Mangrove Forests and DRRM in the Philippines:
Lessons from super-typhoon Haiyan

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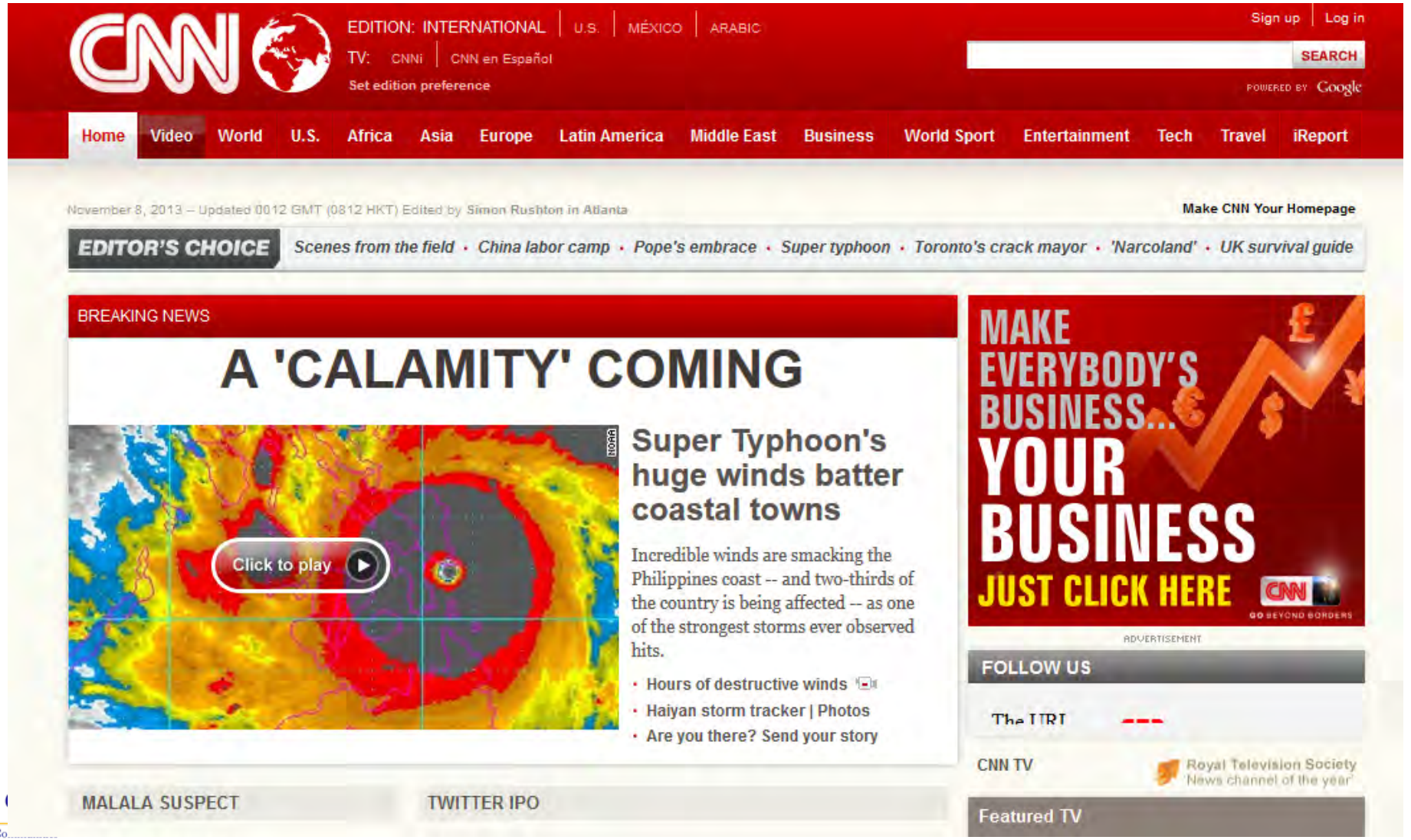
Super Typhoon Haiyan the strongest ever to hit land [Nov 2013]



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Saved by mangroves?

Standing brave to save the living: The Resilient Mangroves of Samar

Survey team led by Dr. JH Primavera (in white top) inspecting mangroves in Hernani, Eastern Samar. Photo by Belinda de la Paz.

by Beechie de la Paz
May 2014

It was my first time to go to Samar. I had always wanted to go because of its unique biodiversity. The island alone hosts a variety of wildlife and flora that can be found nowhere else in the world. Considered an Important Biodiversity Area (IBA), more than 200 bird species can be found in the island of which half are endemic. Similarly, endemic plant species account for more than half of at least 1000 plant species this island hosts'.

Thus, an opportunity to map the impacts of Yolanda on the mangroves in Tacloban and Samar was timely and provided a perfect excuse to visit the island. Mangroves or mangal ecosystems are found along coasts with plants that can tolerate brackish water. They are dominated by plants or trees with broad leaves and stilt roots or pencil-like projections called pneumatophores and live-born seedlings. This ability to produce live young (technically known as vivipary) has "prevented the extinction of mangroves in the past 50 million years and enabled them to occupy tidal areas around the world."

'Yolanda'-stricken mangroves in Leyte need long-term protection

April 20, 2014 12:07 am
by Haribon foundation

Share Tweet

Since Super Typhoon Yolanda devastated the mangroves in central Visayas, the government has allocated P347 million, and has then increased to P1 billion recently, intended to rehabilitate mangroves in coastal areas.

A map showing Leyte-Eastern Samar sites assessed in January and March, the mangrove areas highlighted

As the deaths of thousands and loss of livelihood were extensively documented by the local and international media, the extent of destruction in mangrove ecosystems was underrated. Surprisingly, the government has allocated such an amount.

A town saved by mangroves

Palompon could've been any other devastated town after Super Typhoon Haiyan ravaged the area, but the town was spared; all thanks to their mangroves

BY THE SEA. Leticia Sumili and her family's main source of income is fishing. They live by the shore to make their source of livelihood more accessible. Photo by David Lozada/ Rappler

DENR to restore mangrove forests in Yolanda-hit areas

Mangrove forests can make coastal communities less vulnerable to storms and storm surges

GREEN WALLS. Mangrove forests can serve as a buffer against typhoons, storm surge and sea level rise.

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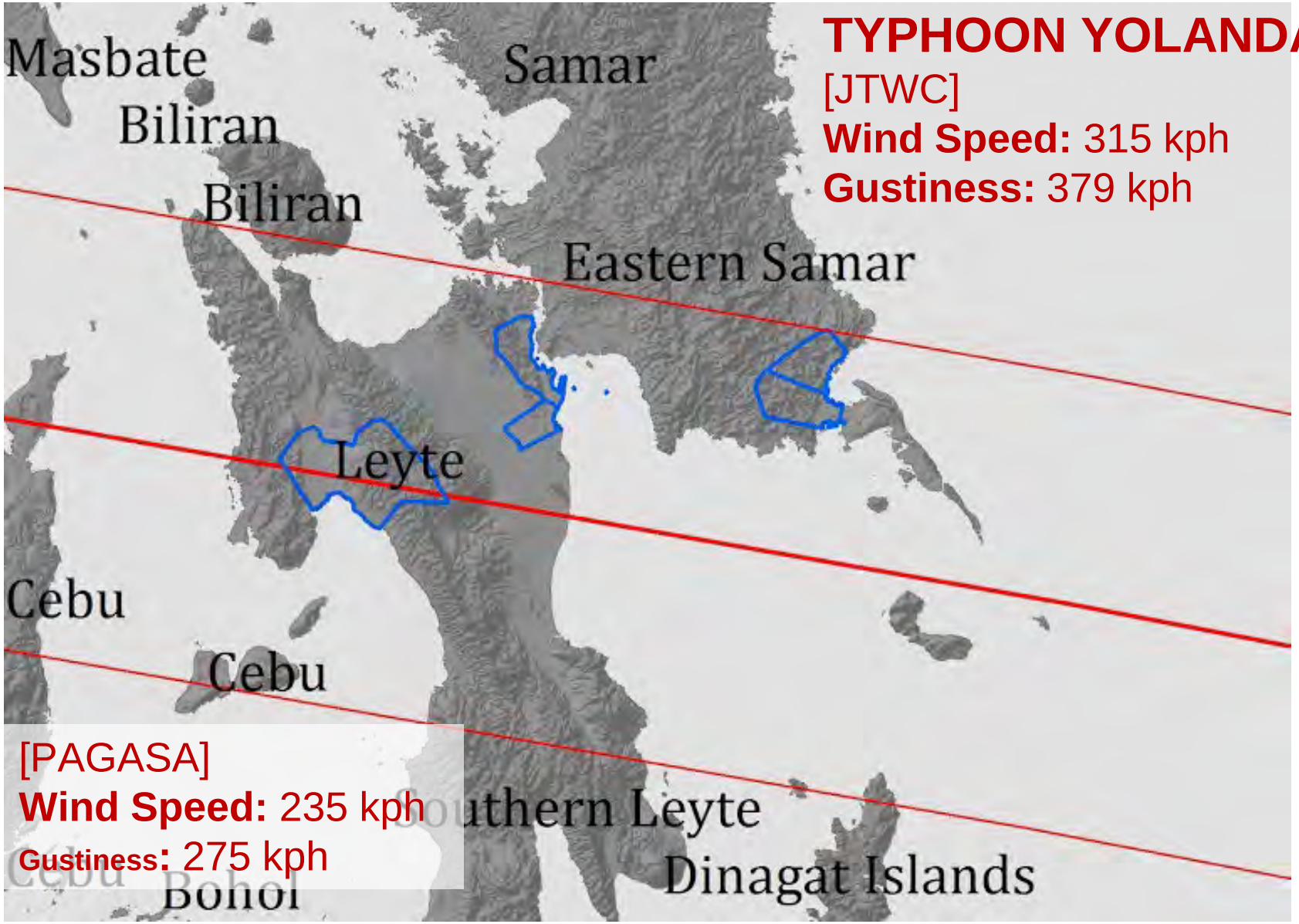

TYPHOON YOLANDA

[JTWC]

Wind Speed: 315 kph

Gustiness: 379 kph

[PAGASA]

Wind Speed: 235 kph

Gustiness: 275 kph

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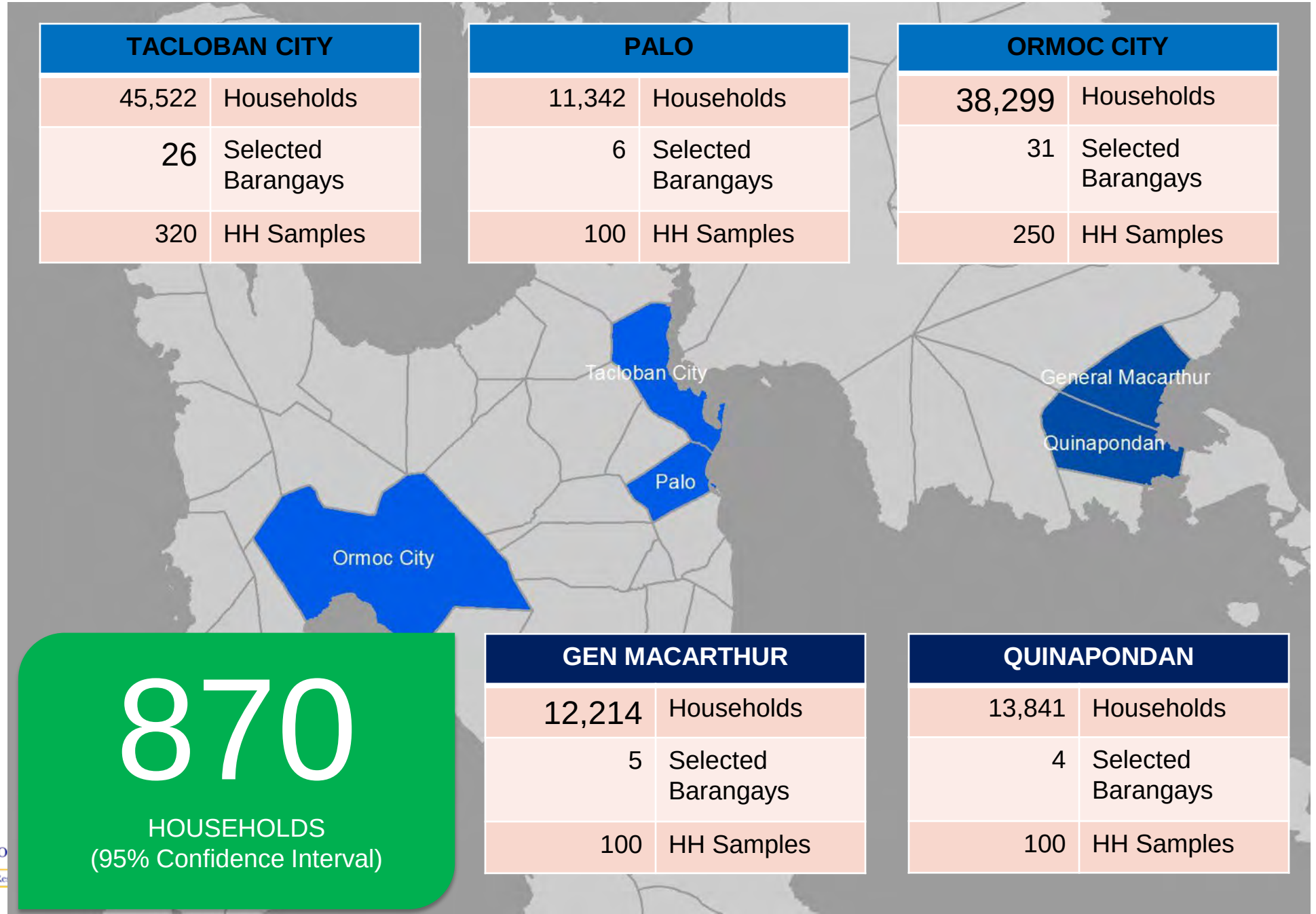
Delfino et al., 2015



TACLOBAN CITY	
45,522	Households
26	Selected Barangays
320	HH Samples

PALO	
11,342	Households
6	Selected Barangays
100	HH Samples

ORMOC CITY	
38,299	Households
31	Selected Barangays
250	HH Samples

870

HOUSEHOLDS
(95% Confidence Interval)

GEN MACARTHUR	
12,214	Households
5	Selected Barangays
100	HH Samples

QUINAPONDAN	
13,841	Households
4	Selected Barangays
100	HH Samples

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Did mangroves make a difference?

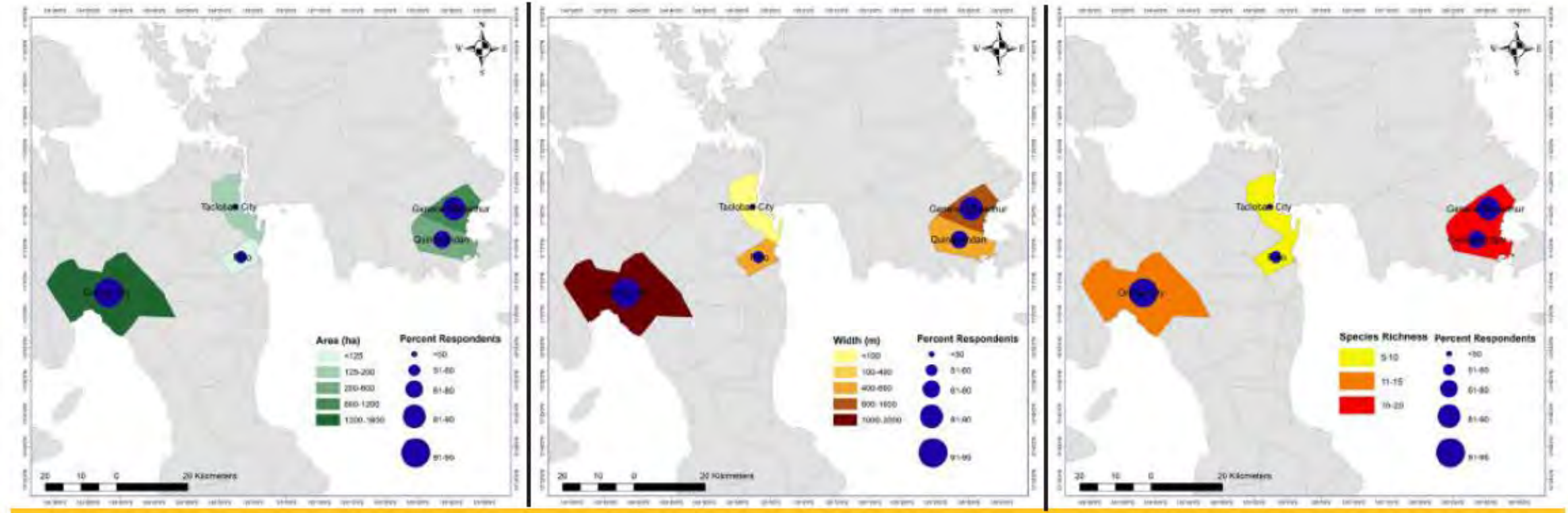

Figure 6. Percentage of surveyed residents that perceived mangroves provided coastal protection compared with the estimated mangrove area in hectares (left), estimated (average) width of mangroves in meters (middle) and species richness (right) in the study sites.

Delfino et al., 2015

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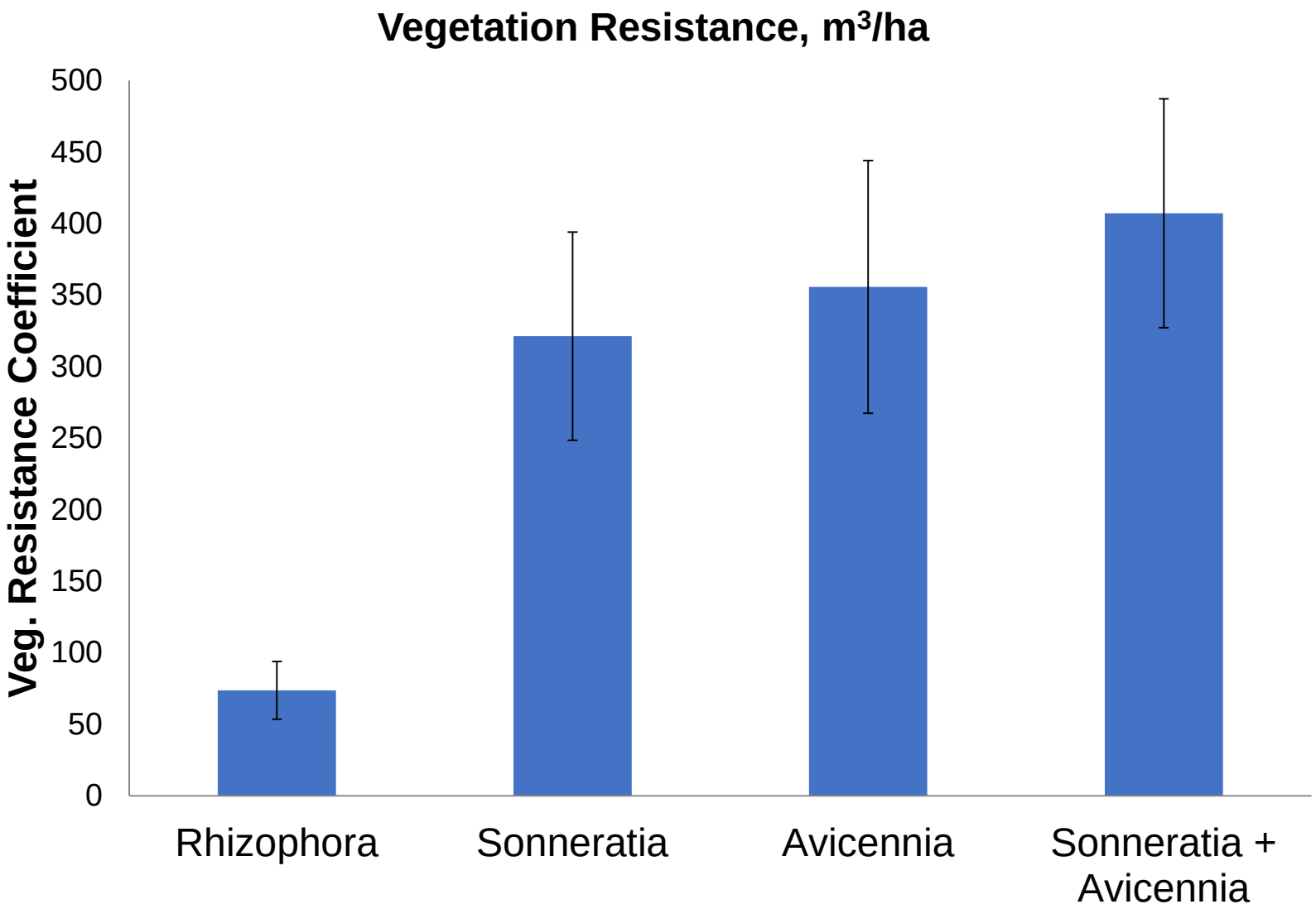
Vegetation Resistance

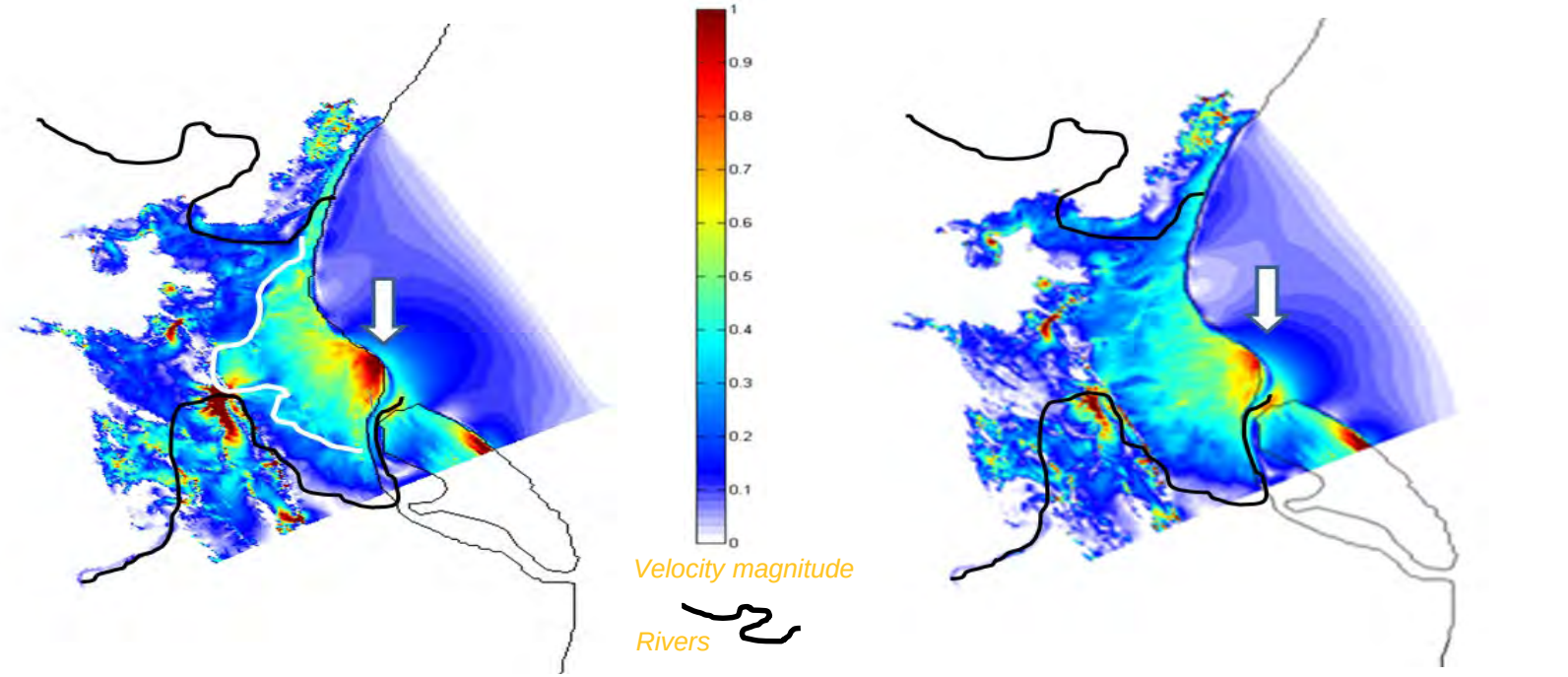


Carlos et al., 2015

Storm surge simulations

1 40-m wide semi-permeable seawall

2 400-m wide mangrove and beach forest



Semi-permeable seawall will allow for drainage of rainfall and river water otherwise there might be flooding problems in low-lying areas even during normal rain event.

Mangrove/beach forest will doubly provide for biodiversity and marine fish nursery thus contributing to food security; among other ecosystem goods and services.

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Delfino et al., 2016

Mangroves as carbon sink

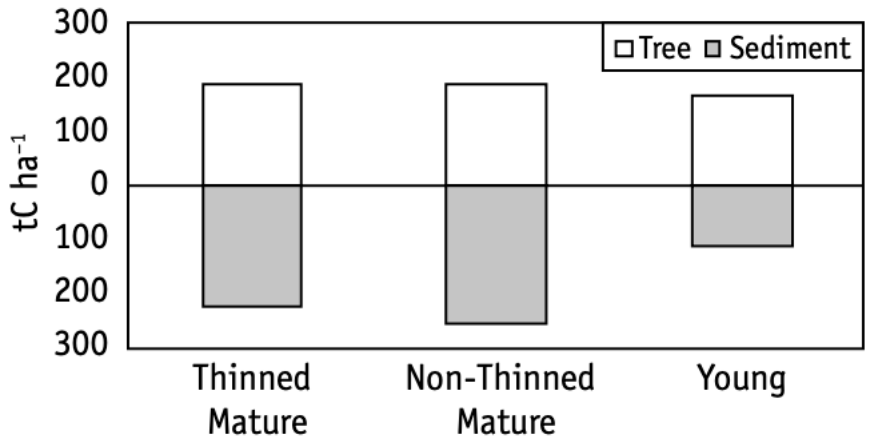

Figure 3. Tree and sediment contribution to carbon stock of mature and young *Rhizophora stylosa* Griff. stands of Banacon stands in Banacon Island, Philippines.

Gevana et al., 2017

Table 5. Biomass and carbon density distribution in a *Avicennia*-dominated stand in Barangay Catmon, San Juan, Batangas.

Carbon Pool	Biomass Density (Mg/ha)	Carbon Density (Mg/ha)
1. Aboveground Layer		
A. Large Plot	**259.05**	**116.57**
B. Small Plot		
Plot 1	5.59	2.51
Plot 2	27.76	12.49
Plot 3	28.35	12.76
Plot 4	20.27	9.12
Mean	**26.35**	**9.22**
	16.14 [a]	7.26 [a]
2. Belowground Layer	799.00	15.92
Aboveground Subtotal	285.40	125.79
Belowground Subtotal	799.00	15.92
TOTAL C stored	-	**141.71**

[a] standard deviation of the estimate (in Mg/ha)

Gevana et al., 2008

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Carbon stocks in mangroves in PH

Salmo, 2019

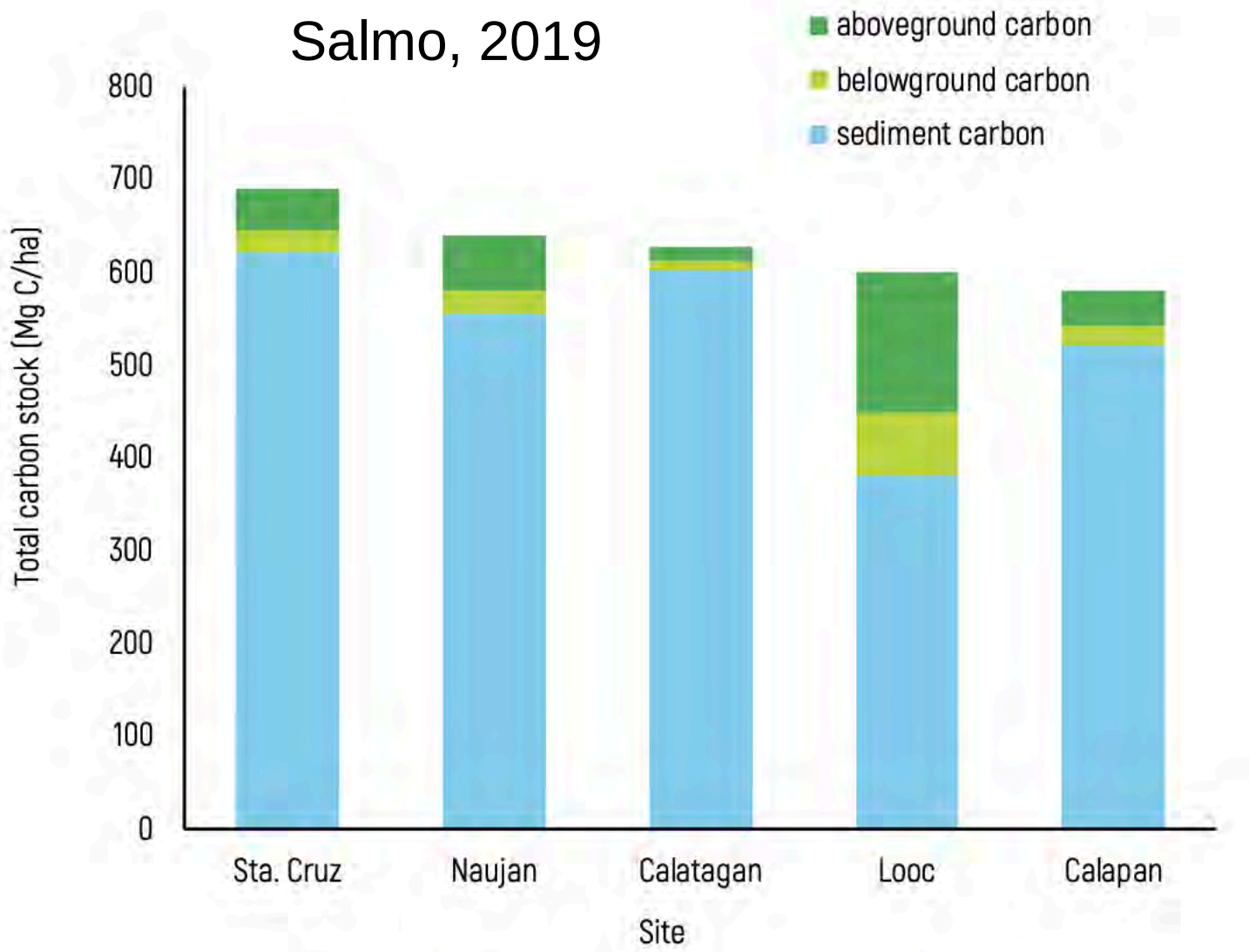

Figure 2: Total carbon stock in each mangrove sampling site

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