	San Roque	Bato	0.192	0.102	0.120
AB12	Cabugao	Bato	0.168	0.130	0.099
AB13	Talisay	Bato	0.298	0.1658	0.196
AB14	San Andres	Bato	0.505	0.148	0.110
AB15	Hitoma	Caramoran	0.570	0.329	0.125
AB16	Sabloyon (Latag)	Caramoran	0.751	0.231	0.210
AB17	Hitoma	Caramoran	0.163	0.694	0.208
AB18	Supang	Caramoran	0.194	0.249	0.112
AB19	Mabini	Caramoran	0.419	0.134	0.117
AB20	Sabangan	Caramoran	0.149	0.097	0.150
AB21	Toytoy	Caramoran	0.201	0.152	1.674
AB22	Dariao	Caramoran	16.090	11.000	8.905
AB23	Toytoy	Caramoran	0.420	0.347	0.261
AB24	Paniqui	Caramoran	32.26	40.36	
AB25	Libod	Caramoran	20.750	20.58	
AB26	Dororian	Gigmoto	0.209	0.164	0.229
AB27	Biong	Gigmoto	0.238	0.340	0.570
AB28	San Vicente	Gigmoto	1.016	0.181	

AUGER No.	BARANGAY	MUNICIPALITY	EC (mS/cm) @0-30cm	EC (mS/cm) @30-60cm	EC (mS/cm) @60-90cm
AB29	Libod	Pandan	0.525	0.205	0.153
AB30	Tariwada	Pandan	6.280	1.393	1.516
AB31	Pandan Del Norte	Pandan	0.243	0.142	0.225
AB32	Sta. Ana	Panganiban	0.106	0.078	0.103
AB33	San Pedro	Panganiban	0.147	0.201	0.163
AB34	Cabuyoan	Panganiban	0.143	0.201	0.154
AB35	Bon'ot	San Andres	0.121	0.0894	0.098
AB36	Agojo	San Andres	0.137	0.135	0.144
AB37	Bagong Sirang	San Andres	0.235	0.169	0.163
AB38	Manambrag	San Andres	8.755	9.984	7.438
AB39	Cabungahan	San Andres	0.232	6.467	0.149
AB40	Palawig	San Andres	0.966	0.898	0.680
AB41	Villa Aurora	Viga	5.086	19.55	13.78
AB42	Tinago	Viga	2.328	3.141	3.224
AB43	Buenavista	Viga	0.727	0.408	0.291
AB44	Begonia	Viga	0.738	0.378	0.593
AB45	Santa Rosa	Viga	3.553	4.543	4.396
AB46	Botinagan	Viga	0.802	2.841	5.780
AB47	Ibong Sapa	Virac	5.374	9.801	11.22
AB48	Capilihan	Virac	0.231	0.107	0.113
AB49	Sogod Tibgao	Virac	0.238	0.201	0.108
AB50	Gogon	Virac	1.005	0.378	0.368
AB51	Palnab Del Norte	Virac	0.107	0.091	0.106
AB52	San Isidro Pajo	Virac	0.258	0.212	0.171
AB53	Pajo Baguio	Virac	0.142	0.118	0.161
AB54	Maralima	Virac	0.314	0.244	0.298
AB55	Casoocan	Virac	0.165	0.090	0.076
AB56	Talisoy	Virac	0.502	0.366	0.544
AB57	Igang	Virac	0.125	0.146	0.125

Note: Please refer to Table 3.1 for the Salinity Classification

Soil Salinity Maps (@pages 17-19) at three different depths (0-30cm, 30-60cm, and 60-90cm) are delineated using the corresponding Electrical Conductivity (EC) readings, then interpolation is used to estimate the soil salinity at unsampled locations to create a continuous representation. Tables 3.3-3.5 interpret the land area in hectares per municipality at different degrees of salinity.

Table 3.3 shows the land area (in hectares) affected by salinity for 0-30cm depth. Very severely saline is 145.76 hectares, in Baras and Caramoran. Severely saline is 218.11 hectares, also in Baras, Caramoran and San Andres. Moderately saline is 589.40 hectares, mostly in Baras and Pandan. Majority of the coastal areas for 0-30cm depth are non-saline (10,510.50 ha.) to slightly saline (1,799.54 ha.).

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
BAGAMANOC	180.27	325.32	52.16		
BARAS	135.29	36.28	156.51	98.79	53.65
BATO	1,158.44	22.33			
CARAMORAN	986.71	144.17	79.16	51.73	92.11
GIGMOTO	264.78	82.21			
PANDAN	402.88	487.76	120.07		
PANGANIBAN (PAYO)	1,522.08				
SAN ANDRES (CALOLBON)	2,079.38	78.67	67.55	67.59	
SAN MIGUEL	330.31				
VIGA	1,712.53	566.57	42.45		
VIRAC (Capital)	1,737.83	56.23	71.50		
TOTAL	**10,510.50**	**1,799.54**	**589.40**	**218.11**	**145.76**

On Table 3.4 at 30-60cm depth, the land area affected by salinity is a little higher than the 0-30cm depth. Very severely saline is 133.96 hectares, mostly in Caramoran. Severely saline is 389.29 hectares, mostly in Baras and San Andres. Moderately saline is 622.93 hectares, mostly in Baras, Caramoran, San Andres and Viga. Slightly saline is 1,495.15 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
BAGAMANOC	349.03	177.75	30.96		
BARAS	142.03	58.53	137.88	111.64	30.44
BATO	1,179.13	1.64			
CARAMORAN	976.52	129.39	108.50	68.82	70.64
GIGMOTO	247.26	35.90	62.53	1.30	
PANDAN	1,010.71				
PANGANIBAN (PAYO)	1,522.08				
SAN ANDRES (CALOLBON)	1,936.81	144.45	105.70	106.24	
SAN MIGUEL	330.31				
VIGA	1,229.73	898.09	116.70	44.16	32.88
VIRAC (Capital)	1,698.36	49.41	60.67	57.13	
TOTAL	**10,621.96**	**1,495.15**	**622.93**	**389.29**	**133.96**

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
BAGAMANOC	423.30	112.78	21.66		
BARAS	160.99	148.23	75.32	84.37	11.63
BATO	1,171.36	9.41			
CARAMORAN	972.95	160.43	87.26	62.37	70.87
GIGMOTO	207.52	47.53	91.94		
PANDAN	1,010.71				
PANGANIBAN (PAYO)	1,522.08				
SAN ANDRES (CALOLBON)	2,125.15	37.91	130.13		
SAN MIGUEL	330.31				
VIGA	1,314.08	790.67	157.60	59.20	
VIRAC (Capital)	1,690.68	49.88	50.17	74.82	
TOTAL	**10,929.11**	**1,356.86**	**614.07**	**280.76**	**82.50**

Table 3.5 at 60-90cm depth, the land area affected by salinity is almost the same at 30-60cm depth. Very severely saline is 82.50 hectares, in Baras and Caramoran. Severely saline is 280.76 hectares, also in Baras and Caramoran, with

areas in Viga and Virac. Moderately saline is 614.07 hectares, mostly in Viga and San Andres. Slightly saline is 1,356.86 hectares.

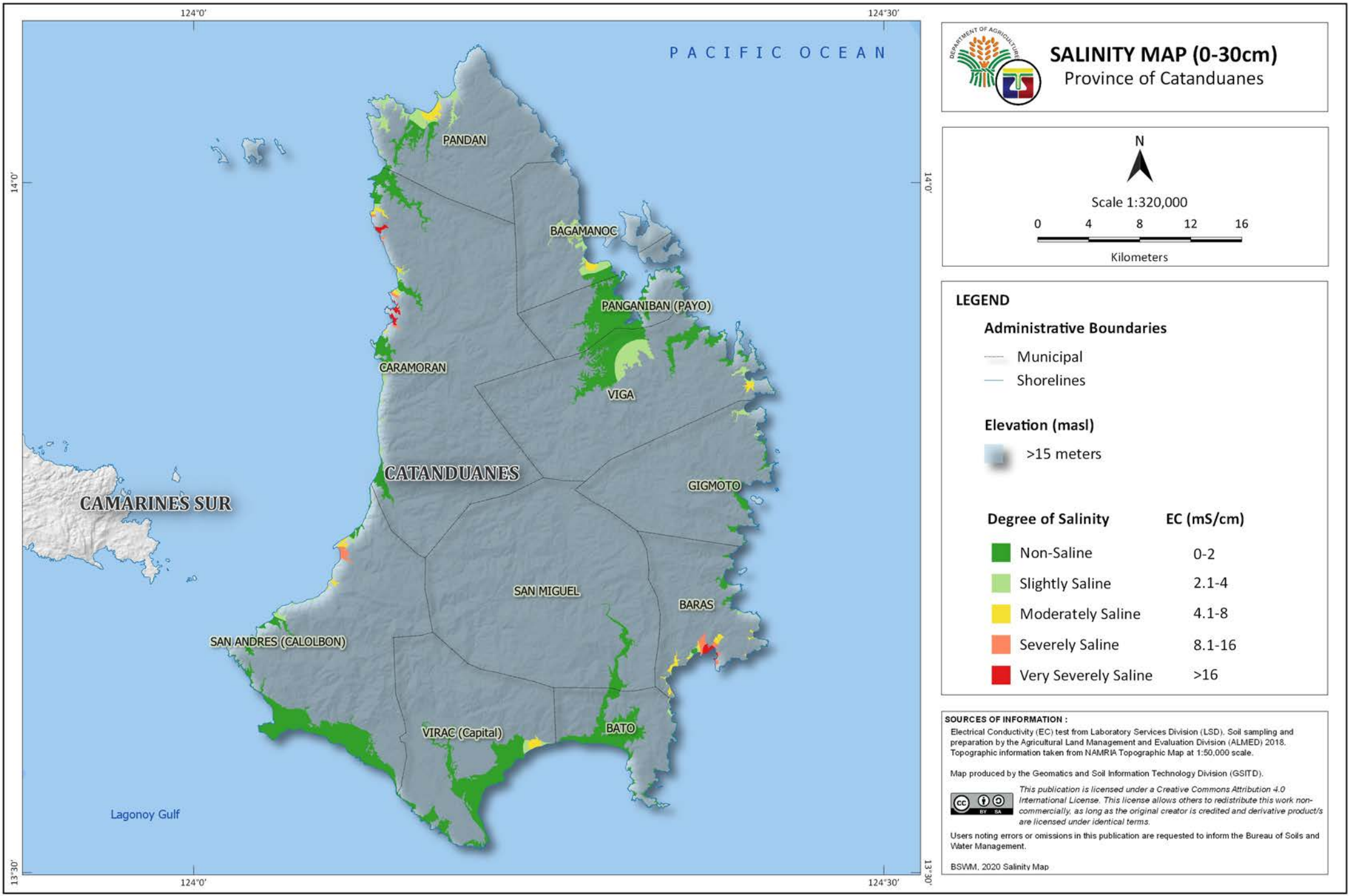
Table 3.6 summarizes the total coastal land area of Catanduanes per degree of salinity. Only 1.1% of the coastal area is very severely saline at 0-30cm depth, and 2.9% severely saline at 30-60 cm depth. While the moderately saline is almost 4.6% of the total coastal area for the 3 depths. Generally, the degree of salinity for Catanduanes is non saline to slightly saline.

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

Salinity Class	Soil Depth (cm)					
	0-30		30-60		60-90	
	hectares	%	hectares	%	hectares	%
Non saline	10,510.50	79.2	10,621.96	80.1	10,929.11	82.4
Slightly saline	1,799.54	13.6	1,495.15	11.3	1,356.86	10.2
Moderately saline	589.40	4.4	622.93	4.7	614.07	4.6
Severely saline	218.11	1.6	389.29	2.9	280.76	2.1
Very Severely saline	145.76	1.1	133.96	1.0	82.50	0.6

B. Output Maps

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



SALINITY MAP (0-30cm)

Province of Catanduanes

N

Scale 1:320,000

0 4 8 12 16

Kilometers

LEGEND

Administrative Boundaries

- 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

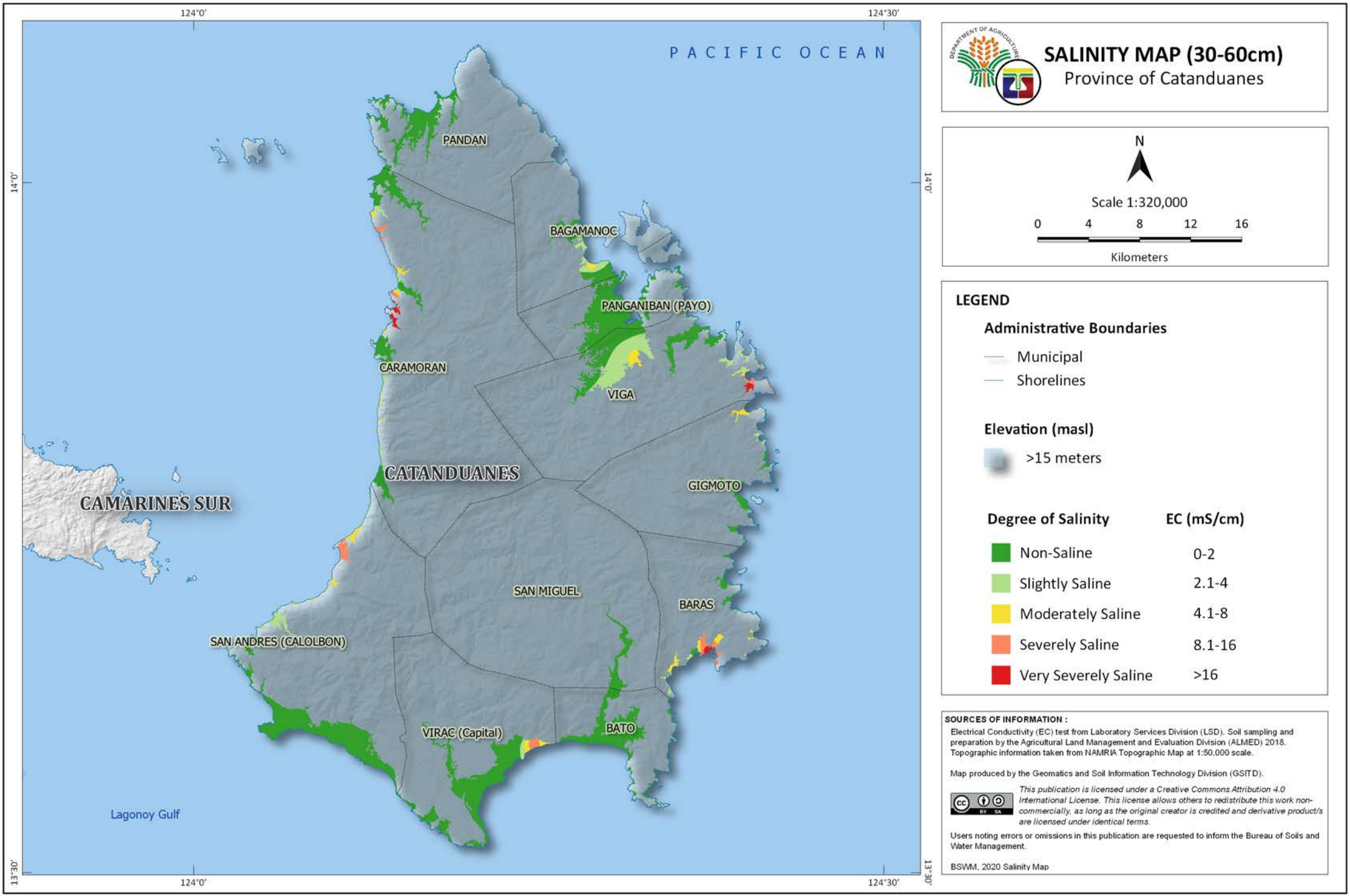
SOURCES OF INFORMATION :

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, 2020 Salinity Map



SALINITY MAP (30-60cm)

Province of Catanduanes

N

Scale 1:320,000

0 4 8 12 16

Kilometers

LEGEND

Administrative Boundaries

- 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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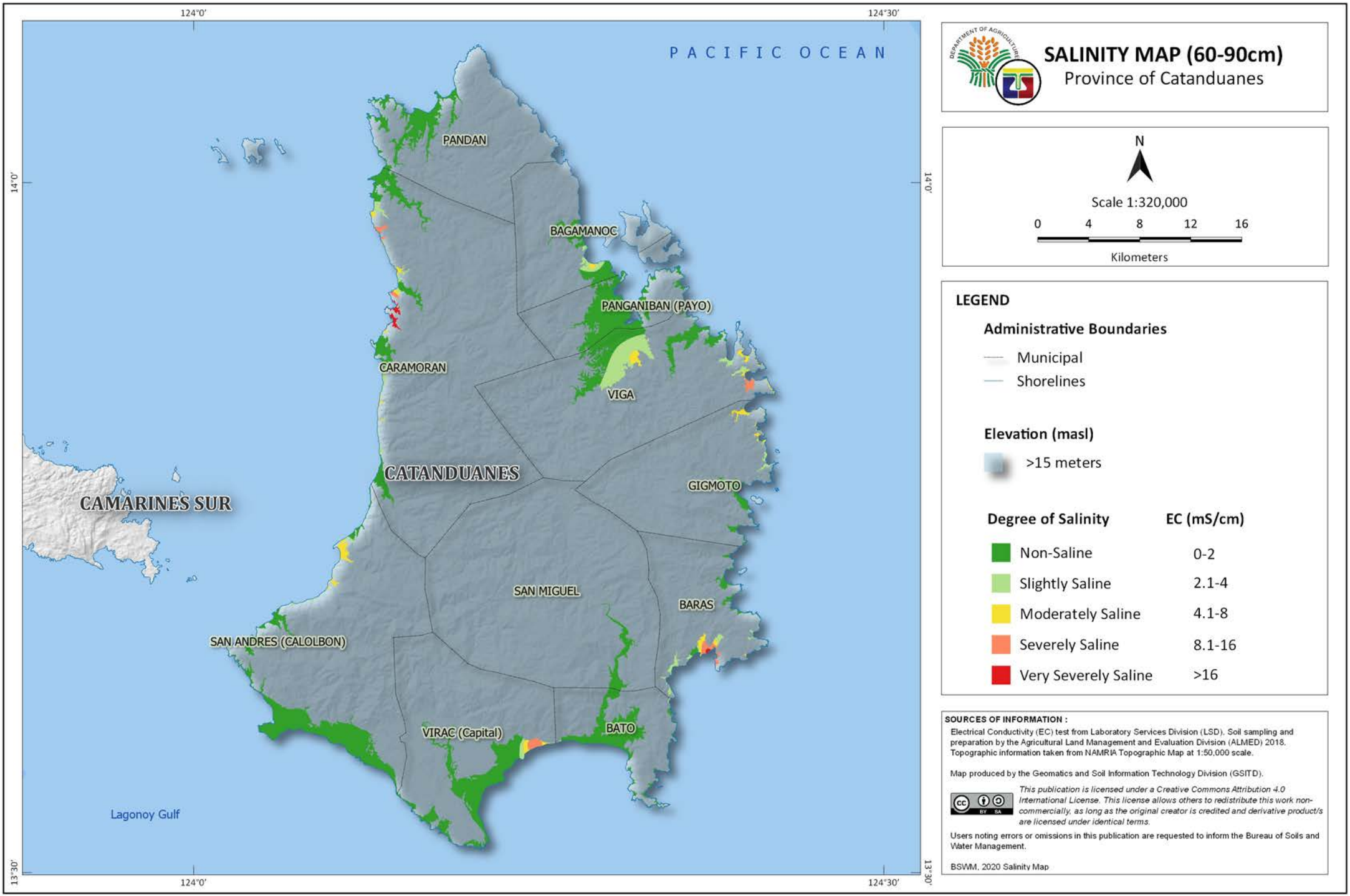
BSWM, 2020 Salinity Map



SALINITY MAP (60-90cm)

Province of Catanduanes

N

Scale 1:320,000

0 4 8 12 16

Kilometers

LEGEND

Administrative Boundaries

- 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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