

CLIMATE CHANGE VULNERABILITY MAPPING IN SELECTED MUNICIPALITIES IN LAGUNA, PHILIPPINES*

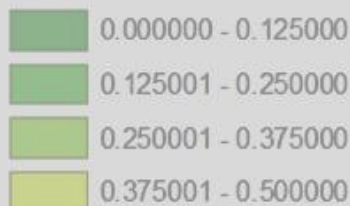
***Building Capacity to Adapt to Climate Change in Southeast Asia**

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University of the Philippines Los Baños

Le **PROJECT DISSEMINATION AND SHARING SEMINAR**

June 25, 2013

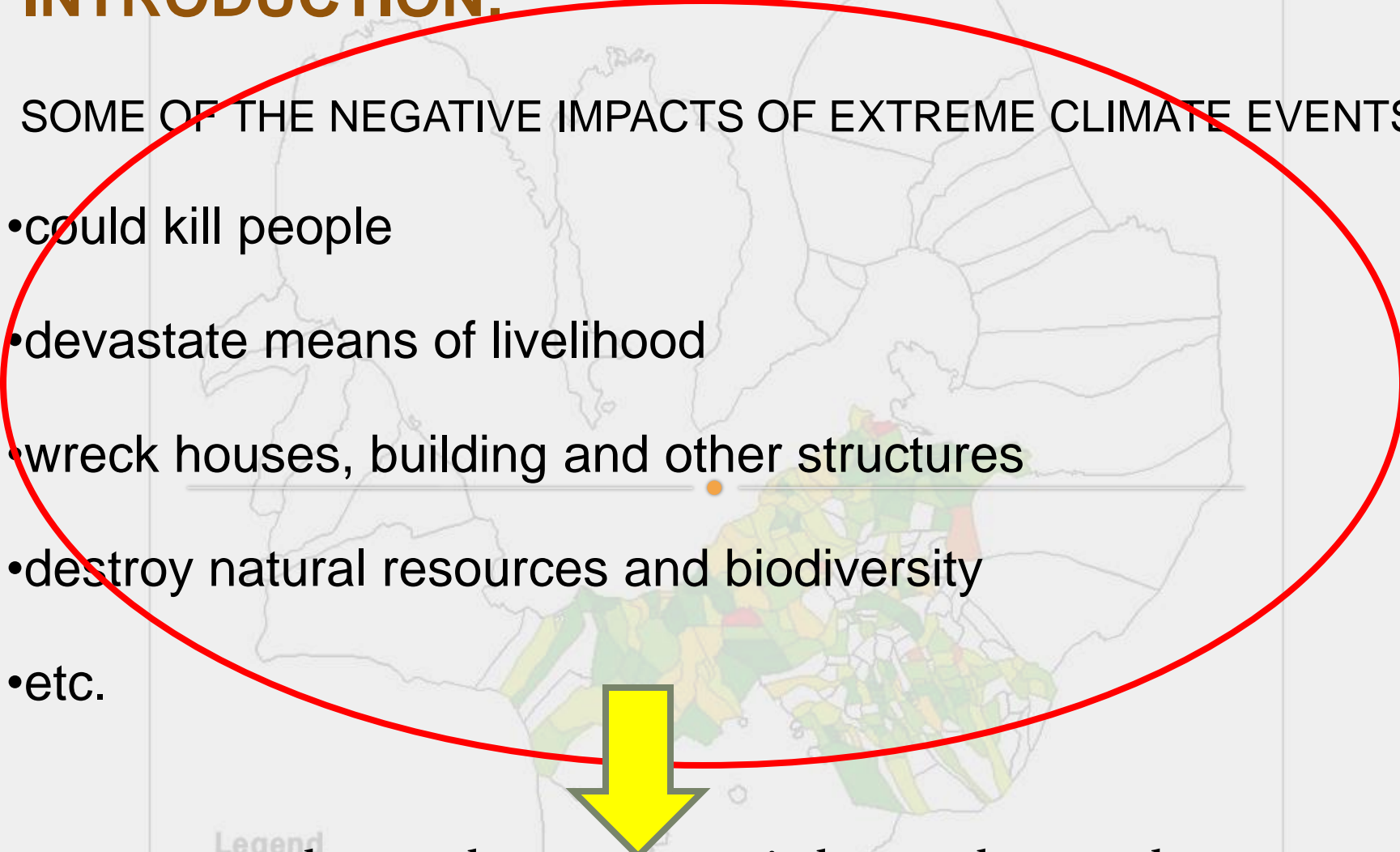
Manila, Philippines



INTRODUCTION:

SOME OF THE NEGATIVE IMPACTS OF EXTREME CLIMATE EVENTS

- could kill people
- devastate means of livelihood
- wreck houses, building and other structures
- destroy natural resources and biodiversity
- etc.



translate to huge economic losses that can be detrimental to further improvements of food security

Legend

0.000000 - 0.125000

0.250001 - 0.375000

0.375001 - 0.500000

OVERALL OBJECTIVE:

*To build local capacity to adapt to climate change, especially in vulnerability assessment and adaptation analysis

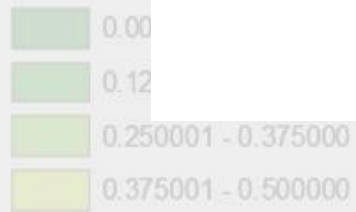
SPECIFIC OBJECTIVES:

- to measure community's vulnerability to climate change through research in selected communities
- to produce maps of each community's relative vulnerability to climate change (commune and agriculture)



Laguna

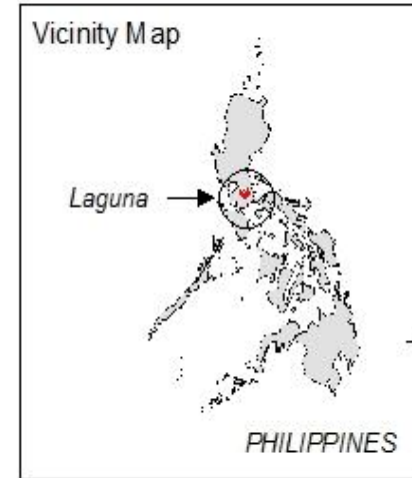
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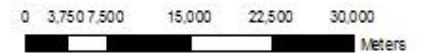
PHILIPPINES STUDY SITE

Legend

-  Lake
-  Watersheds
-  Selected Municipalities
-  Laguna



PROVINCE OF LAGUNA



Source: NAMRIA, DA-BAR

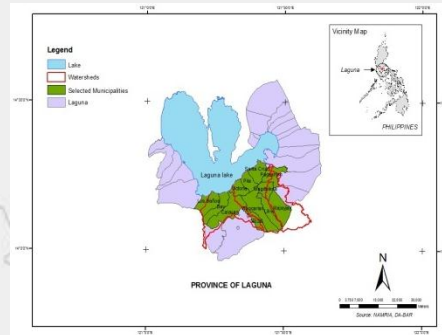
121°0'0"E

121°30'0"E

122°0'0"E

0.375001 - 0.500000

The Study Site



- Watershed approach
- proposed watershed includes municipalities that have experienced flooding and heavy typhoon damages in recent years
- chosen watershed will include the agricultural area of Laguna

Province of Laguna

- 30 municipalities
- 676 barangays
- 1,760 km²
- 2007 Population: 2, 473, 530



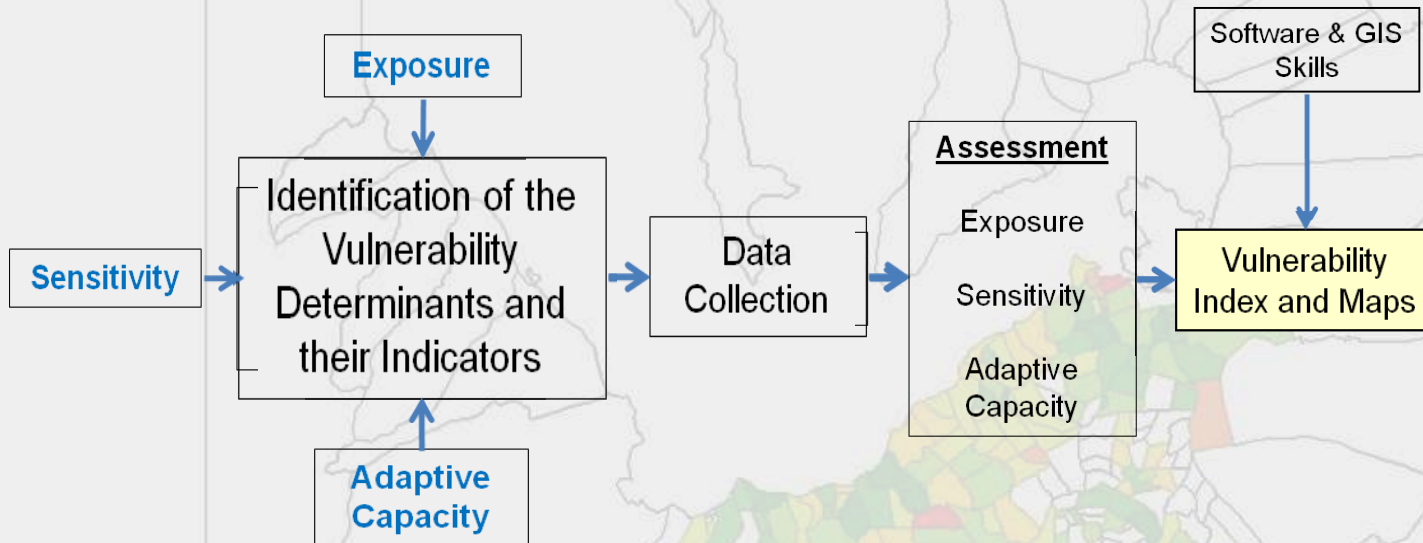
The Study Site

- ✓ 12 municipalities
- ✓ 274 barangays (194)
- ✓ 568 km²
- ✓ 2007 population: 568, 690 (23% share)

Laguna Lake:

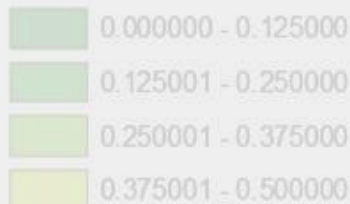
- largest living lake in Southeast Asia
- 90,000 ha
- serves as a catchment basin for 21 major tributaries with a total catchment area of 45,000 km²
- Seventeen of the tributaries draining to the lake are within Laguna
- has only a single outlet into Manila Bay through the Napindan Channel

METHODOLOGY:



Participation from Local Officials, Communities, and other Stakeholders

Legend

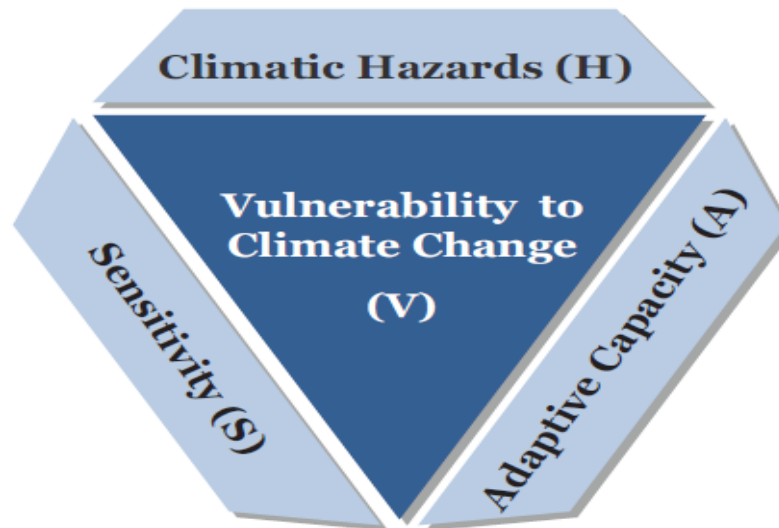


FRAMEWORK:

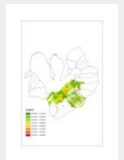
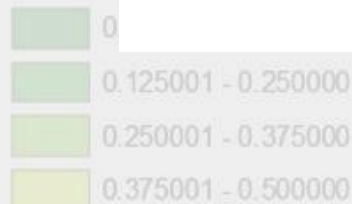
Vulnerability = (Exposure, Sensitivities, and Adaptive Capacity)

Climate Change Vulnerability (of region i)

$$V_i = F(H_i, S_i, A_i)$$



Legend



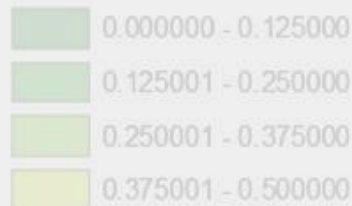
EXPOSURE / HAZARD

- Typhoon
- Flood

SENSITIVITY

- Natural
- Human
- Infrastructure
- Livelihood

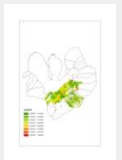
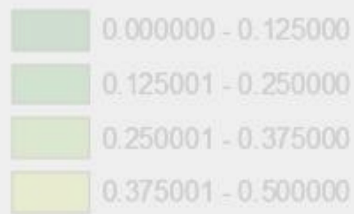
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ADAPTIVE CAPACITY

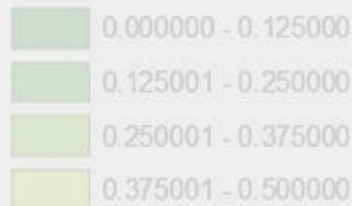
- Infrastructure
- Economic
- Technology
- Social
- Human

Legend



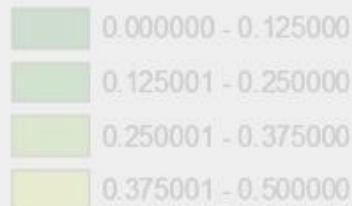
essentially the nature and extent by which a particular community experiences climate hazards, such as typhoons, floods, and drought.

Legend



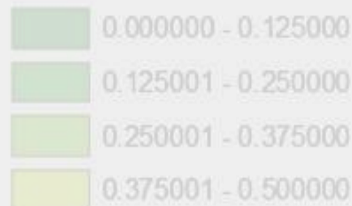
the degree by which the community is affected by climate change stressors

Legend



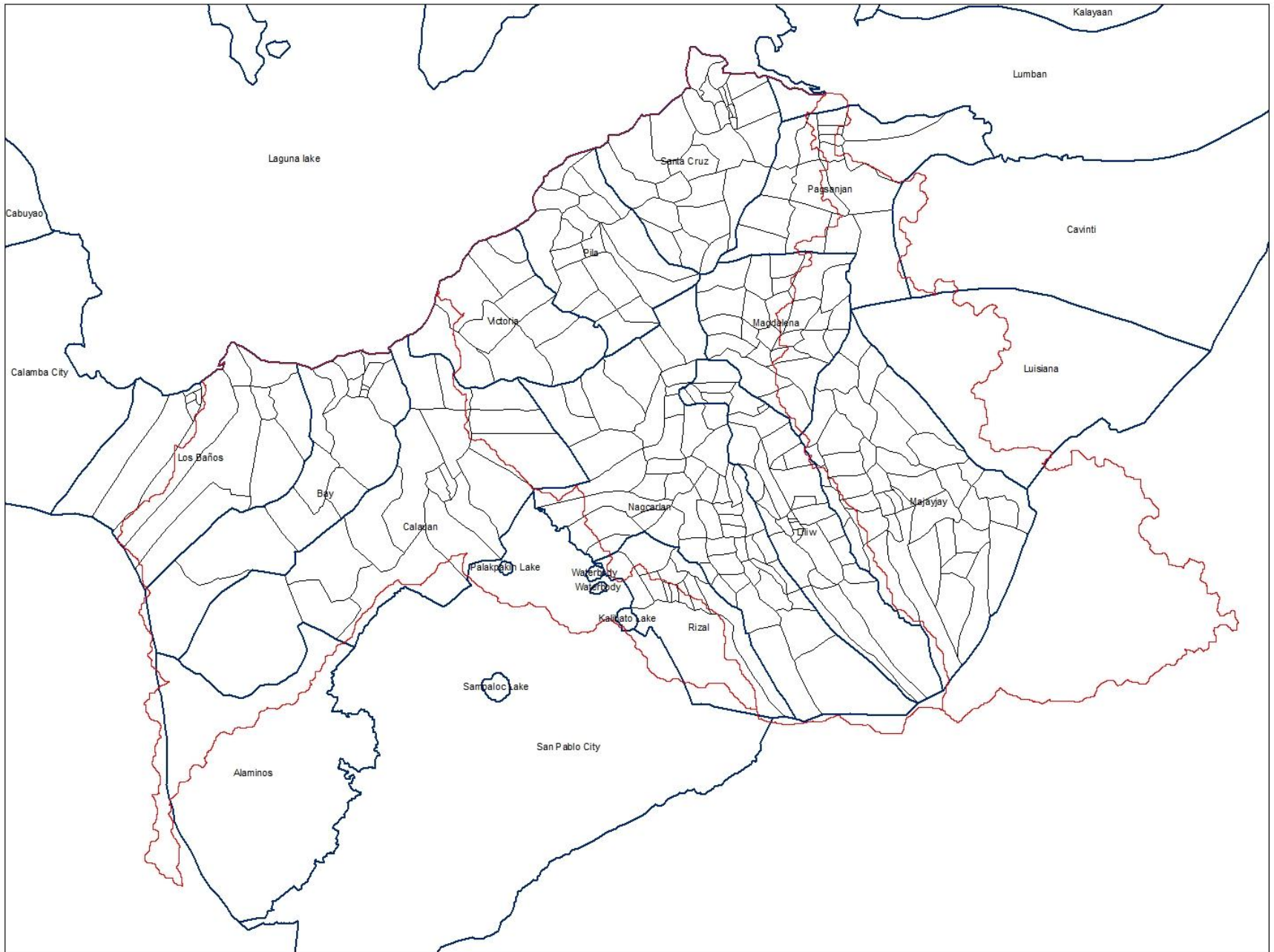
reflects the ability of the community to adjust its practices and behavior so that the impacts of climate change area are reduced

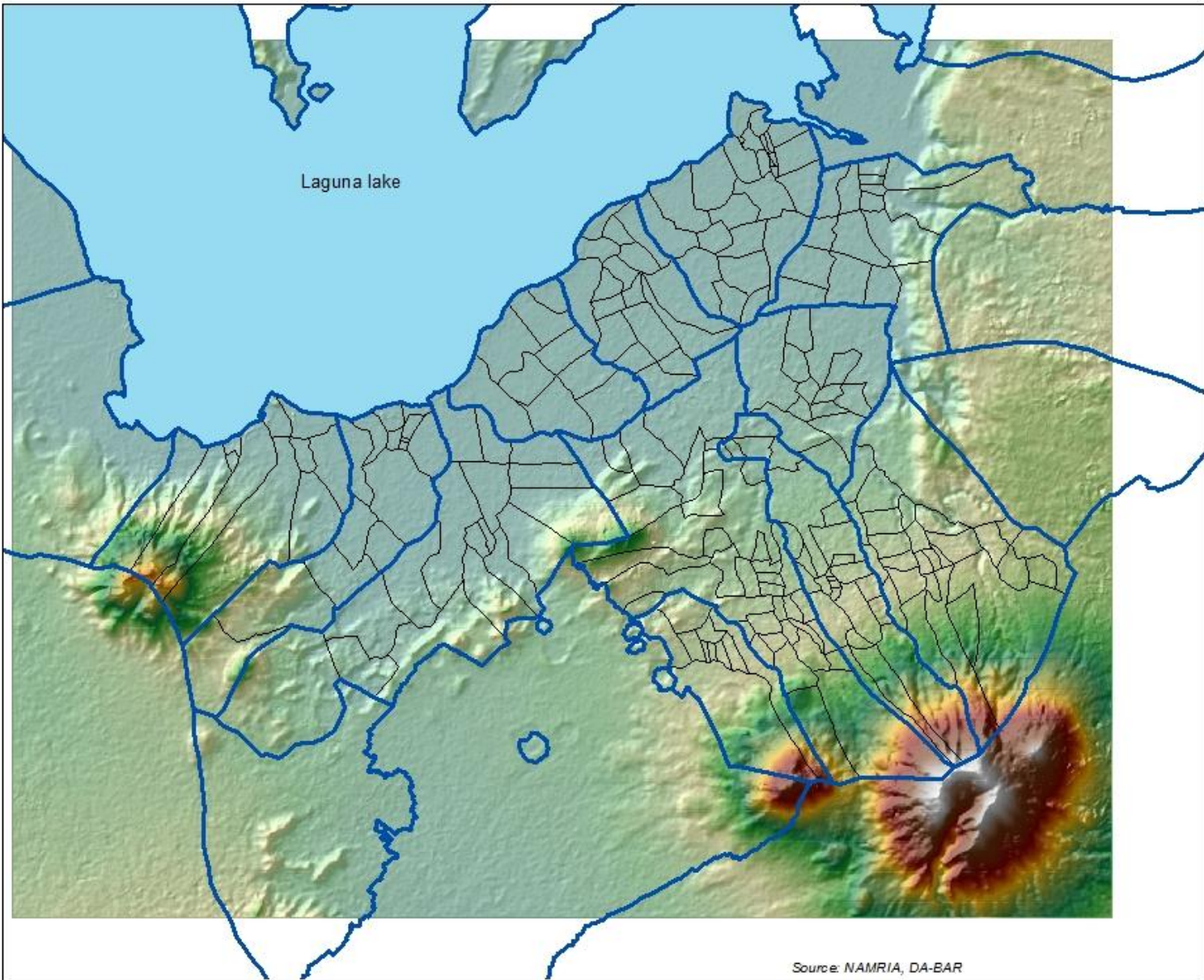
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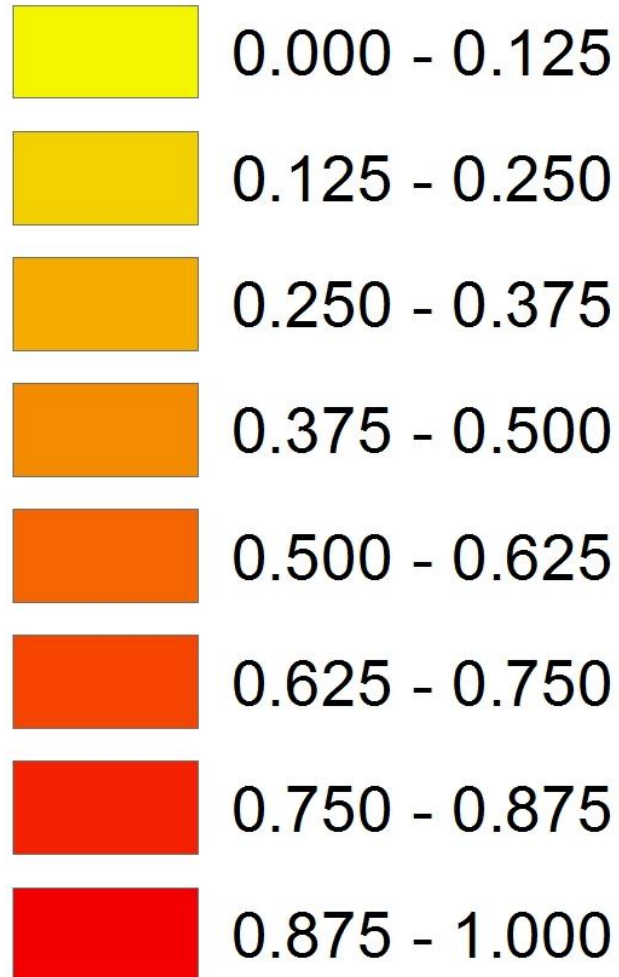
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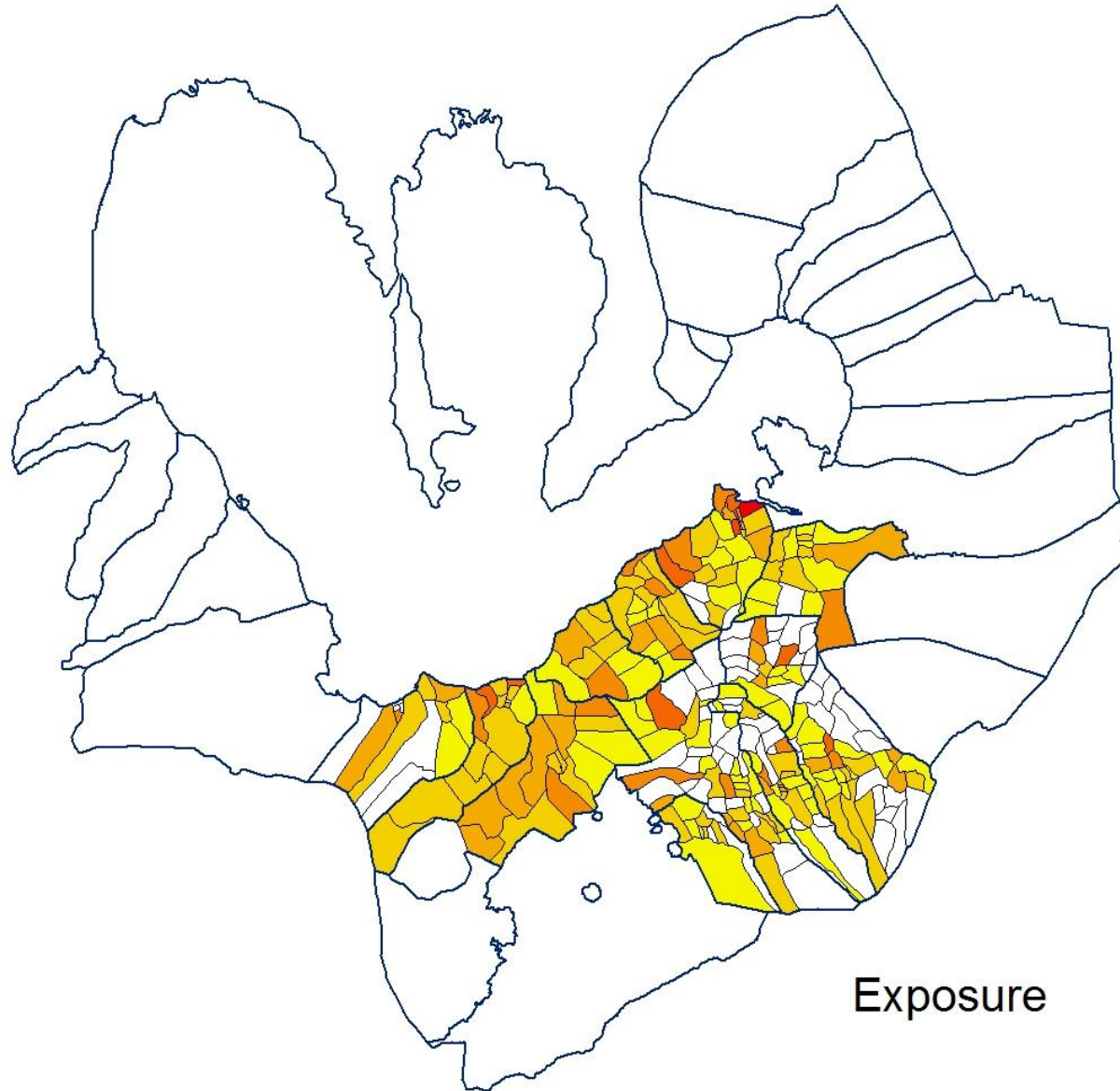


Source: NAMRIA, DA-BAR

0.375001 - 0.500000

VULNERABILITY INDEX





Legend

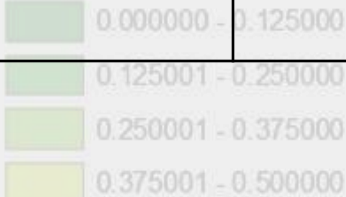


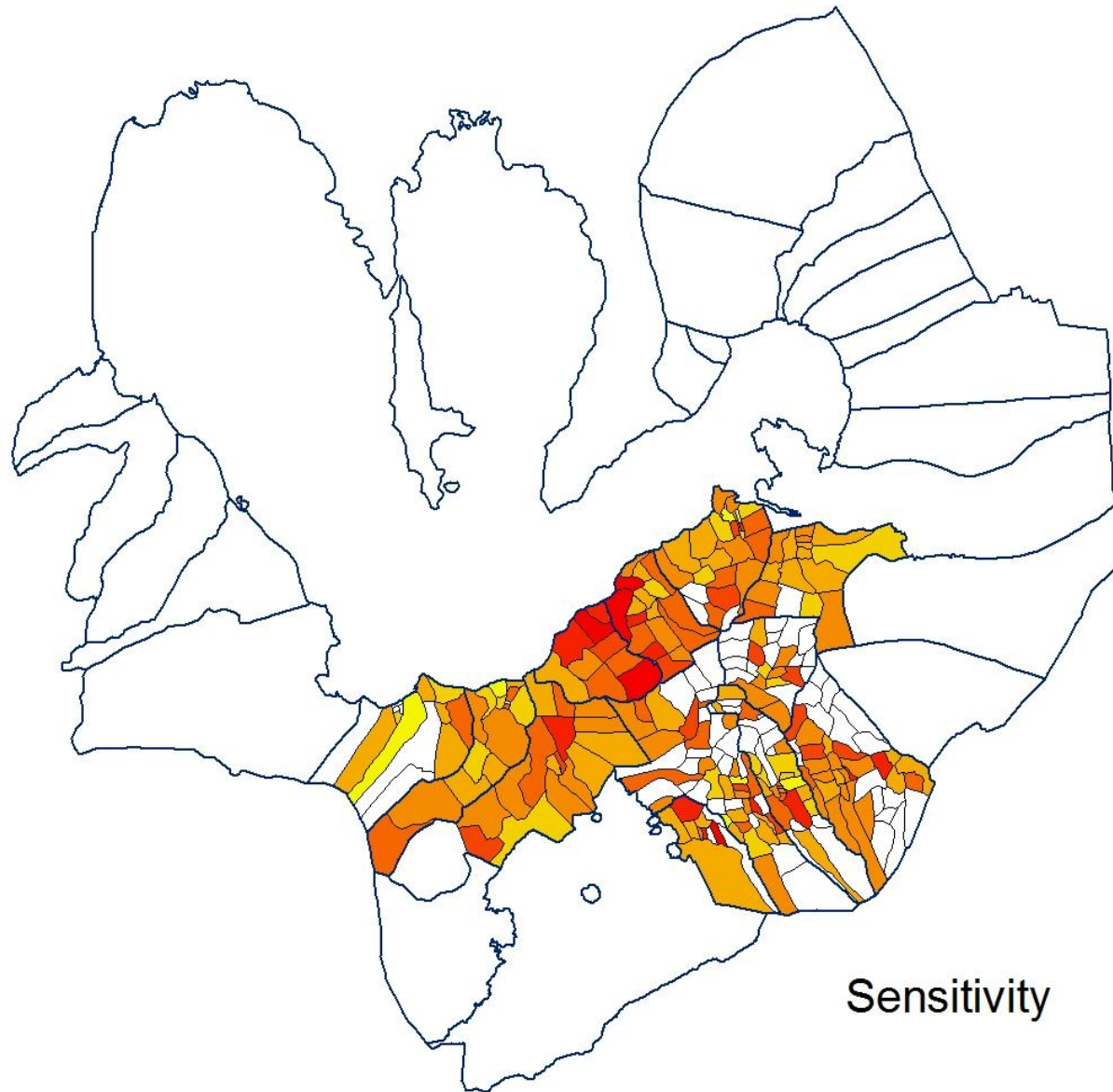
Exposure

Table 1. Vulnerable areas in terms of exposure to climatic hazards.

Municipality	Barangay	Topographic Classification	Relative Exposure Vulnerability Index
Bay	Maitim	Coastal	0.618
	Tagumpay	Coastal	0.544
Magdalena	Bucal	Lowland	0.504
Majayjay	Munting Kawayan	Lowland	0.621
Nagcarlan	Maravilla	Lowland	0.516
Sta. Cruz	Duhat	Coastal	0.513
	Poblacion V	Lowland	0.591
	San Pablo Norte	Coastal	1.000
	Santisima Cruz	Coastal	0.609

Legend





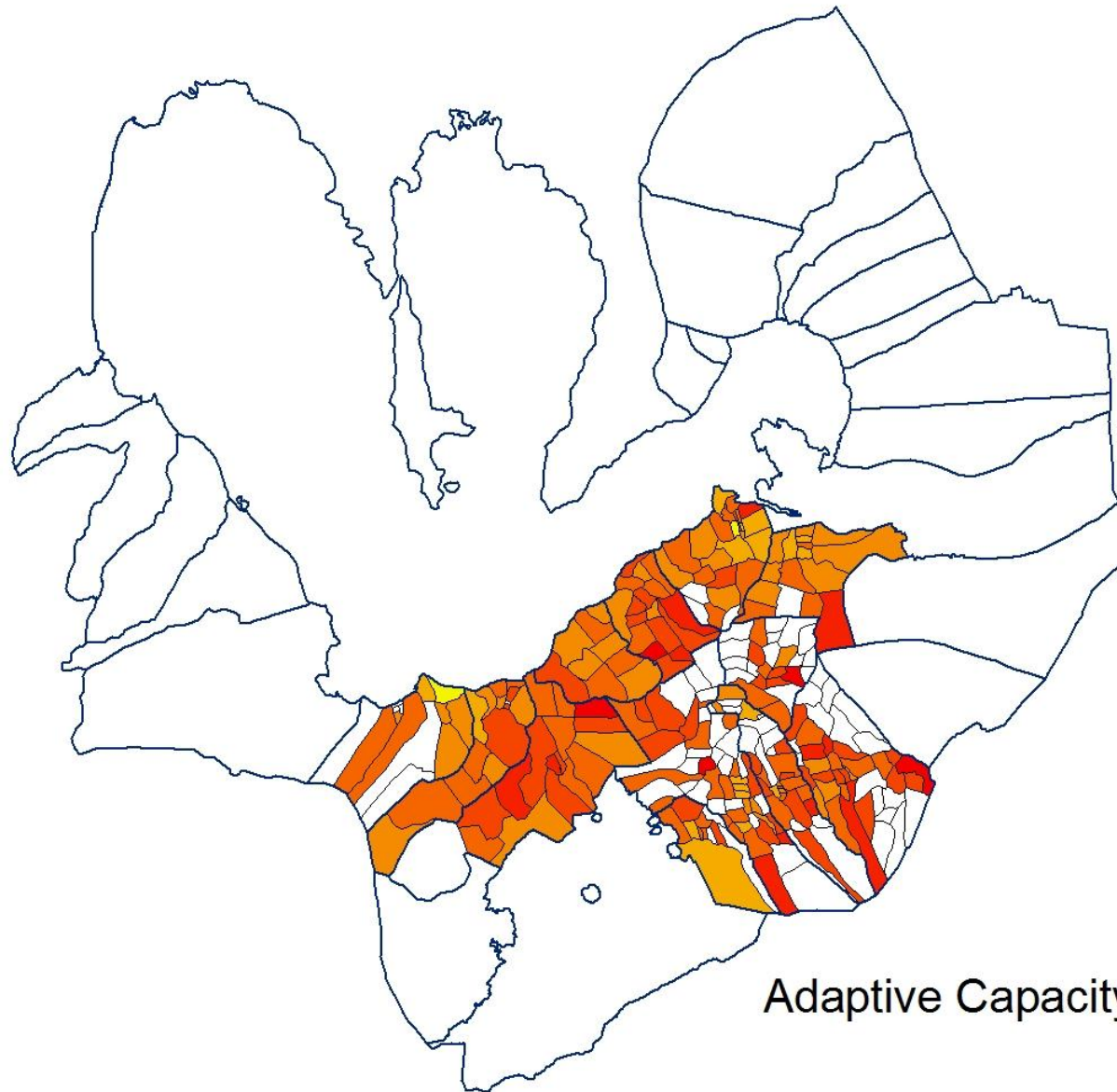
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- 0.000 - 0.125
- 0.125 - 0.250
- 0.250 - 0.375
- 0.375 - 0.500
- 0.500 - 0.625
- 0.625 - 0.750
- 0.750 - 0.875
- 0.875 - 1.000

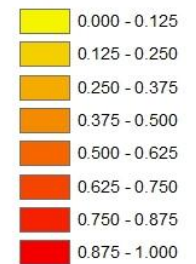
Sensitivity

Table 2. Vulnerable areas in terms of sensitivity determinant.

Municipality	Barangay	Topographic Classification	Relative Sensitivity Vulnerability Index	
Bay	Bitin	Midland	0.530	
	San Agustin	Lowland	0.554	
	San Isidro	Lowland	0.527	
Calauan	Bangyas	Lowland	0.5114	
	Masiit	Lowland	0.503	
	Perez	Lowland	0.703	
	San Isidro	Lowland	0.766	
	Silangan	Lowland	0.707	
	Calumpang	Lowland	0.501	
Liliw	Kanlurang Bukal	Midland	0.873	
	Maslun	Midland	0.518	
	Oples	Midland	0.622	
	Pag Asa	Lowland	0.599	
Los Baños	Maahas	Lowland	0.543	
Magdalena	Ibabang Butnog	Lowland	0.711	
	Ilayang Atingay	Lowland	0.657	
Majayjay	Bitaoy	Midland	0.530	
	Ibabang Banga	Midland	0.725	
	Olla	Lowland	0.685	
	Panglan	Midland	0.612	
	Piit	Midland	0.810	
	San Francisco	Midland	0.857	
	San Isidro	Lowland	0.696	
	Balimbing	Midland	0.676	
	Balinacon	Midland	0.843	
	Banago	Midland	0.509	
Nagcarlan	Cabangan	Lowland	0.545	
	Manaol	Lowland	0.580	
	Palina	Lowland	0.614	
	Poblacion II	Lowland	0.695	
	Sabang	Midland	0.518	
	Sibulan	Lowland	0.712	
	Silangang Kabubuhayan	Lowland	0.535	
	Pagsanjan	Buboy	Lowland	0.598
		Bagong Pook	Lowland	0.519
		Bukal	Lowland	0.791
Concepcion		Lowland	0.518	
Pila	Mojon	Lowland	0.507	
	San Antonio	Lowland	0.557	
	San Miguel	Lowland	0.722	
	Santa Clara Sur	Lowland	0.518	
	Tubuan	Lowland	0.518	
	East Poblacion	Lowland	0.518	
	Entablado	Lowland	0.518	
Rizal	Tuy	Midland	0.884	
	Oogong	Lowland	0.517	
Sta. Cruz	Pagsawitan	Lowland	0.502	
	Poblacion II	Lowland	0.689	
	San Jose	Lowland	0.652	
	San Juan	Lowland	0.612	
	San Pablo Sur	Lowland	0.514	
	Santo Angel Sur	Lowland	0.514	
	Banca-Banca	Lowland	0.514	
	Daniw	Lowland	0.514	
	Masapang	Lowland	0.514	
	Nanhaya	Lowland	0.514	
Victoria	Pagalangan	Lowland	0.514	
	San Francisco	Lowland	0.514	
	coastal	coastal	0.981	
	coastal	0.916		
	coastal	0.770		
	coastal	0.820		



Legend

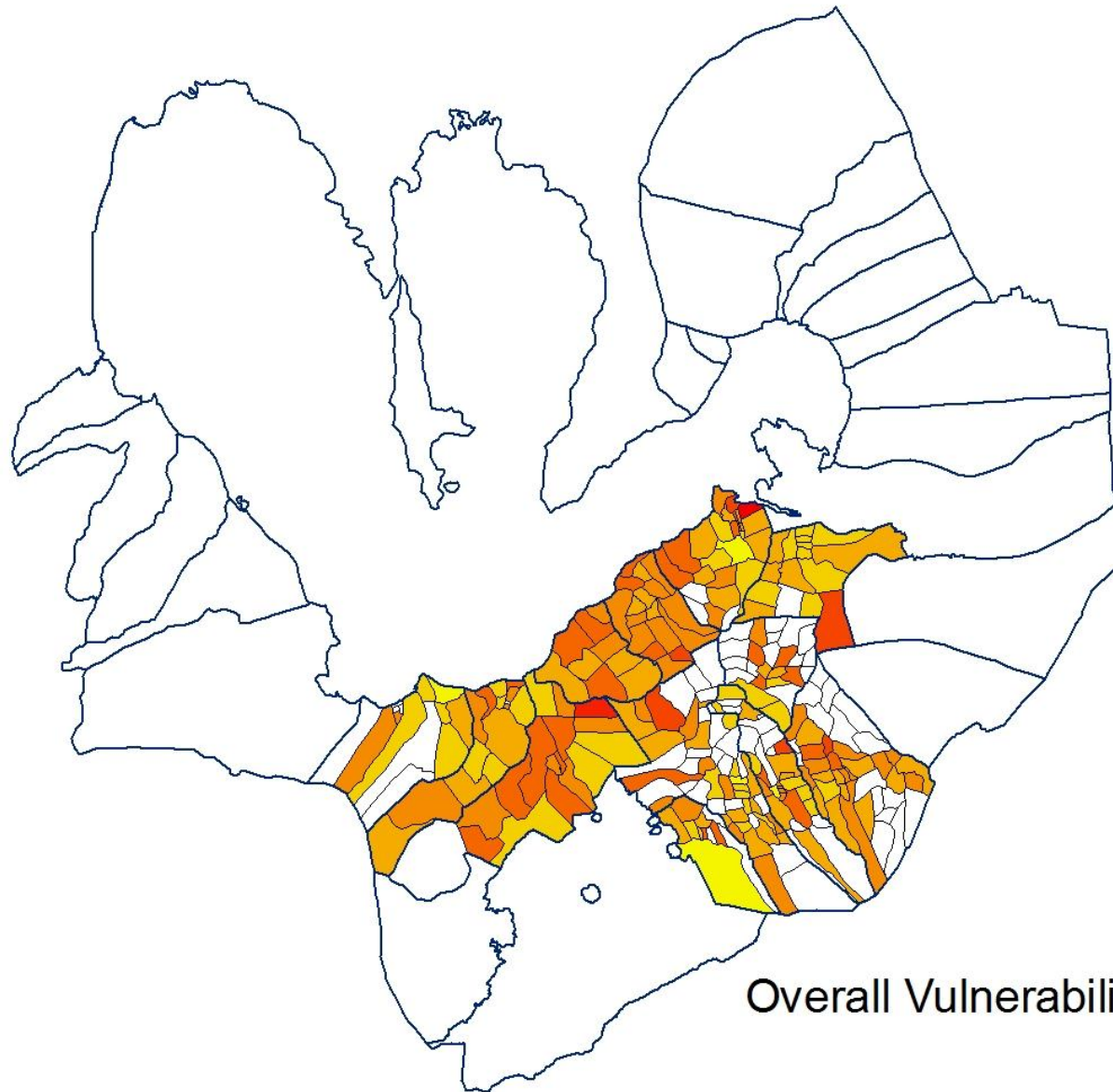


Adaptive Capacity

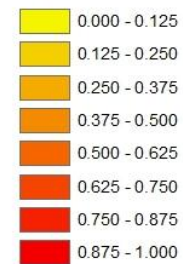
Table 3. Percentage of vulnerable barangays having a low adaptive capacity

Municipality	Number of Vulnerable Barangays	Percentage
Bay	8 out of 14	57%
Calauan	14 out of 16	88%
Liliw	14 out of 20	70%
Los Baños	2 out of 8	25%
Magdalena	9 out of 10	90%
Majayjay	20 out of 24	83%
Nagcarlan	23 out of 30	77%
Pagsanjan	5 out of 15	33%
Pila	14 out of 17	82%
Rizal	6 out of 8	75%
Sta. Cruz	12 out of 23	52%
Victoria	4 out of 9	44%





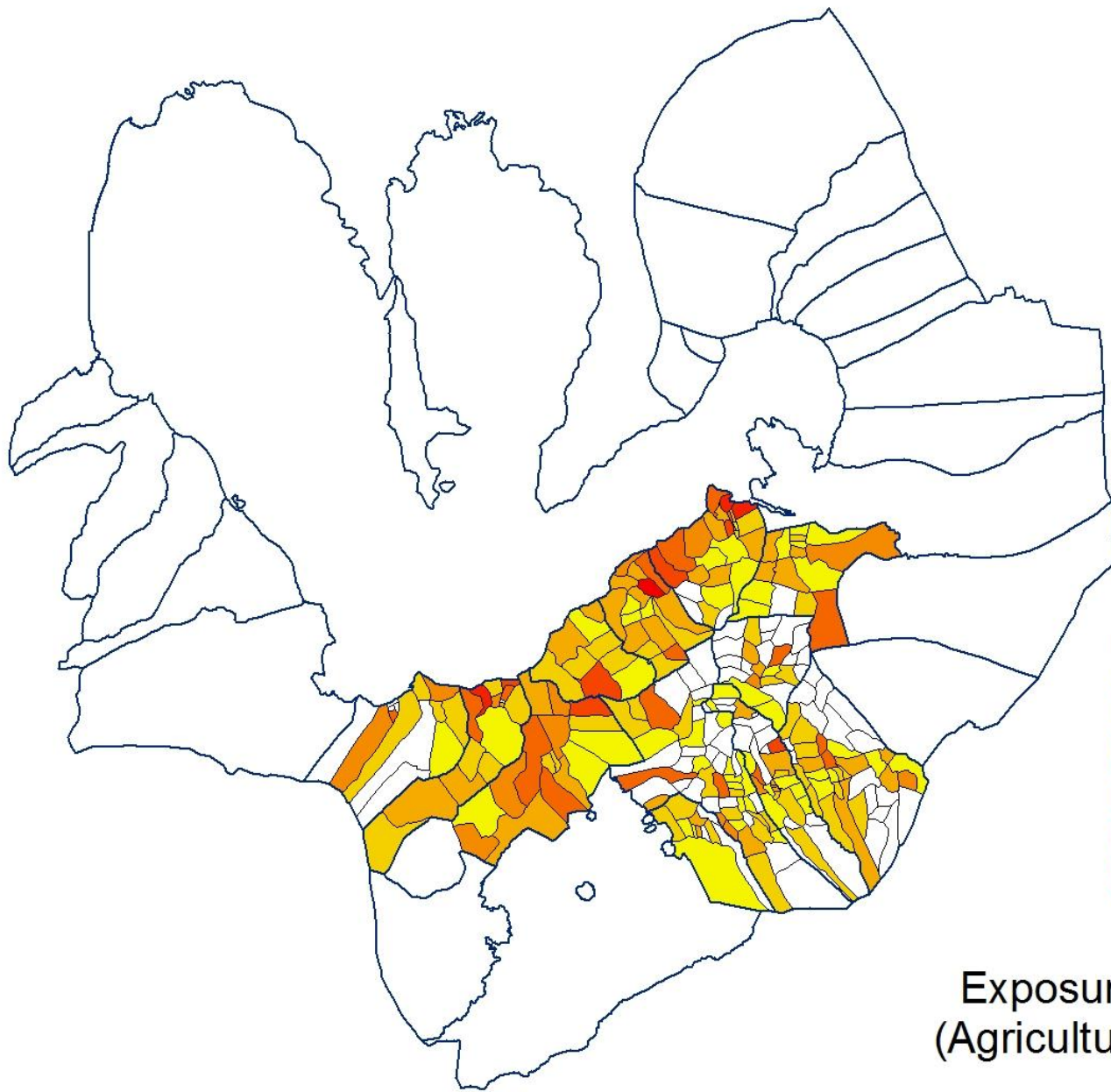
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Overall Vulnerability

Table 4. Overall Vulnerable Areas

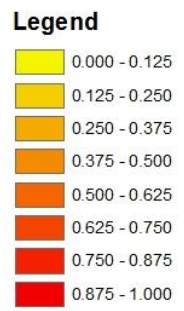
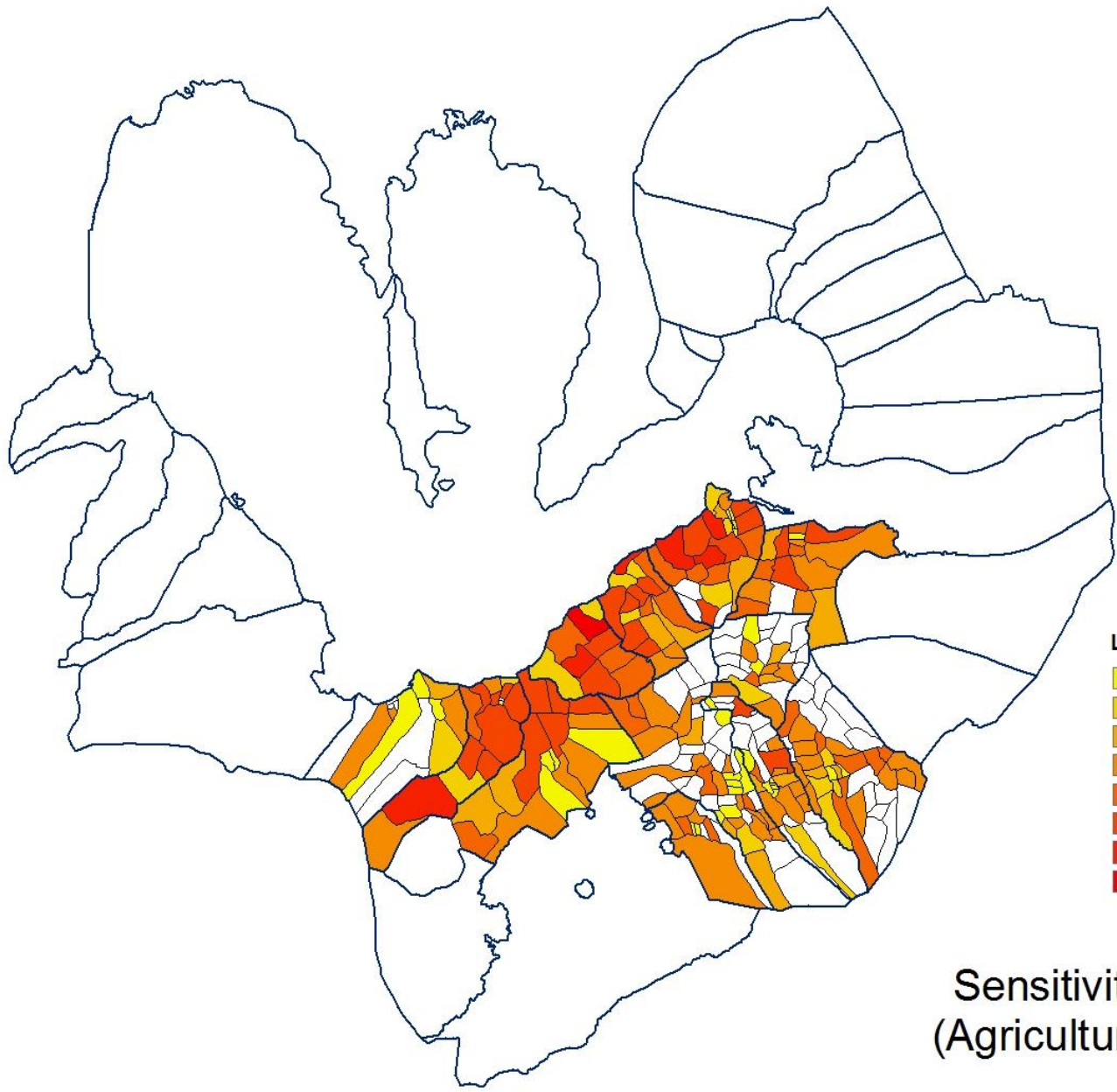
Municipality	Barangay	Topographic Classification	Overall Vulnerability
Bay	Maitim	Coastal	0.530
	Tagumpay	Coastal	0.582
Calauan	Balayhangin	Lowland	0.598
	Dayap	Lowland	0.770
	Mabacan	Lowland	0.554
	Masiit	Lowland	0.566
	Perez	Lowland	0.535
	San Isidro	Lowland	0.599
	Silangan	Lowland	0.538
Liliw	Ilayang Palina	Lowland	0.502
	Kanlurang Bukal	Midland	0.546
	Tuy-Baanan	Lowland	0.656
Magdalena	Bucal	Lowland	0.563
	Ibabang Butnog	Lowland	0.581
	Ilayang Atinay	Lowland	0.545
	Tipunan	Lowland	0.531
Majayjay	Munting Kawayan	Lowland	0.718
	Olla	Lowland	0.502
	Santa Catalina	Lowland	0.549
Nagcarlan	Maravilla	Lowland	0.628
	Sabang	Midland	0.615
Pagsanjan	Anibong	Lowland	0.634
Pila	Aplaya	Coastal	0.551
	Bukal	Lowland	0.596
	Masico	Lowland	0.659
	Pinagbayanan	Coastal	0.581
Rizal	East Poblacion	Midland	0.503
	Tuy	Midland	0.561
Sta. Cruz	Duhat	Coastal	0.537
	Gatid	Coastal	0.505
	Poblacion V	Lowland	0.612
	San Pablo Norte	Coastal	1.000
	Santisima Cruz	Coastal	0.652
	Santo Angel Sur	Lowland	0.577
	Masapang	Lowland	0.615



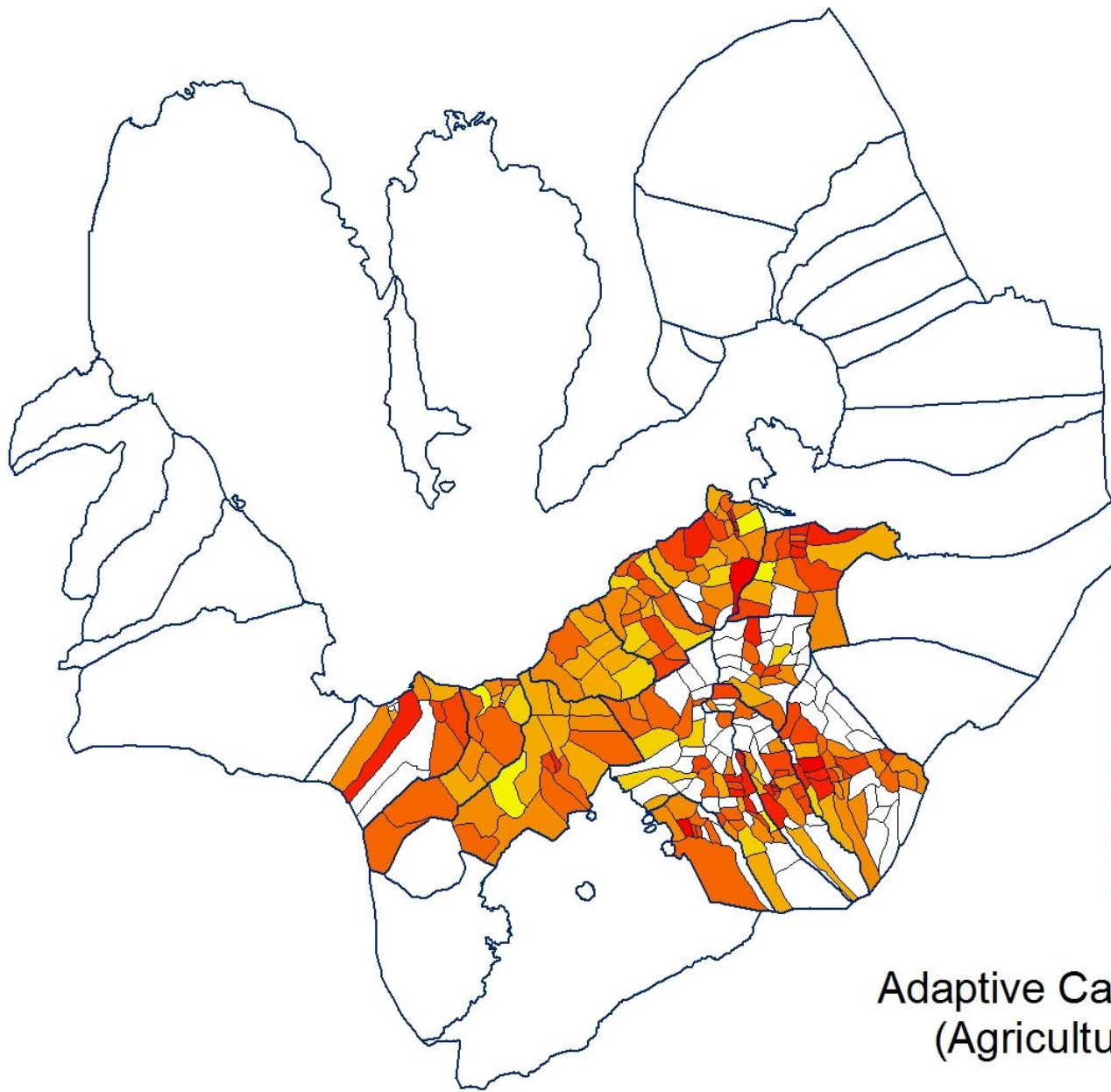
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Exposure
(Agriculture)



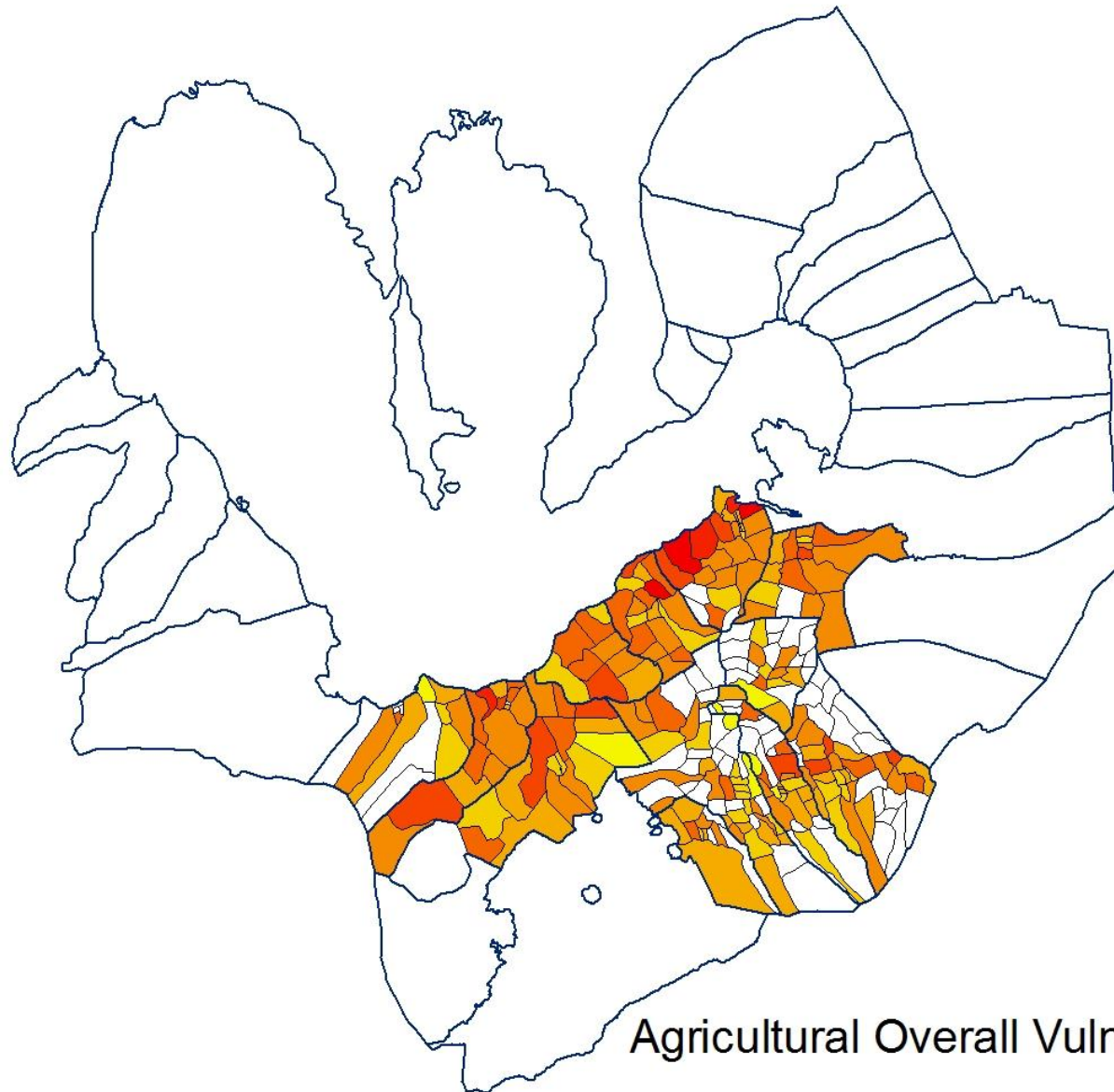
Sensitivity
(Agriculture)



Legend



Adaptive Capacity
(Agriculture)



Legend



Agricultural Overall Vulnerability

Municipality	Barangay	Topographic Classification	Overall Vulnerability
Bay	Calo	Lowland	0.632
	Maitim	Coastal	0.788
	Paciano Rizal	Lowland	0.513
	San Isidro	Lowland	0.623
	Sta. Cruz	Lowland	0.724
	Sto. Domingo	Coastal	0.619
	Tagumpay	Coastal	0.531
Calauan	Bangyas	Lowland	0.599
	Dayap	Lowland	0.735
	Masiit	Lowland	0.629
	Perez	Lowland	0.577
	San Isidro	Lowland	0.585
Liliw	Bongkol	Lowland	0.688
	Calumpang	Lowland	0.615
	Ilayang Palina	Lowland	0.568
	Tuy-Baanan	Lowland	0.615
Los Baños	Timugan	Lowland	0.540
Magdalena	Tipunan	Lowland	0.519
Majayjay	Bitaoy	Midland	0.512
	Botocan	Midland	0.637
	Ilayang Banga	Midland	0.523
	Munting Kawayan	Lowland	0.687
	Talortor	Lowland	0.628
Nagcarlan	Maravilla	Lowland	0.617
	Yukos	Lowland	0.555
Pagsanjan	Calusiche	Lowland	0.580
	Magdapio	Lowland	0.544
	Maulawin	Lowland	0.674
	Sampaloc	Lowland	0.553
Pila	Aplaya	Coastal	0.747
	Bagong Pook	Lowland	0.537
	Bulilan Norte	Lowland	0.591
	Labuin	Lowland	1.000
	Masico	Lowland	0.617
	San Antonio	Lowland	0.568
	Tubuan	Coastal	0.578
Rizal	Talaga	Lowland	0.509
Sta. Cruz	Bagumbayan	Lowland	0.773
	Calios	Coastal	0.705
	Duhat	Coastal	0.659
	Gatid	Coastal	0.885
	Oogong	Lowland	0.539
	San Pablo Norte	Coastal	0.876
	Santisima Cruz	Coastal	0.807
Victoria	Masapang	Lowland	0.686
	Nanhaya	Coastal	0.620

SUMMARY:

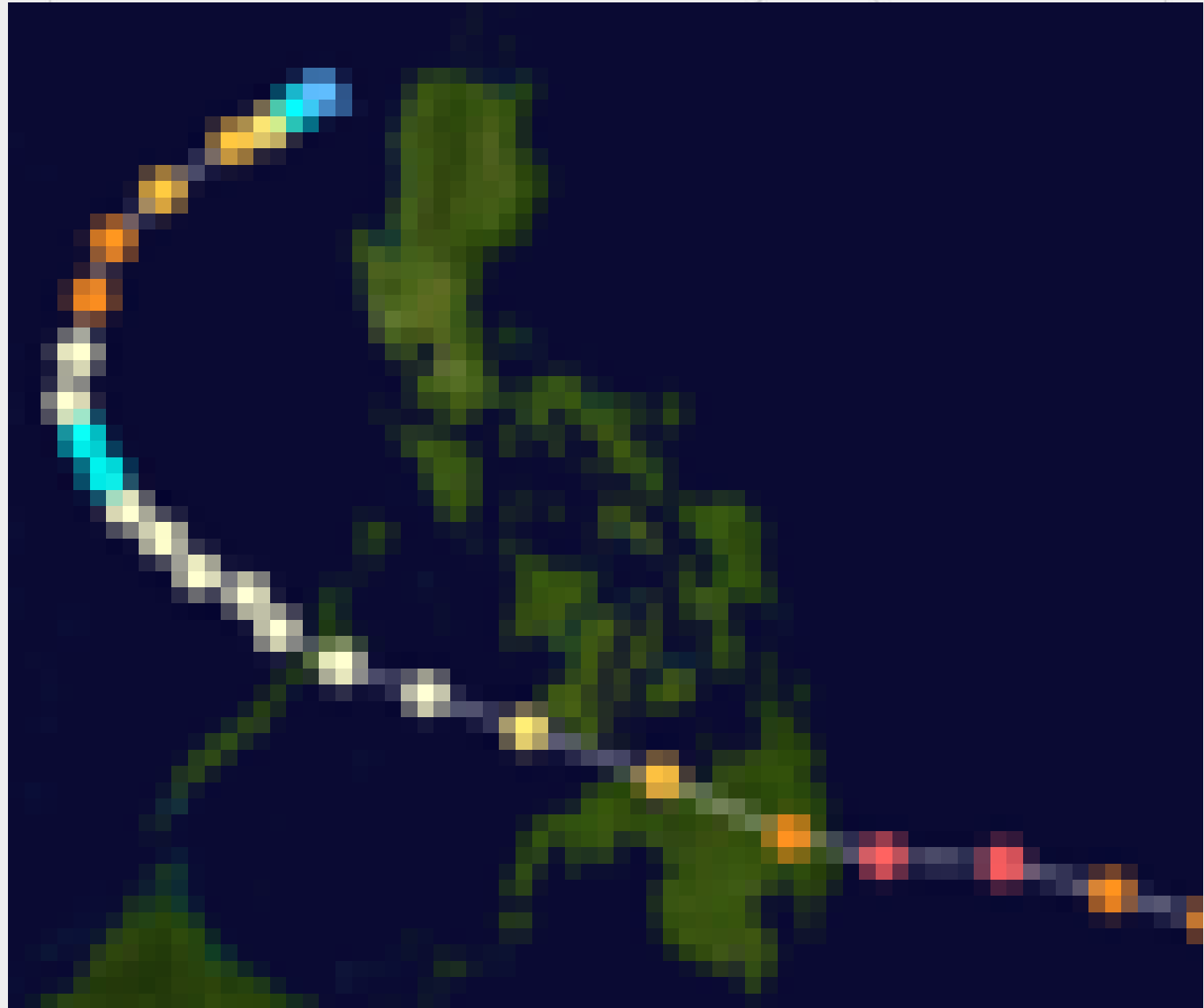
	COMMUNE			AGRICULTURE		
Determinants	No. of Vulnerable Municipalities	No. of Vulnerable Barangays	Most Vulnerable Barangay	No. of Vulnerable Municipalities	No. of Vulnerable Barangays	Most Vulnerable Barangay
EXPOSURE	5	9	San Pablo Norte of Sta. Cruz	11	27	Labuin of Pila
SENSITIVITY	12	59	Tubuan of Pila	11	66	Nanhaya of Victoria
ADAPTIVE CAPACITY	12	135	Ilayang Atingay of Magdalena	12	98	Talaga of Rizal
OVERALL	11 Legend 0.000000 - 0.125000 0.125001 - 0.250000 0.250001 - 0.375000 0.375001 - 0.500000	37	San Pablo Norte of Sta. Cruz	12	48	Labuin of Pila

TYPHOON SENDONG'S (Washi) TRACK - Dec 2011



0.375001 - 0.500000

TYPHOON PABLO'S (Bopha) TRACK - Dec 2012



END

Thank you for listening

Legend

