

Facing the challenges of ecosystems loss:

Science-Community Practice Collaboration in Post-Haiyan Recovery and Resilience-Building

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Presented during the **2017 International Training Workshop on Natural Disaster Reduction**

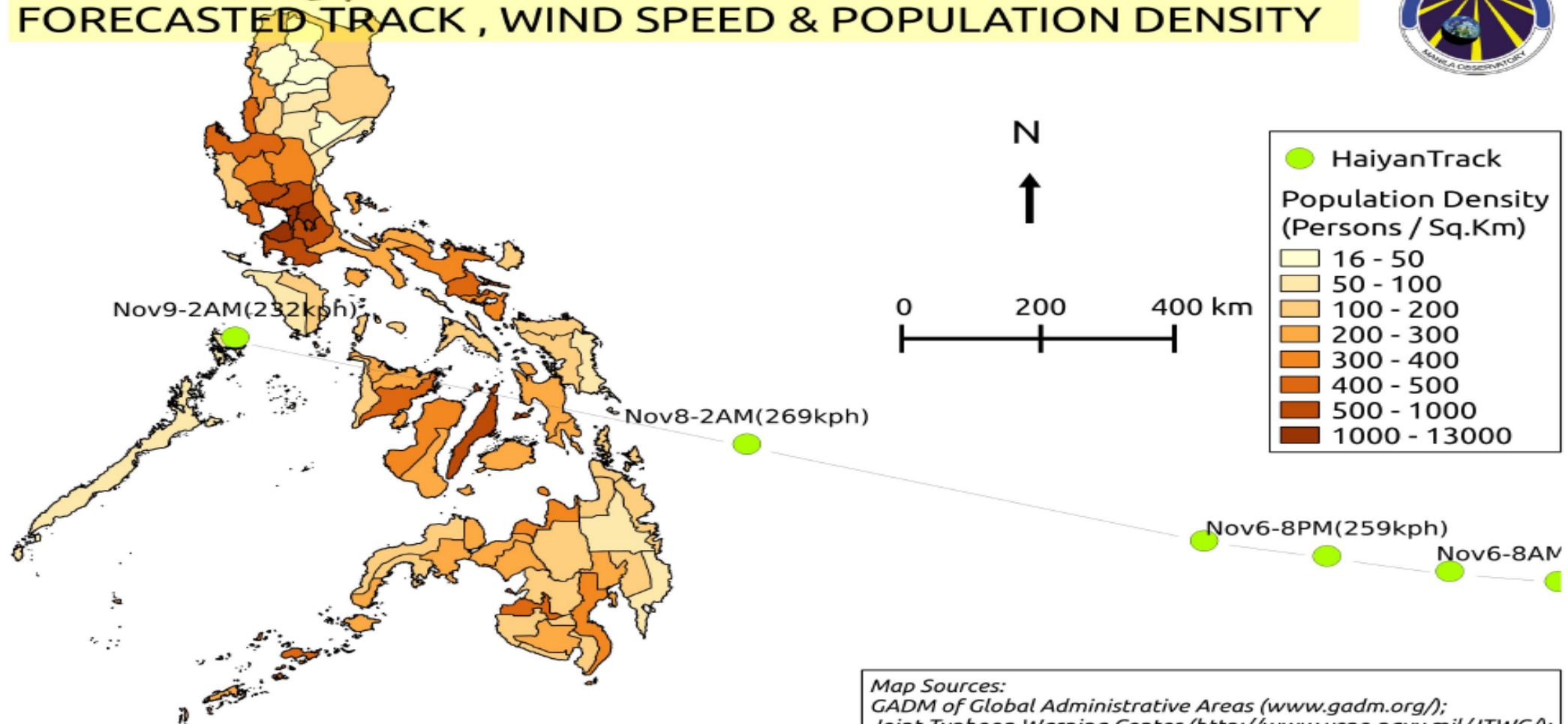
Regional and Local Best Practices of Post-Disaster Recovery: Building Sustainability and Resilience through Scientific Approaches

July 17th – 21st, 2017 in Taipei, Taiwan

Haiyan and Philippines' Small Islands

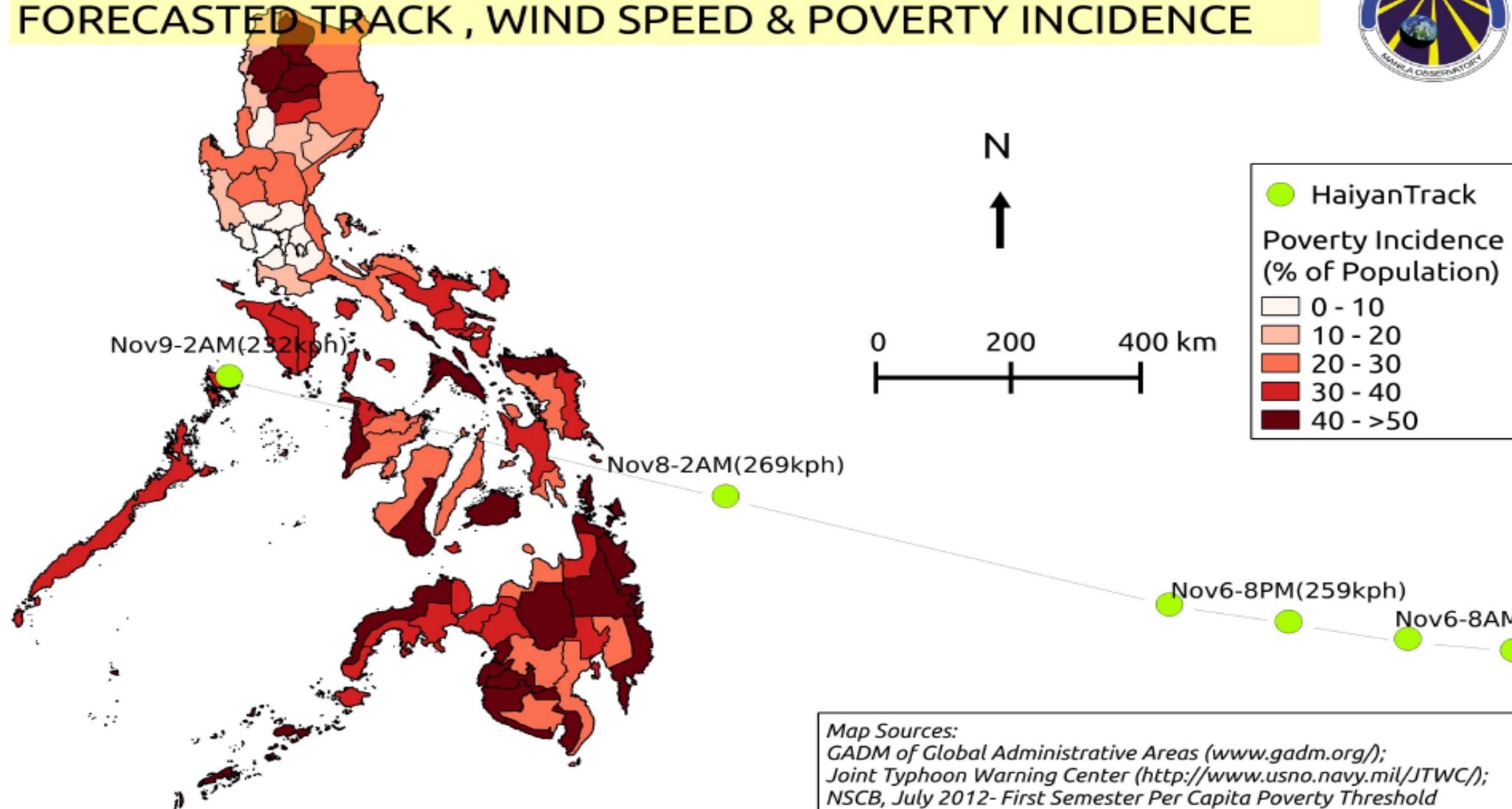


SUPERTYPHOON HAIYAN (YOLANDA) FORECASTED TRACK, WIND SPEED & POPULATION DENSITY



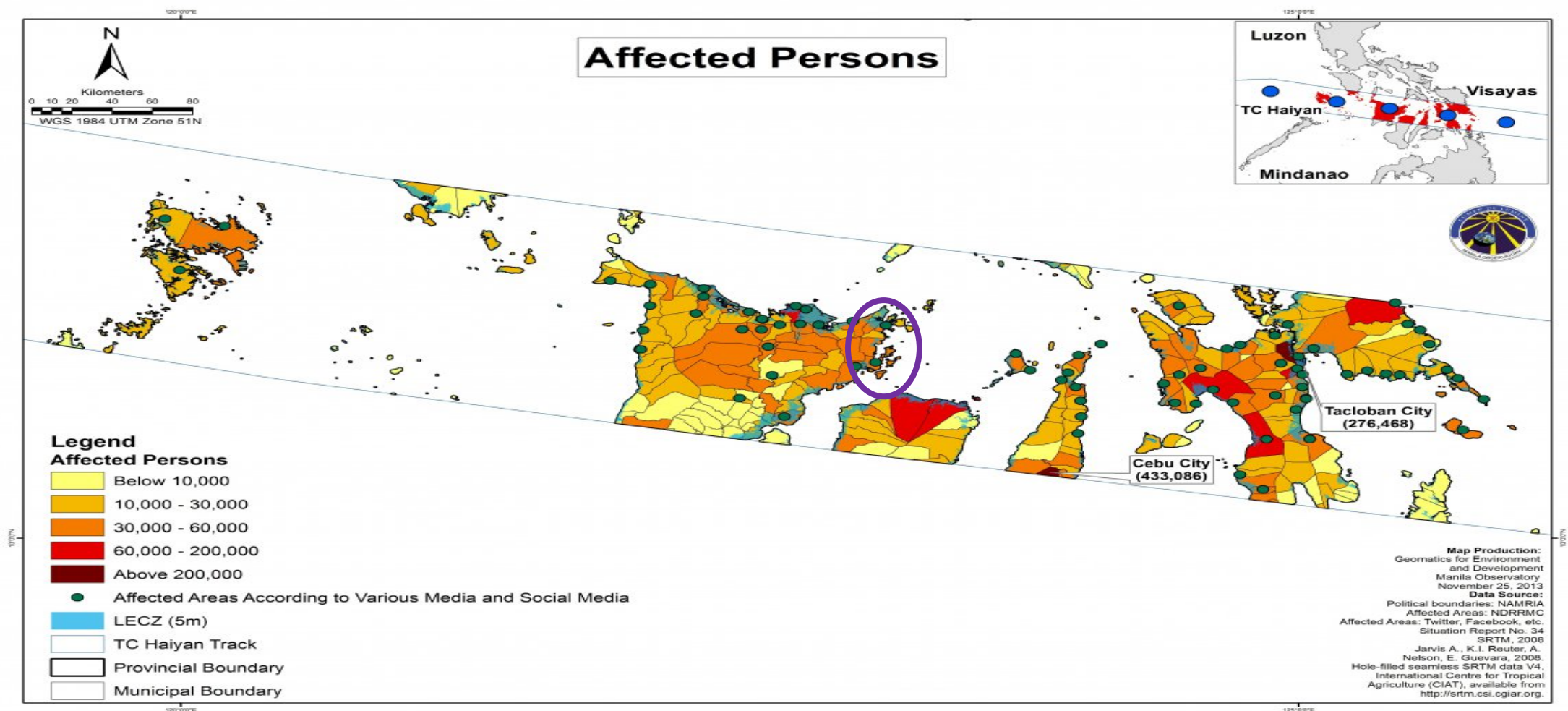
Map Sources:
GADM of Global Administrative Areas (www.gadm.org/);
Joint Typhoon Warning Center (<http://www.usno.navy.mil/JTWC/>);
NSO 2010 Census

SUPERTYPHOON HAIYAN (YOLANDA) FORECASTED TRACK , WIND SPEED & POVERTY INCIDENCE



Map Sources:
GADM of Global Administrative Areas (www.gadm.org/);
Joint Typhoon Warning Center (<http://www.usno.navy.mil/JTWC/>);
NSCB, July 2012- First Semester Per Capita Poverty Threshold
and Poverty Incidence Among Population,
by Region and Province: 2012

Focus on small islands in the path of Haiyan



Philippines Typhoon Haiyan (Yolanda) Storm Surge

Map shows predicted and actual storm track, and predicted storm surge levels

Predicted Storm Surge

- 0.10 - 0.25 m
- 0.25 - 0.50 m
- 0.51 - 0.75 m
- 0.75 - 1.00 m
- 1.01 - 2.57 m

Actual Storm Path
Predicted Storm Path
(as of 2100 GMT/02-Nov-2013)

Settlements
Administrative Areas
Provinces

0 10 20 30 40 50
Kilometres
1:3,250,000 (N.A. AG)

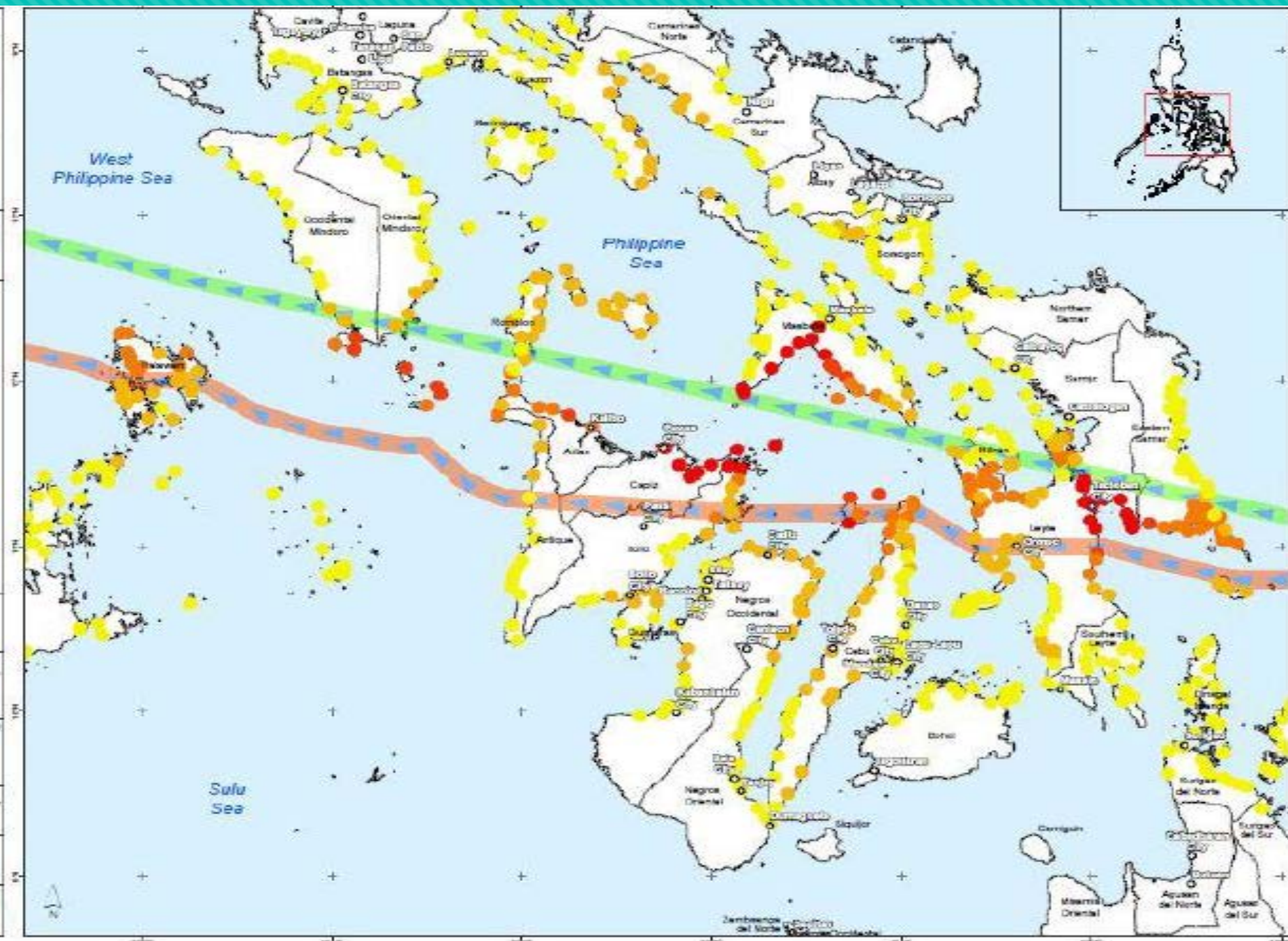
Data sources:
Storm data: Joint Research Centre,
JAGASA, Joint Typhoon Warning Centre
Boundaries: GADM
Settlements: OSM

Created: 09 Nov 2013 / 15:00 UTC+0800
Map Occasion: MOC_Burillaga_01
Projection / Datum: WGS 1984
Slide Number: TC-2013-080139-PHE

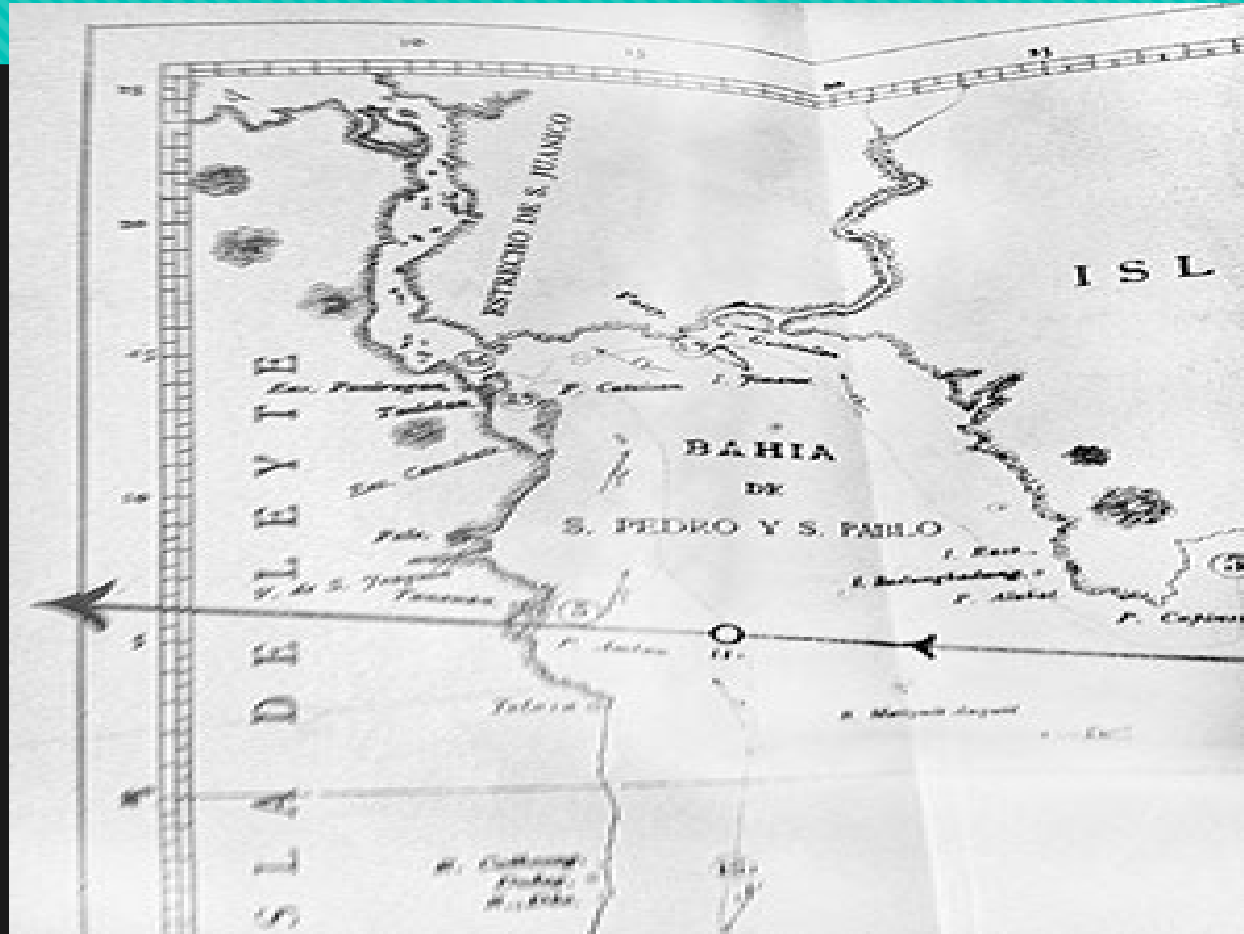
The depiction and use of boundaries, names and associated data shown here do not imply endorsement or acceptance by MapAction.

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info@mapaction.org

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Throwback 1897



"El Bagueio de Samar y Leyte, 12-13 de Octubre de 1897" by P. Jose Algue, S.J. were published by the Observatorio de Manila, Dirigido por los Padres de la Compañia de Jesus. Foto-tipografia de J. Marty. Manila: 1898. From the Emilia A. Lotilla Book Collection.)

Throwback 1897

THE BARRIER MINER, WEDNESDAY, JANUARY 12, 1898.

INTERCONTINENTAL NEWS.
(By Cable.)

New South Wales.
Tenders are showing signs of being for the construction of a railway from the coast to Sydney and thence to the interior.

South America.
The new English and American colonies in the new world. The former colonies in the new world. The former colonies in the new world.

THE QUEENSLAND LAMP.
The Queensland lamp.

MR. CHARSTON'S HEALTH.
Mr. Charston's health.

TYPHOON AND TIDAL WAVE IN THE PHILIPPINES.
7000 Lives Lost.

MAT. advices, brought by the steamer Gaelic from Chinese and other ports in the Far East, contain details of the fearful destruction wrought in the Philippine Islands by the typhoon and tidal wave during October. It is estimated that 400 Europeans and 6000 natives lost their lives, many being drowned by the rush of water, while others were killed by the violence of the wind. Several towns have been swept or blown away. The hurricane first struck the Bay of Santa Paula, and devastated the district lying to the south of it. No communication with the neighborhood was possible for two days. The hurricane reached Leyte on October 12, and striking Tacloban, the capital, with terrific force, reduced it to ruins in less than half an hour. The bodies of 125 Europeans have been recovered from the fallen buildings. Four hundred natives were buried in the ruins. A score of small trading vessels and two Sydney traders were wrecked on the southern coast, and their crews drowned. At Zamboanga the sea swept inland for a mile, destroying property worth seven million dollars, and many natives lost their lives. The Government prison at Tacloban was wrecked, and of the 200 rebels therein half succeeded in making their escape. The town of Herman was swept away by flood, and its 5000 inhabitants are missing. The small station of Weera, near Loog, is also gone, while in Loog itself only three houses are left standing. Thousands of natives are roaming about the devastated province seeking food and medical attendance. In many cases the corpses were mutilated as though they had fallen in battle, and the expressions of their faces were most agonising.

AN AMERICAN TRAIN WRECK.

- October 1897 typhoon landed very near Guiuan in Samar, proceeded to Tanauan, Palo and Tacloban in Leyte, struck northern Cebu and northern Panay (then the province of Capiz which included the present-day province of Aklan) and exited just south of Mindoro island

The Barrier Miner,
January 1898
In
<http://noypistuff.blogspot.com/2013/11/philippine-typhoon-left-7000-dead-in.html>

Raphael Lotilla in
<http://www.rappler.com/moveph/issues/disasters/typhoon-yolanda/44062-leyte-1897-typhoon>

Throwback 1912

15,000 DIE IN PHILIPPINE STORM

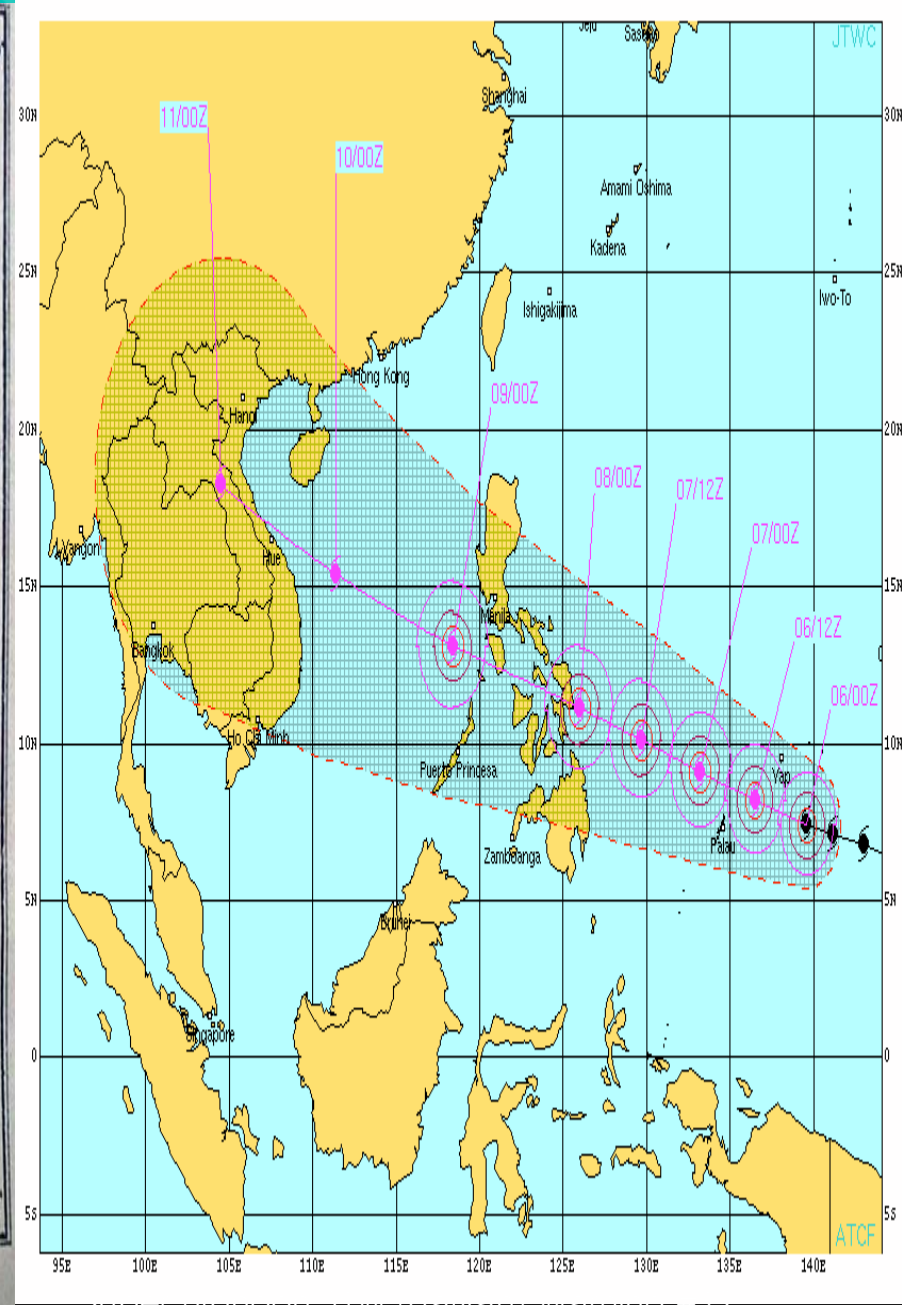
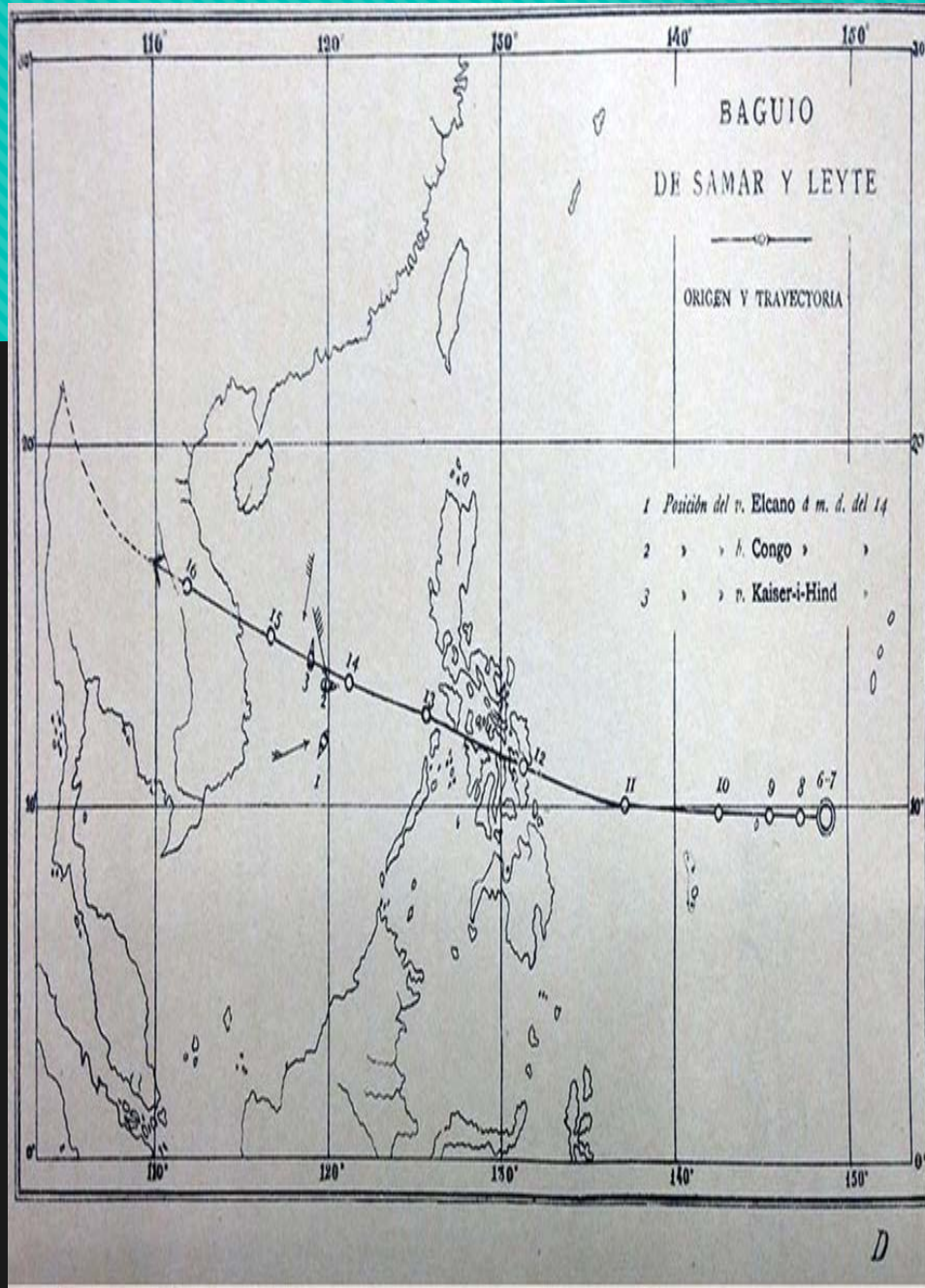
That 15,000 persons were probably killed and wounded in a typhoon that swept the Philippine Islands last Tuesday was reported yesterday in cable dispatches to the Bureau of Insular Affairs.

The typhoon swept the Visayas and is said to have practically destroyed Tacloban, the capital of Leyte, and to have wrought enormous damage and loss of life at Capiz, the capital of the province of Capiz.

Tacloban has a population of 12,000. Capiz has a population of over 20,000. Capiz is the terminal of the railroad from Iloilo. It is a most important sugar port.

Washington Herald, November 1912

<http://www.westernpacificweather.com/2013/11/19/15300-tacloban-wrecked-by-typhoon-before-haiyan/>



super typhoon 51W (Nancy) warning #12
Issued at 06/0300Z, warning graphic issued by
the US Navy Joint Typhoon Warning Center.

EL BAGUIO
DE
SAMAR Y LEYTE

12-13 DE OCTUBRE DE 1897

FOR EL
P. JOSÉ ALGUÉ, S. J.
DIRECTOR DEL OBSERVATORIO

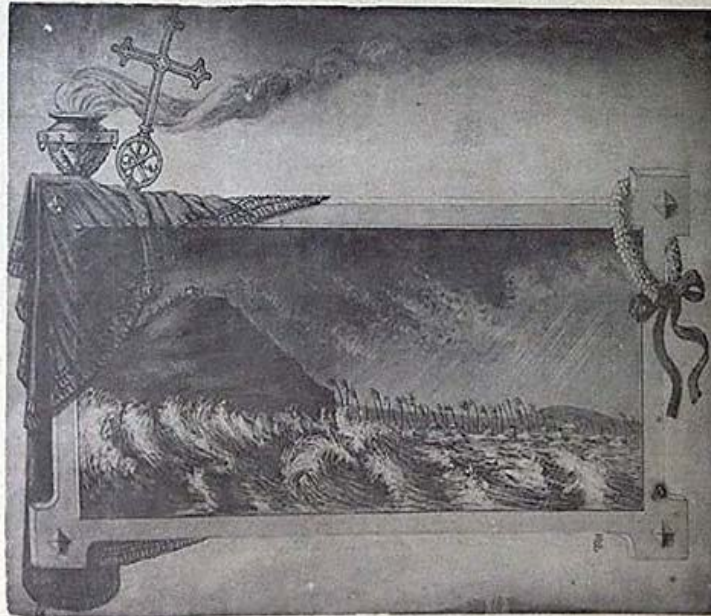
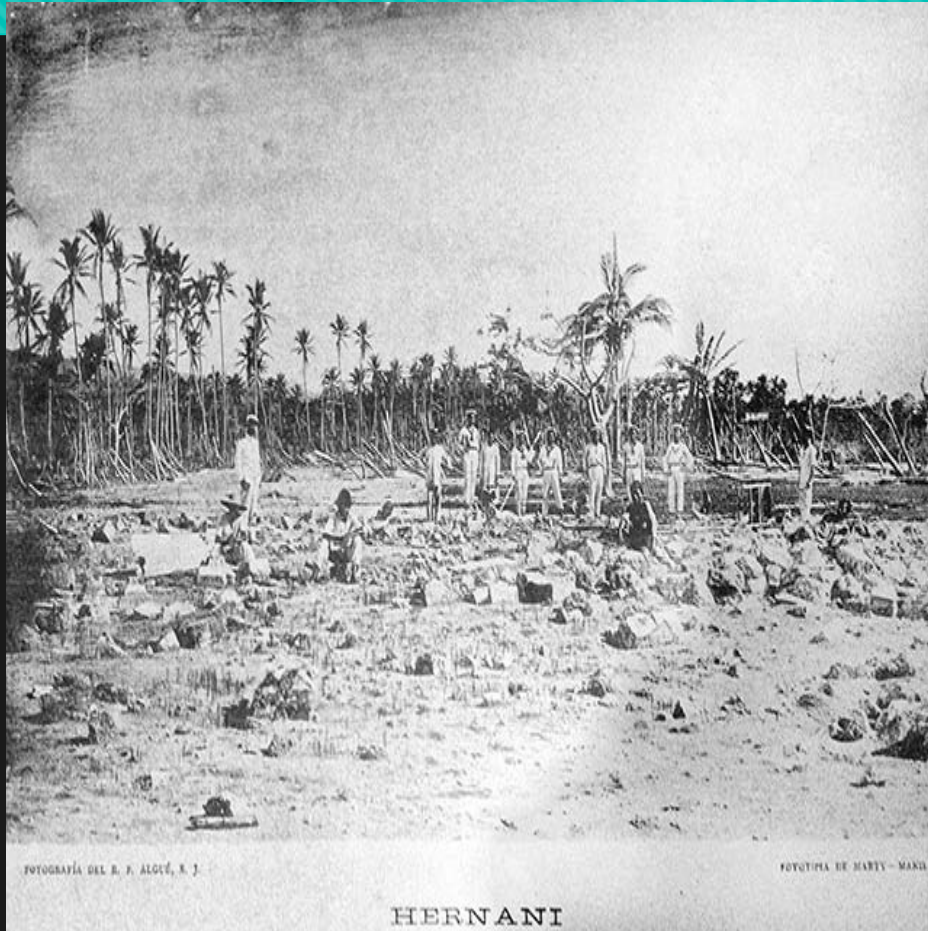


FOTO-TIPOGRAFÍA DE J. MARTY,
6-CARRIEDO-6
MANILA
1898



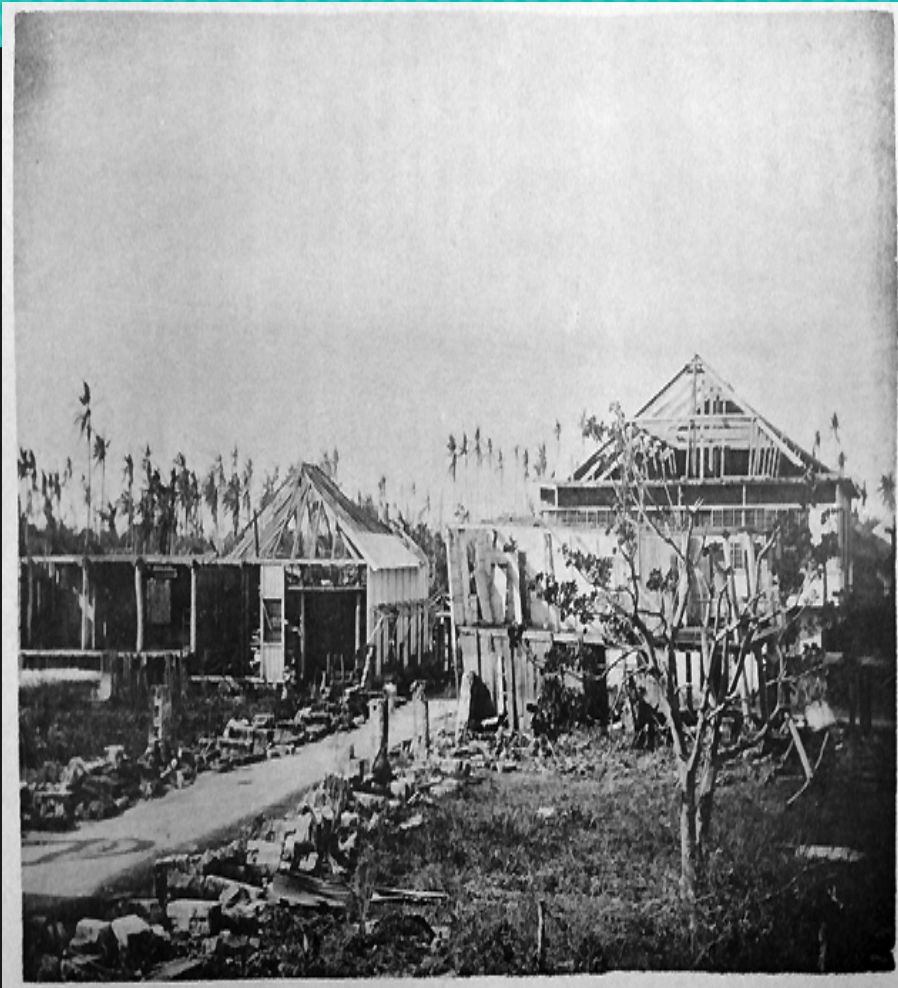
<http://stormsurge2010.blogspot.com/2013/11/haiyans-surge-may-have-been-highest-in.html>



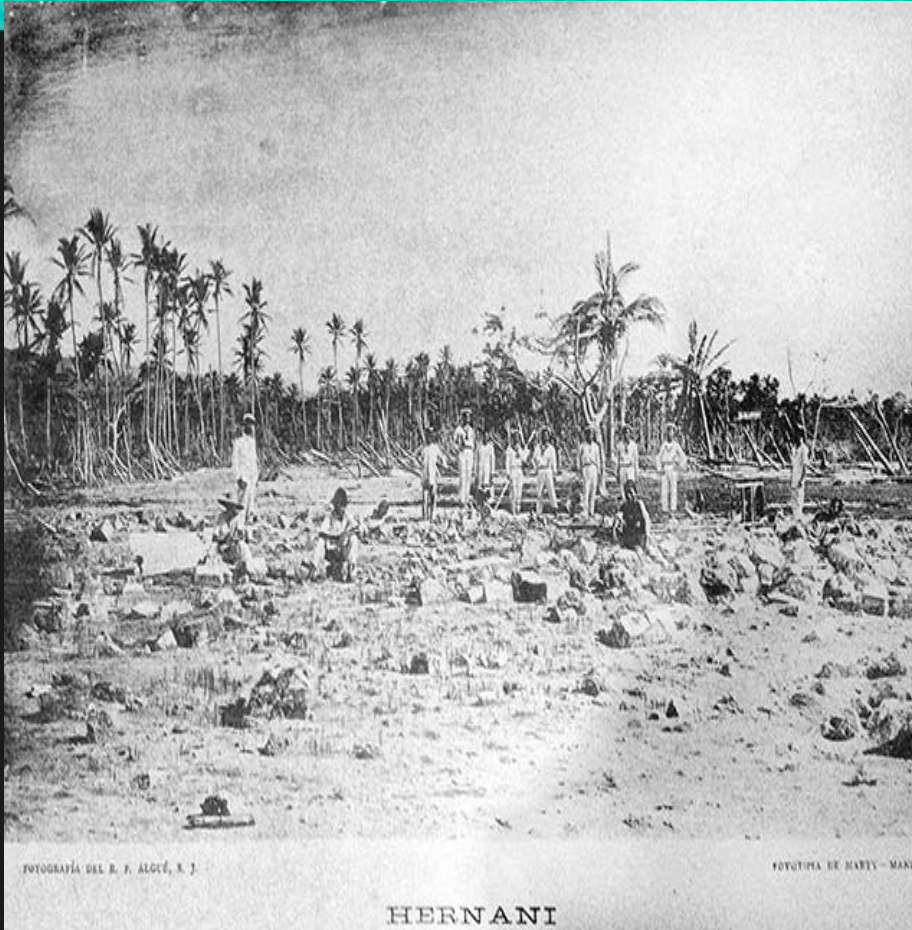
<http://www.eenews.net/stories/1059990425/print>



<http://stormsurge2010.blogspot.com/>



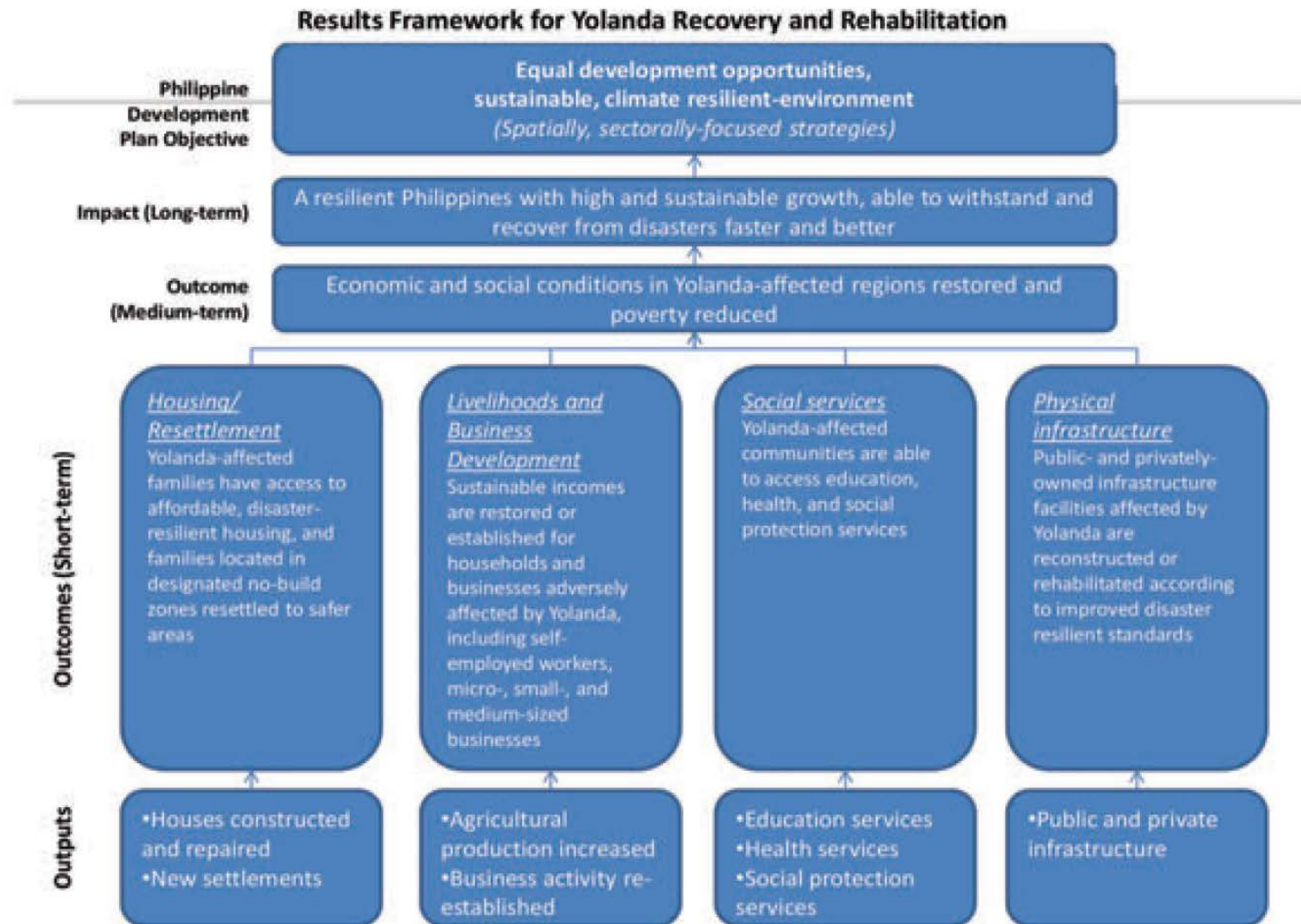
<http://www.gmanetwork.com/news/story/335673/scitech/science/a-history-of-storms-1890s-newspaper-reveals-devastating-leyte-typhoon>



<http://stormsurge2010.blogspot.com/2013/11/the-water-was-as-high-as-coconut-tree.html>



Reconstruction Assistance
on Yolanda



The case of the reef ecosystem supporting the small islands of Concepcion, Iloilo

General Information

Population (2010)
39,617

of Households =
8,019

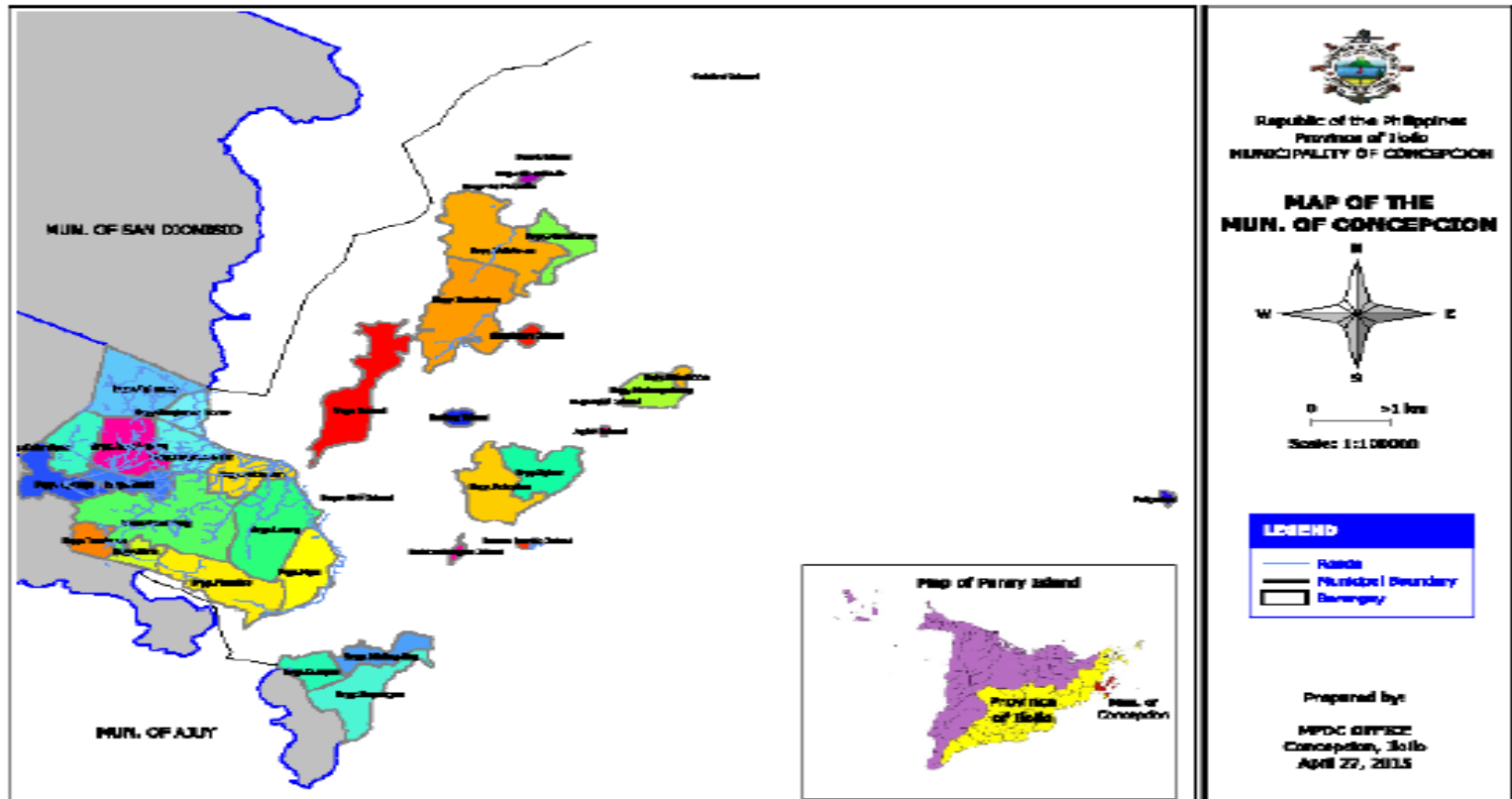
Land Area: **9,702 has.**

Municipal Waters:
96,481.56 has.

No. of Barangays:
25

Geographically
Isolated: **16 islands**

Livelihood:
Farming
Fishing



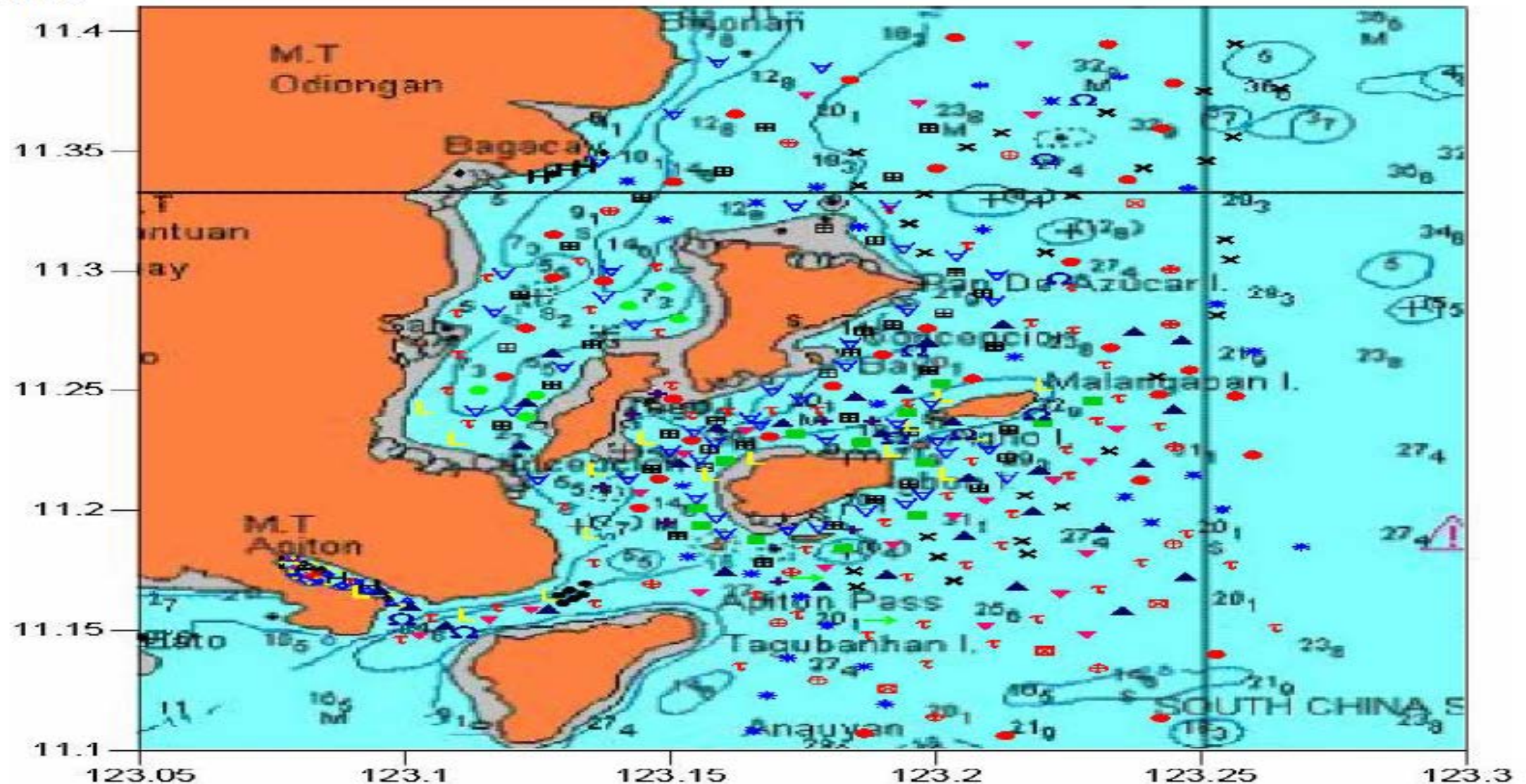


EXPLOREILOILO.COM

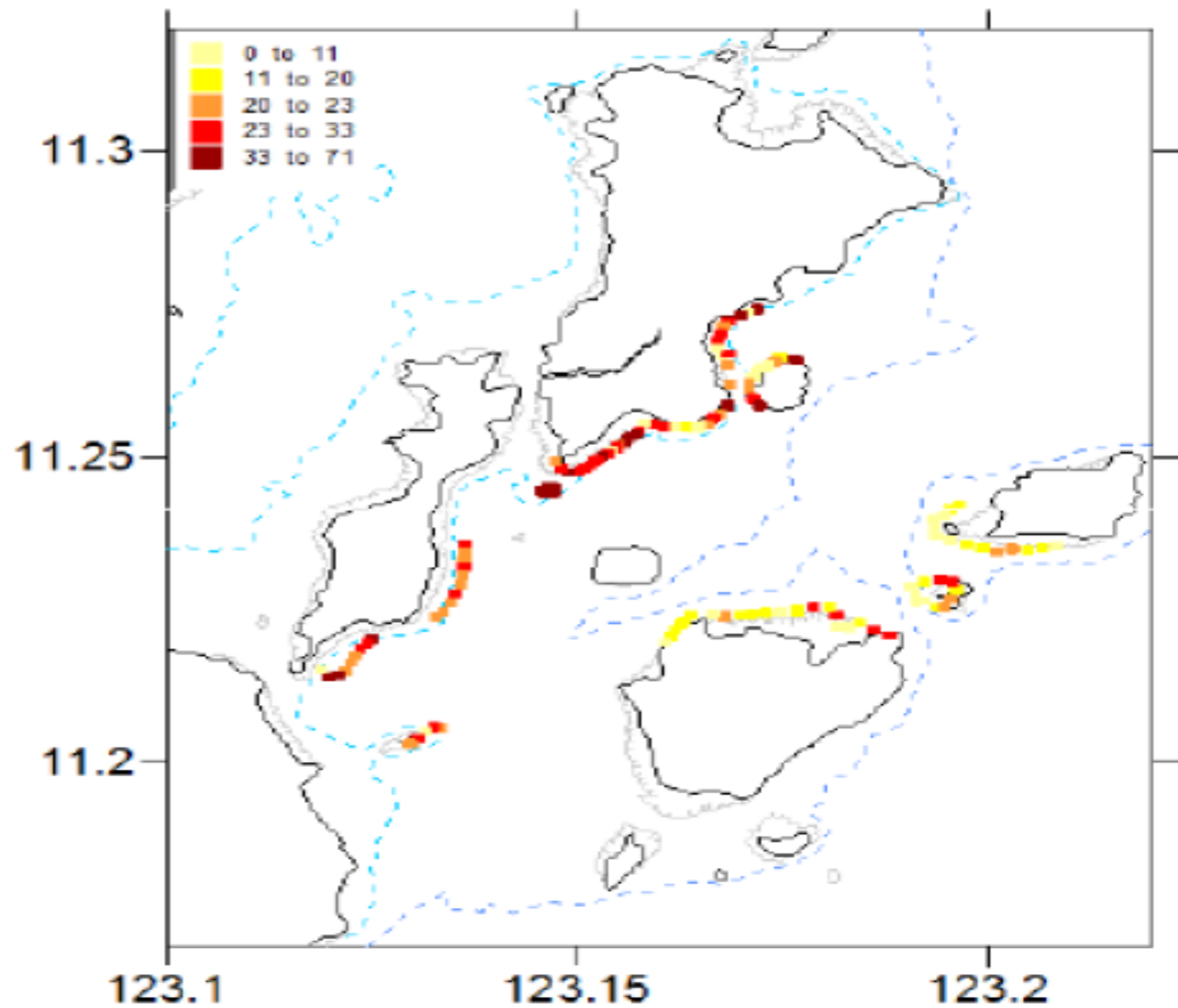
Capture fisheries in the marine ecosystem

- Capture fisheries in Northern Iloilo is a multispecies and multi-gear fishery that involves deep sea fishing on commercial boats and near-shore fishing using both motorized and non-motorized boats (municipal fisheries);
- wild blue crab processing activities (some coming from Concepcion, Iloilo) including meat picking and canning in the neighbouring town of Estancia. The market for canned blue crab is Korea and Taiwan.

Fishing ground = 96,481.56 has w/ +/- 5,000 fishing boats operating in the area



Concepcion, Iloilo
Coral bleaching
August 2010





Damages to coral reefs in municipality of Concepcion in Iloilo province

AREA	PRE-YOLANDA	POST YOLANDA
SAN VICENTE ISLAND		AVERAGE LIVE CORAL COVER:16%; DEAD CORAL COVER:36%; CORAL RUBBLES:35.33%
TAKOT LUTAW PAL-AK	NOVEMBER 2012:63.3% LIVE CORAL COVER (UP VISAYAS)	0%
MALANGABANG ISLAND	AUGUST 2010:30%-50% LIVE CORAL COVER	0%
AGHO ISLAND	AUGUST 2010:87% LIVE CORAL COVER	10%
POLOPINA ISLAND		30%-60% LIVE CORAL COVER

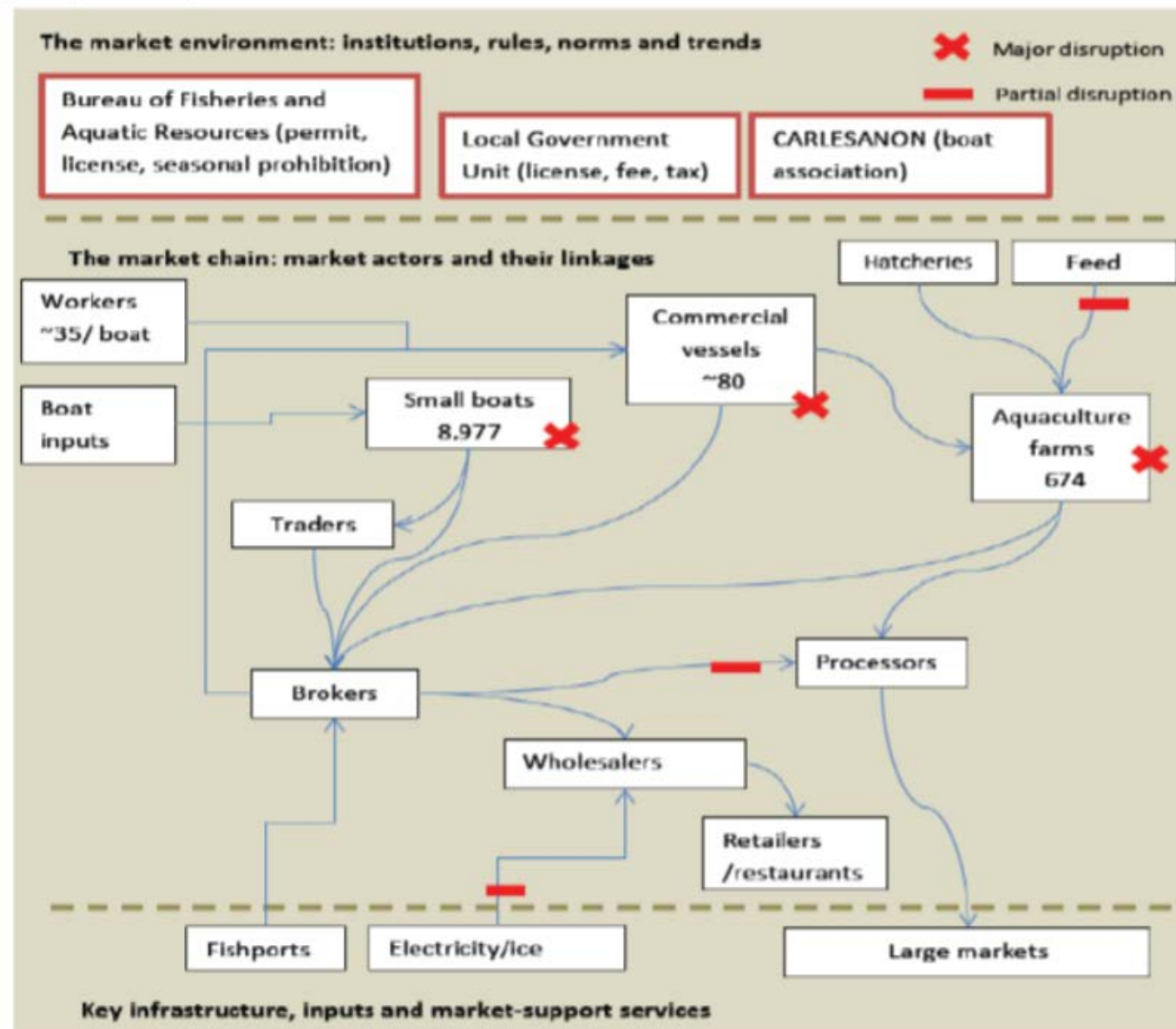


Haiyan impact on the fisheries market:

fishing sector has been crippled in all its components including municipal fisheries, commercial fisheries, aquaculture, and processing

At the Estancia Fishport, the equipment at the blue crab processing factory (Heron Point) was washed out by the storm surge

Figure 74: Northern Iloilo Fisheries and Aquaculture Market Map IFC WB RECOVER report (2013/12)



Recovery will not happen until
fishing assets are replaced and
regular trade and income is
resumed
along the value chain.

Comprehensive Rehabilitation and Recovery Plan (CRRP)

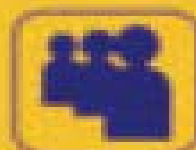
Infrastructure
Cluster Plan



Resettlement
Cluster Plan



Social Services
Cluster Plan



Livelihood
Cluster Plan



Support
Cluster



Local Government Rehabilitation and Recovery Plans (LRRPs)

Private Sector/Development Partners

Baseline Data from
NGAs, LGU (Provinces, Municipalities),
PDNA, RAY

Massive fishing boat distribution: asset recovery option of humanitarian organizations and government



<http://newsinfo.inquirer.net/578962/15000-boats-to-be-given-to-fishermen-displaced-by-yolanda>

Recovery of financial institutions

Type of Banks / Institutions	Lenders covering Northern Cebu	Lenders covering Northern Iloilo	Products Offered	Interest Range and Security	Impact of Typhoon	Initiatives after Typhoon
Commercial Banks	Banco de Oro (BDO); Metrobank; Philippine National Bank (PNB)	Bank of Commerce	<ul style="list-style-type: none"> SME Loans backed by property collateral, Average loans are above P500,000 Deposits 	9-12% <ul style="list-style-type: none"> Real property 	<ul style="list-style-type: none"> Damage to Bank Structure Expects increase in Past Due in portfolio Slower payment process as branches are still off-line 	<ul style="list-style-type: none"> Currently assessing clients and discussing possible restructuring of loans Assessing clients who are applying for reconstruction loans
Government Banks	Landbank, Development Bank of the Philippines	Landbank	<ul style="list-style-type: none"> Salary backed loans Livelihood loans, Government Infrastructure and Real Estate SME loans Wholesale loans to cooperatives and MFIs Deposits 	6-12% <ul style="list-style-type: none"> Real property, Salary deduction 	<ul style="list-style-type: none"> Damage to Bank Structure Expects increase in Past Due in portfolio Increase in withdrawal of deposits 	<ul style="list-style-type: none"> Ongoing discussions and assessment of affected clients for deferment and restructuring of loans Finalizing guidelines for Calamity Rehabilitation Support Program where a big portion is for earmarked for reconstruction looking to impose requirement on building standards of future loans to poultry houses
Rural Banks, Microfinance Institutions and Cooperatives	ASPAC, Mactan Rural Bank, Fairbank, Rural Bank of Sugbuanon, BankWest, Rural Bank of Bogo, City Savings Bank, Katipunan Rural Bank, TSKI, CARD Bank	Progressive Rural Bank, Barabaza Co-operative, TSKI, ASA, CARD Bank	<ul style="list-style-type: none"> Salary Backed loans, Micro Enterprise, Micro Finance loans, Real Estate Mortgage loans Deposits 	18-30% <ul style="list-style-type: none"> Salary deduction Real property 	<ul style="list-style-type: none"> Damage to Bank Structure Expects increase in Past Due in portfolio Slower payment process as banks are still offline 	<ul style="list-style-type: none"> Currently visiting clients and assessing Possible restructuring extension of loans some have waived penalties on delayed payment, stop collection for a month discussions with funders for better terms
Pawnshops and Money lenders	Cebuana, Palawan, Dover, RD Pawnshop, Gemmary, informal lenders (relatives friends, money lenders)	Cebuana, RG, Palawan, informal lenders (relatives, friends, money lenders)	<ul style="list-style-type: none"> Loans against pawned assets, remittances, 1 day multi-purpose loans, Credit for purchase of retail goods 	36% - 240% Retail assets / home appliances	<ul style="list-style-type: none"> Damage to Banks Expects increase in Past Due in portfolio Increased volume of remittances for pawnshops Money lenders selling retail items like pillows and blankets on credit 	<ul style="list-style-type: none"> Many are still unbanked and dependent on informal sources of credits. Reasons for relying on informal sources are fast processing, minimal requirements, and no need to enter a bank branch
Value Chain Players	Traders and dealers of Rice, Sugar, Eggs, Inputs, and Sugar Mill	Fish traders, brokers, processing plants, Rice Mills, Hardware stores, Fuel suppliers	<ul style="list-style-type: none"> Advance loans to rice farmers and fishermen. In kind credit for farmers in the form of inputs. Credit terms for trader clients. 	Share of harvest Sometimes no interest just security of supply	<ul style="list-style-type: none"> Increase in bad loans as typhoon has reduced productivity of rice and sugar farms, destroyed poultry farms, fishing boats and fish ponds 	<ul style="list-style-type: none"> Most of the value chain financiers have stopped giving credit and deal only on cash basis with clients

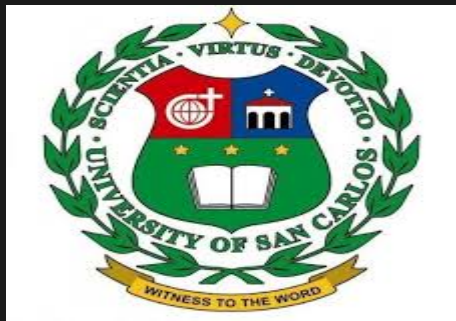
Who takes care of the ecosystem recovery?

	Objective	Member agencies		
Infrastructure 	<ul style="list-style-type: none"> • All infrastructure-related rehabilitation • Construction, repair, and restoration of damaged roads, bridges, and other public infrastructure 	<ul style="list-style-type: none"> • DPWH • DepEd • DOE • DENR • DTI • LWUA 	<ul style="list-style-type: none"> • DA • DOH • DOST • DOTC • DILG • OCD 	<ul style="list-style-type: none"> • DAR • CHED • NIA • NEA
Resettlement 	<ul style="list-style-type: none"> • Relocation of affected residents from unsafe zones • Construction of new houses in resettlement sites • Development of sustainable communities 	<ul style="list-style-type: none"> • HUDCC • NHA • HLURB • DILG • DA • DAR • DPWH 	<ul style="list-style-type: none"> • DepEd • DENR • DOH • DOST • DSWD • NCIP • OPAPP 	<ul style="list-style-type: none"> • OCD • NAPC
Social services 	<ul style="list-style-type: none"> • Transition from relief operations to early recovery and community services • Food, health, education, and emergency shelter assistance and core shelter assistance 	<ul style="list-style-type: none"> • DSWD • DND • DA • DAR • DepEd 	<ul style="list-style-type: none"> • NHA • OCD • DENR • DOH • HLURB 	<ul style="list-style-type: none"> • HUDCC • NCIP • CHED
Livelihood 	<ul style="list-style-type: none"> • Provision of livelihood assistance to affected families • Crop production and industry and trade services, forestry, fishery, and livestock & poultry industries 	<ul style="list-style-type: none"> • DTI • DOLE • DOT • DA • DENR • OCD • NAPC • DAR 	<ul style="list-style-type: none"> • DOST • DSWD • HUDCC • NCIP • NHA • OPAPP • TESDA • GFIs may be invited 	<ul style="list-style-type: none"> • LBP • DBP
Support 	<ul style="list-style-type: none"> • Address cross-cutting policy concerns and issues • Assist OPARR in vetting the cluster action plans • Identification and provision of funding support for major programs & projects 	<ul style="list-style-type: none"> • DBM • DFA • DOF • DOJ • DSWD • PMS • OCD • PCDSPO • PCOO 	<ul style="list-style-type: none"> • NEDA • OES • OCS • OPA • COA • DPWH • HLURB • DENR • DILG 	<ul style="list-style-type: none"> • DOST • CCC

Note: Cluster memberships may be updated as needed

Pushing boundaries: Science and community partnerships in ecosystems restoration

Post- Haiyan Coral Reef Assessment



Dominic Franco Belleza, et.al. , 2014, Post Haiyan Coral Reef Assessment



**al rubbles occupy most of Site A of Polopina Isl
overgrowing the rubble.**



Figure 9. Coral eating snails, *Drupella* sp., devouring an acroporid in one of the assessed sites.



of fragments scattered all near Butlog Island for rehabilitation.

Assessment for

- Coral reef damage due to typhoon
- Potential for 3 phases of coral reef rehabilitation
 1. COP (potential Corals of Opportunity (COP)) supply,
 2. nursery area,
 3. transplantation site

Coral Reef Rehabilitation

- ❖ Fabrication & Deployment of Concrete AR Modules – 410
- ❖ Fabrication & Deployment of 20 Coral Nursery Units (CNUUs)
- ❖ Planting of CoPs (Live Coral Fragments) – 5,243 pcs.
- ❖ Collection/removal of drupella



Emelinda Abian, 2014, Loss and Damage of Coastal and Marine Resources to Extreme Climatic Events The case of Concepcion, Iloilo Philippines





Concrete AR fabrication and deployment



Coral planting



Deployment of Coral Nursery Units

20 coral nursery units deployed and planted with 5,243 live coral fragment





Coral pest removal

Manual collection/removal of drupella a corallivore that attacks coral polyps. More than 100 kilos of drupella collected and disposed

Solid waste management for coral reef survival





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Division of Biological Sciences
College of Arts & Sciences
UP Visayas
Miag-ao, Iloilo



Natural Resource Management

19 Boats

17 Barangay Patrol Boats and 2 Seaborne Patrol Boats for 2 municipalities



237 Individuals

Trained on Coastal and Marine Resource Protection, Coastal and Fishery Laws Enforcement

7 Hectares

Restored and Expanded Mangrove Zones



400 Wildlings

Planted to restore and establish beach forest in 2 communities



1,554 Units

Concrete jackstone-type artificial reef modules deployed within the marine protected area of 6 coastal and island communities in 3 towns



2 Units

Floating Guard House for Bantay Dagat to enhance monitoring against illegal fishing activities







Brgy. Salvacion, Concepcion, Iloilo - Loading of Artificial Reefs

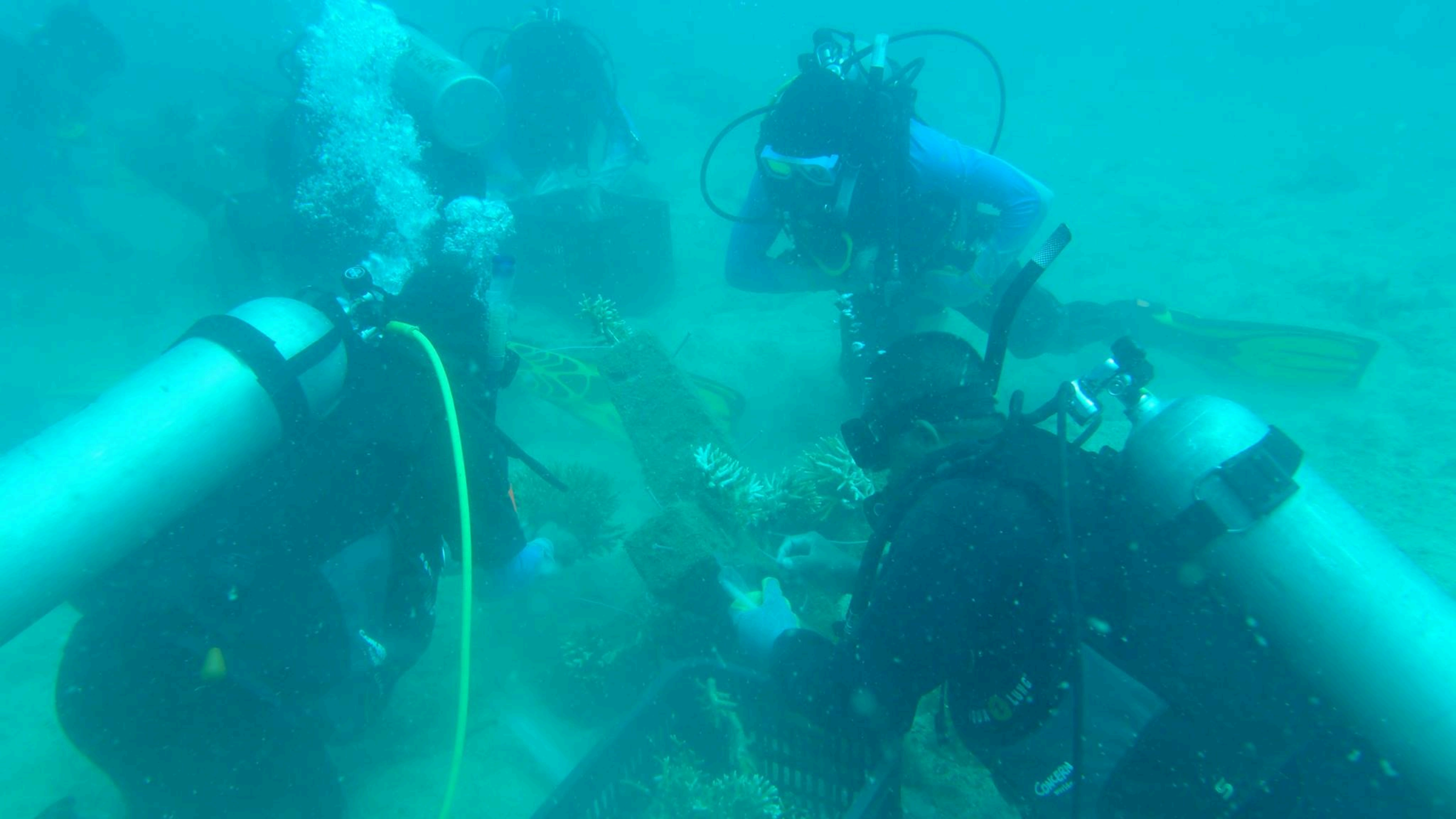
Posted by Iloilo CODE NGOs, Inc. - Christian Aid

222 Views







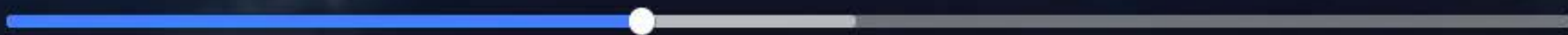




Brgy. Salvacion, Concepcion, Iloilo - Coral Transplantation

Posted by Iloilo CODE NGOs, Inc. - Christian Aid

41 Views



-1:15



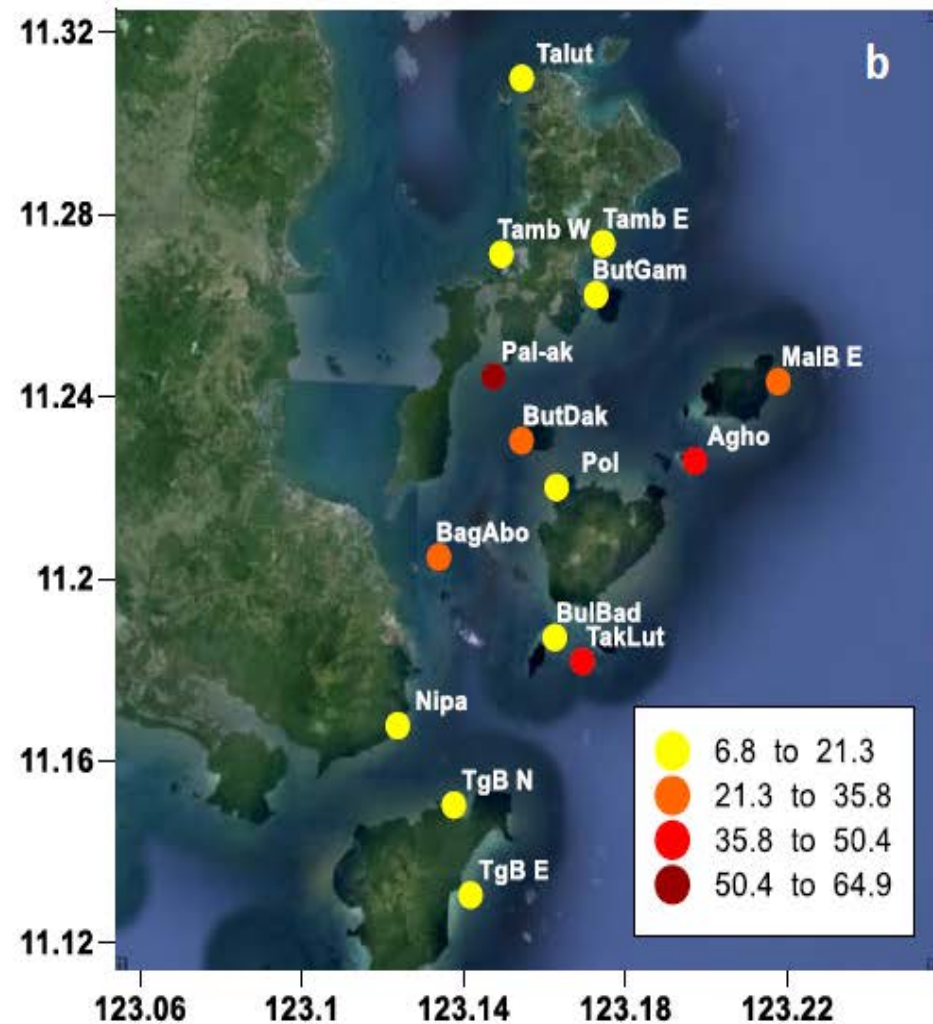
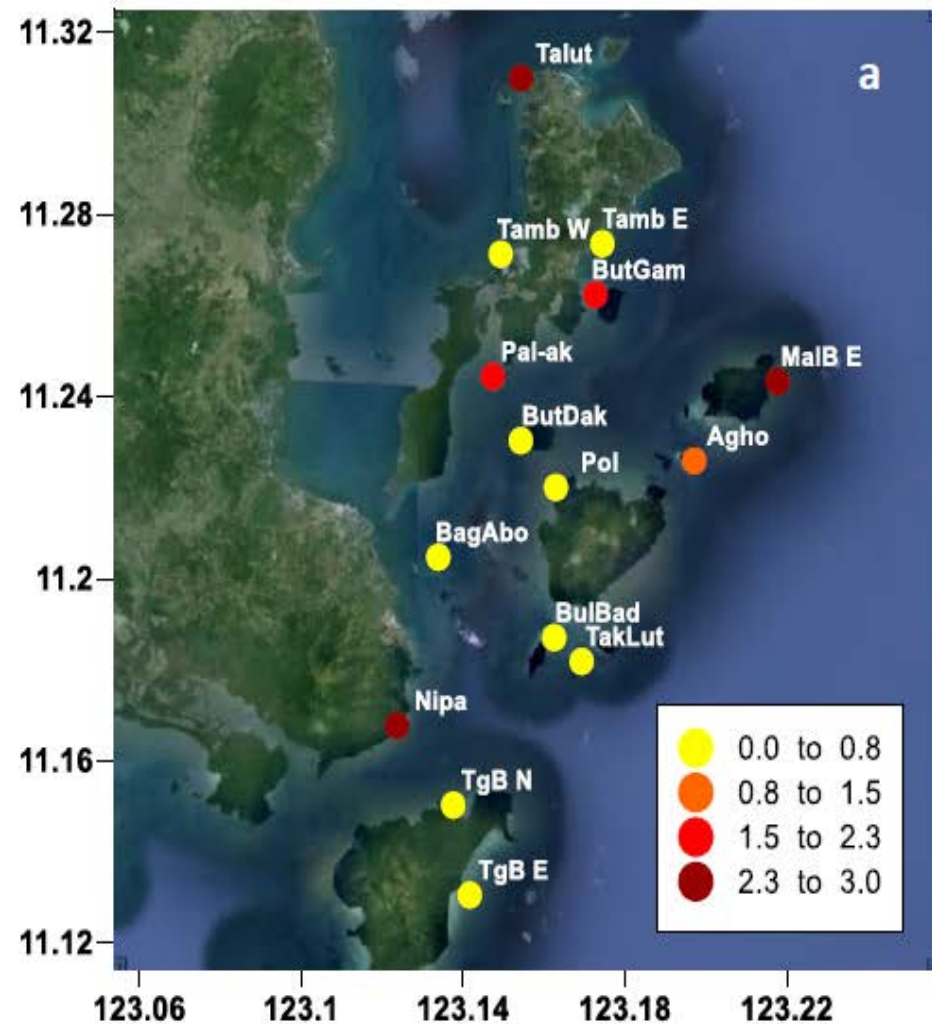


Figure 14. The distribution of **a)** dead corals and **b)** dead corals with algae cover estimates in each of the fifteen dive sites surveyed in Concepcion, Iloilo on January 14 – 15, 2016.

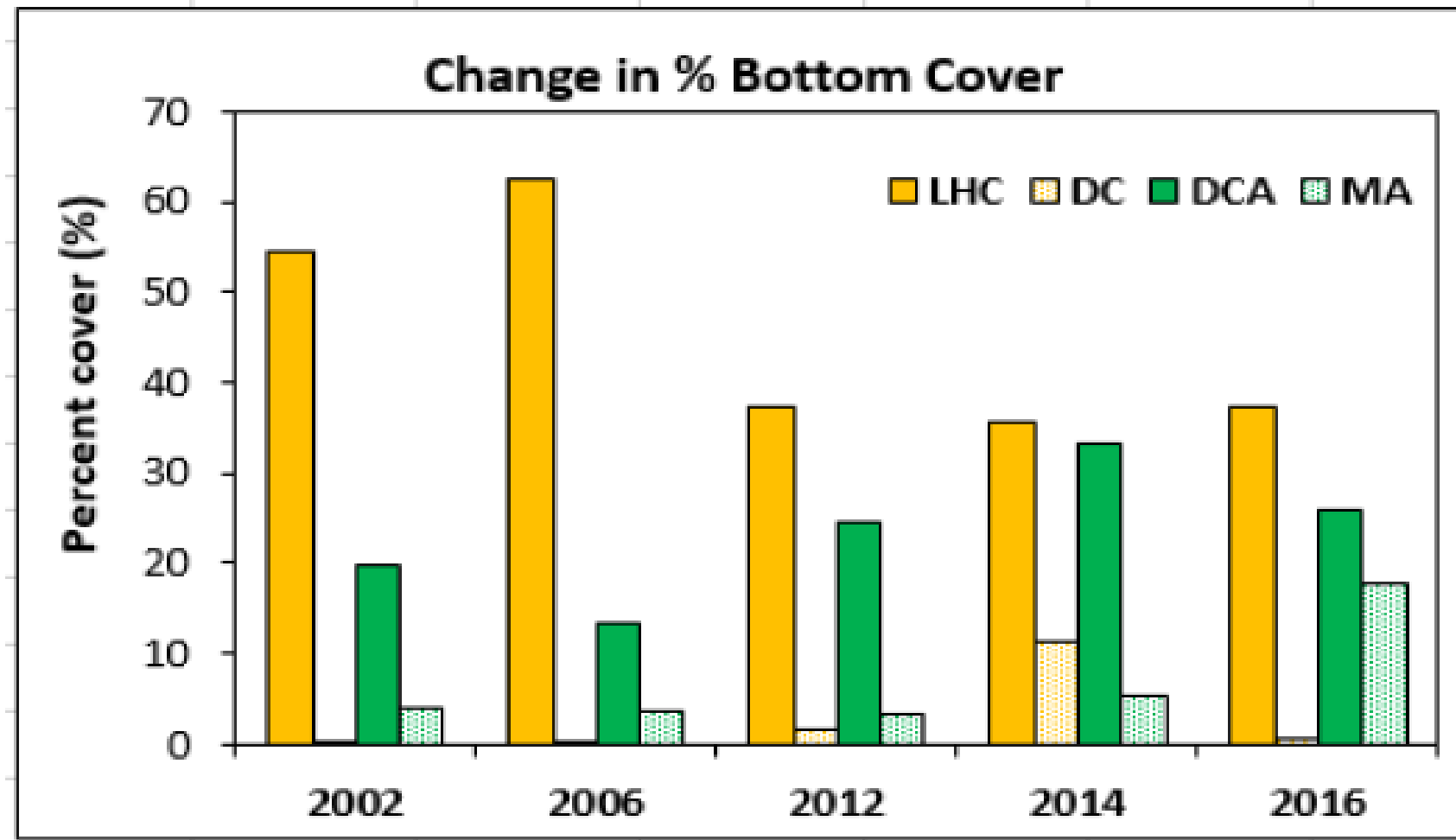


Figure 24. Change in substrate/bottom types in Concepcion, Iloilo from 2002-2016.

Wilfredo L. Campos

Donna M. Guarte
Lucas R. Felix Jr.
Mary Ann Cielo L. Malingin
Kim P. Nuñez

Melsie C. Cadenas

Liesel C. Paraboles
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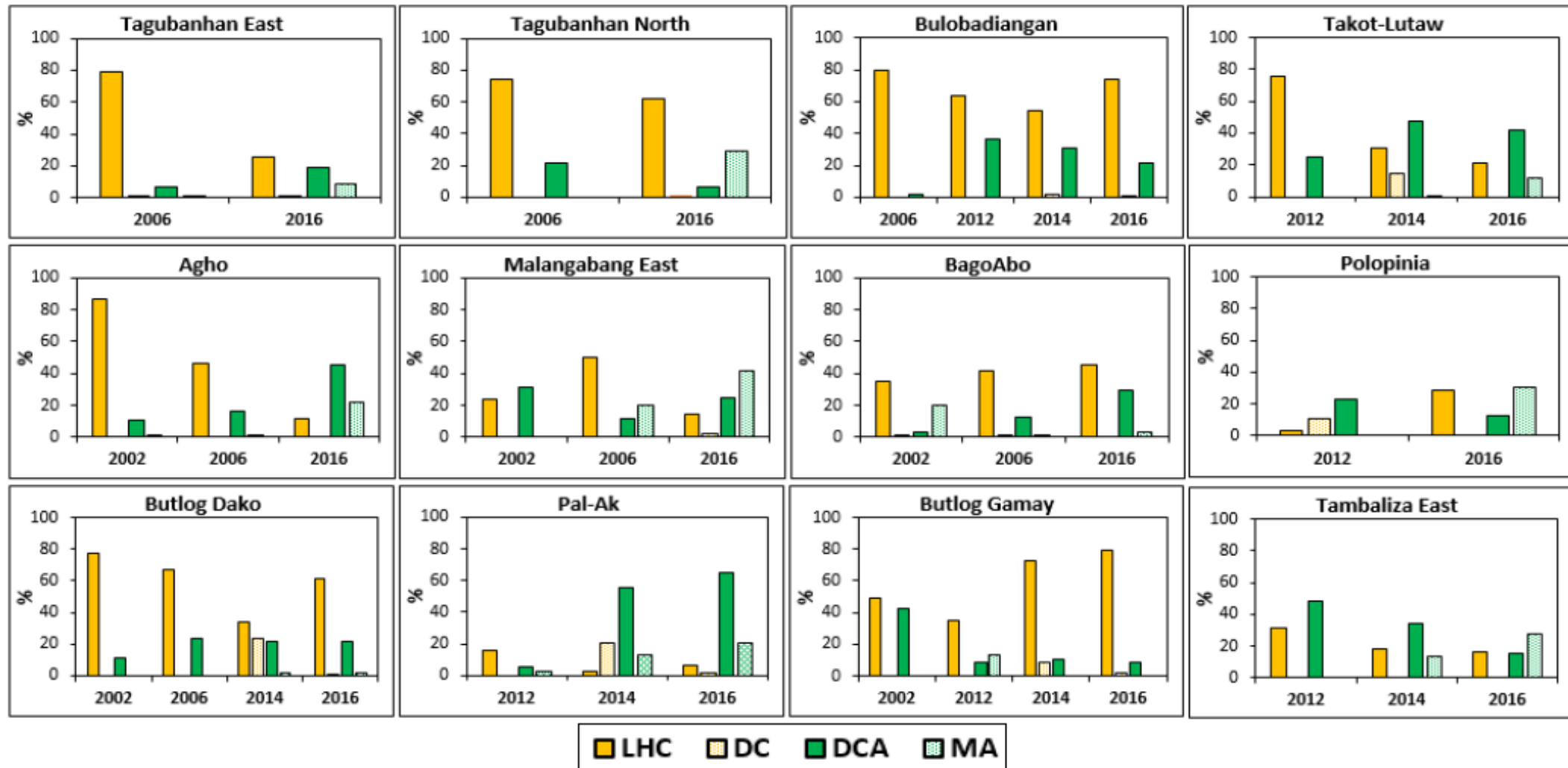


Figure 25. Change in substrate/bottom types in each station surveyed in Concepcion, Iloilo from 2002-2016.

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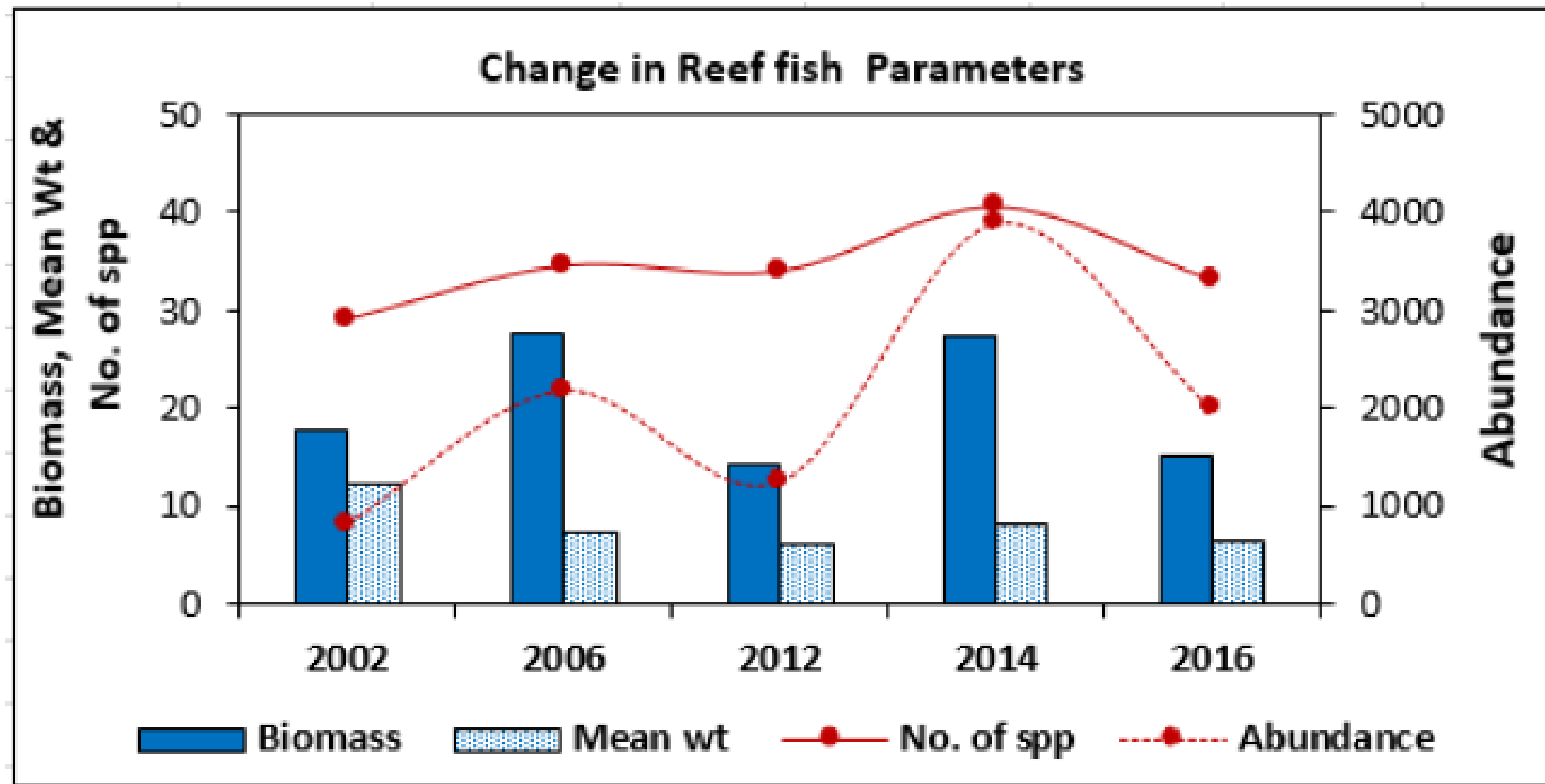


Figure 26. Change in reef fish parameters in Concepcion, Iloilo from 2002-2016.

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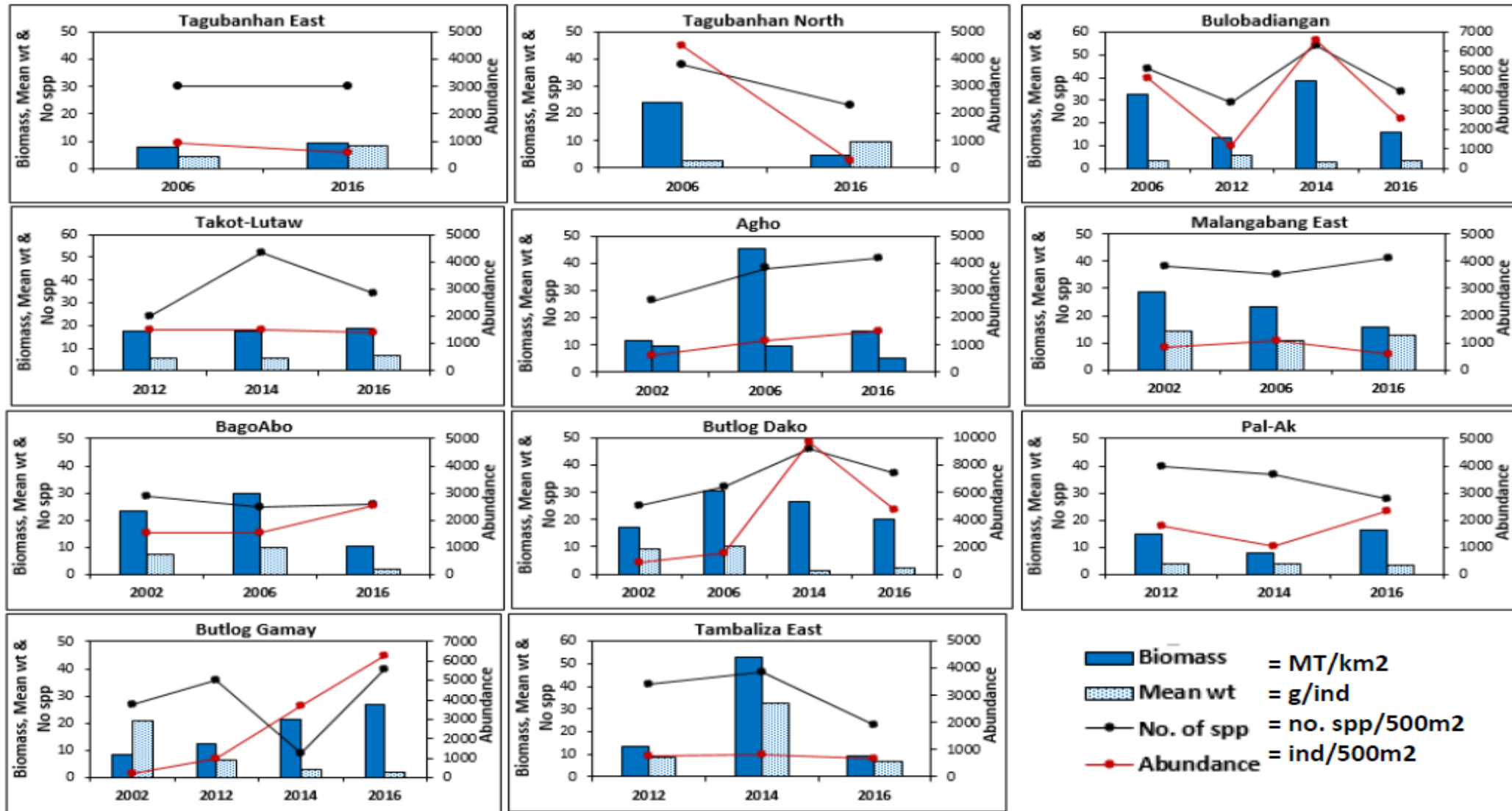


Figure 27. Change in reef fish parameters in each station surveyed in Concepcion, Iloilo from 2002-2016.

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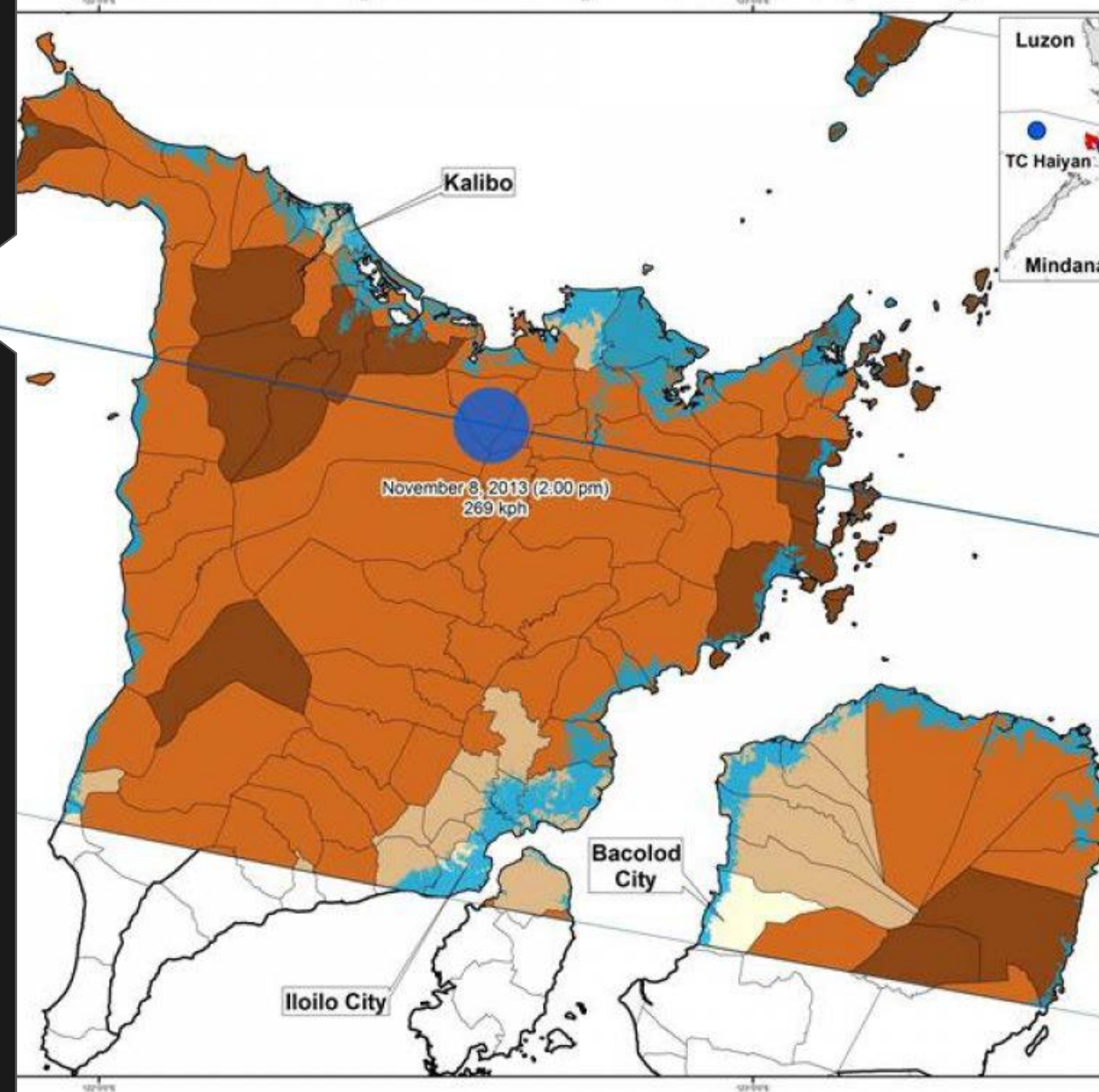


Reflections from Attempts at Ecosystems Restoration as an approach to recovery

Pre-disaster risk assessments and pre-disaster recovery planning must cover near and far-shore assessments



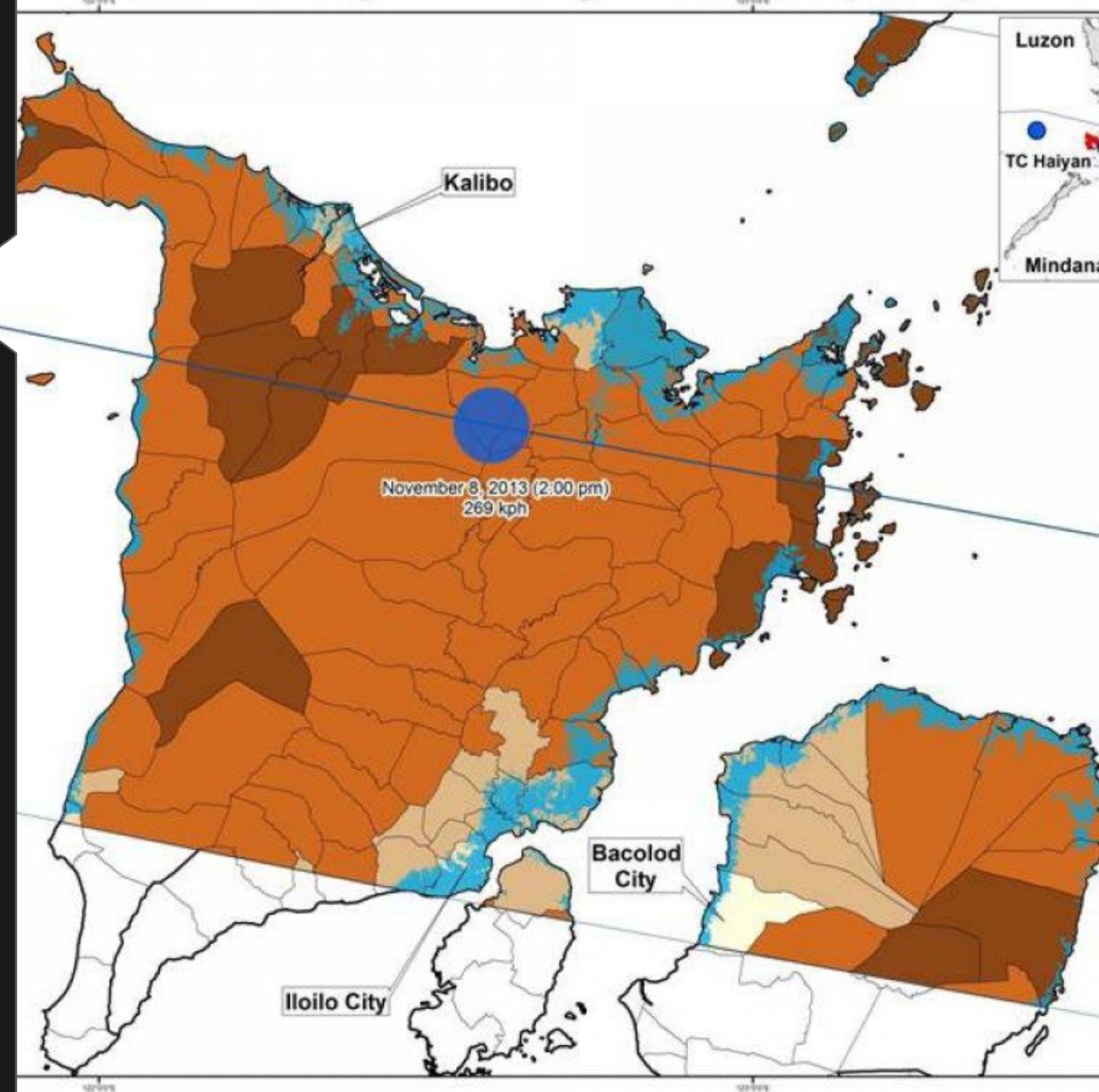
2003 Municipal Poverty Incidence (Iloilo)



Pre-disaster risk assessments and pre-disaster recovery planning must cover near and far-shore assessments



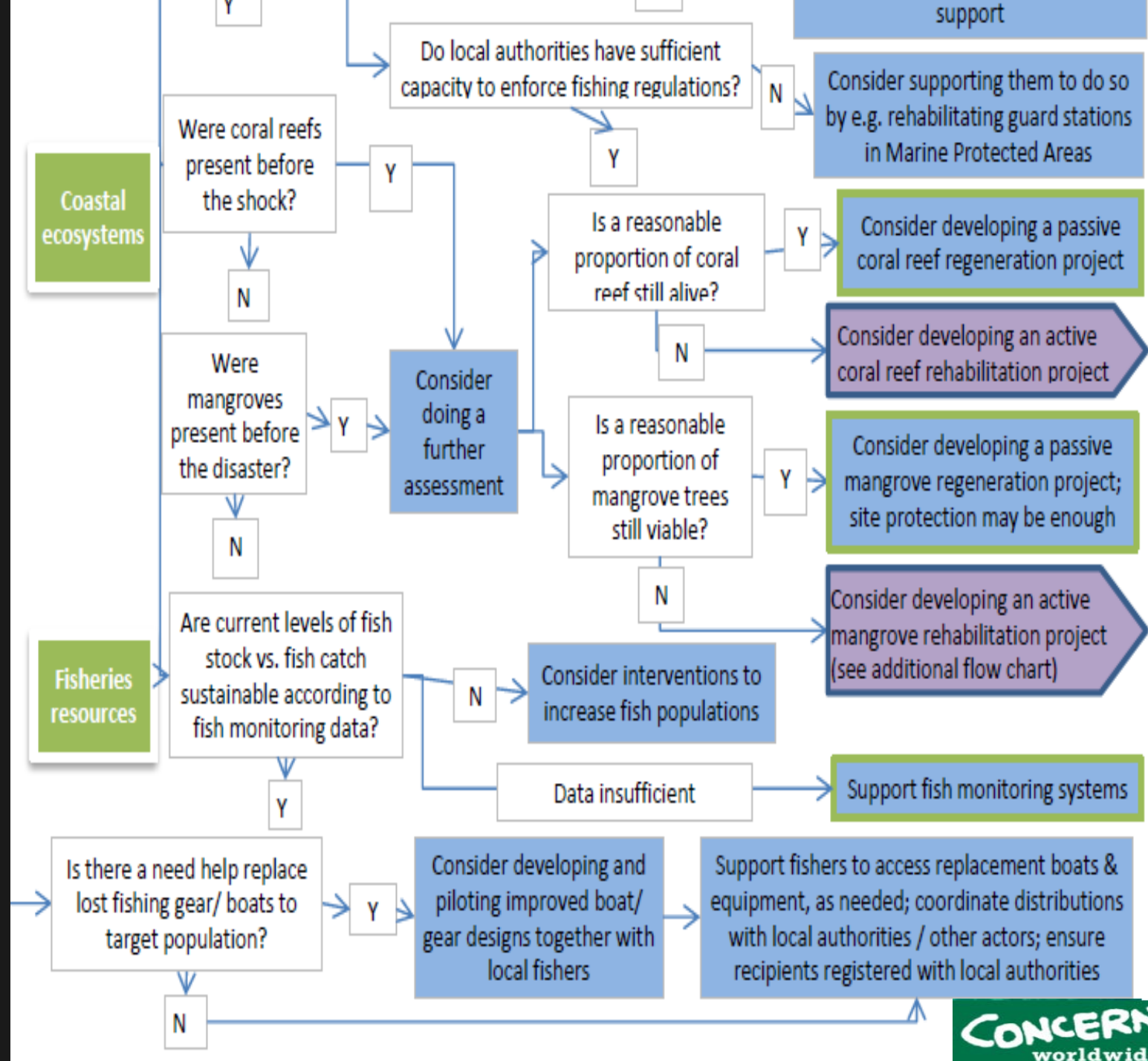
2003 Municipal Poverty Incidence (Iloilo)



Characterizing the hazard and
promoting understanding of
risks to humans and ecosystems



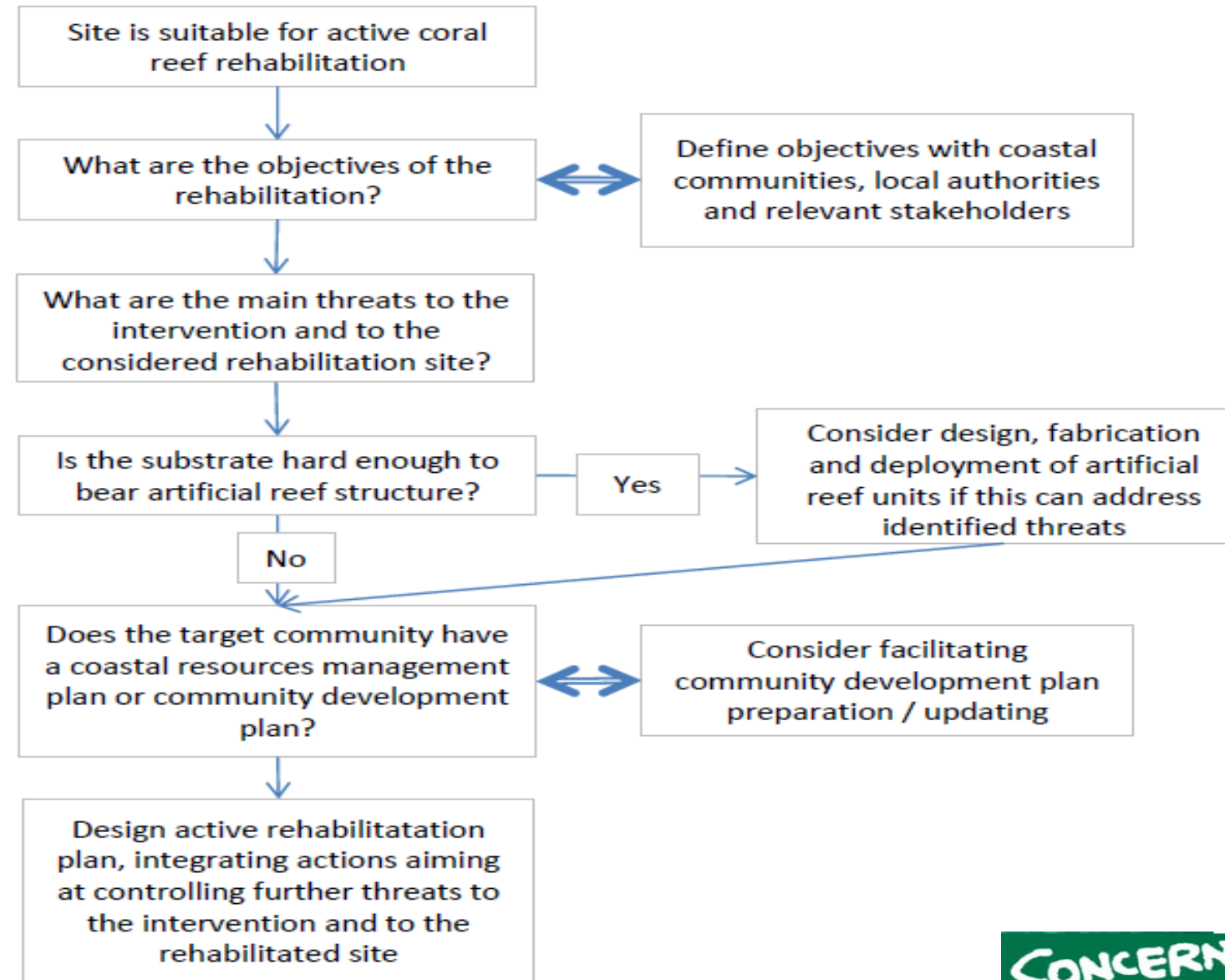
Evidence-based approaches to ecosystems restoration are necessary, ie case of reefs



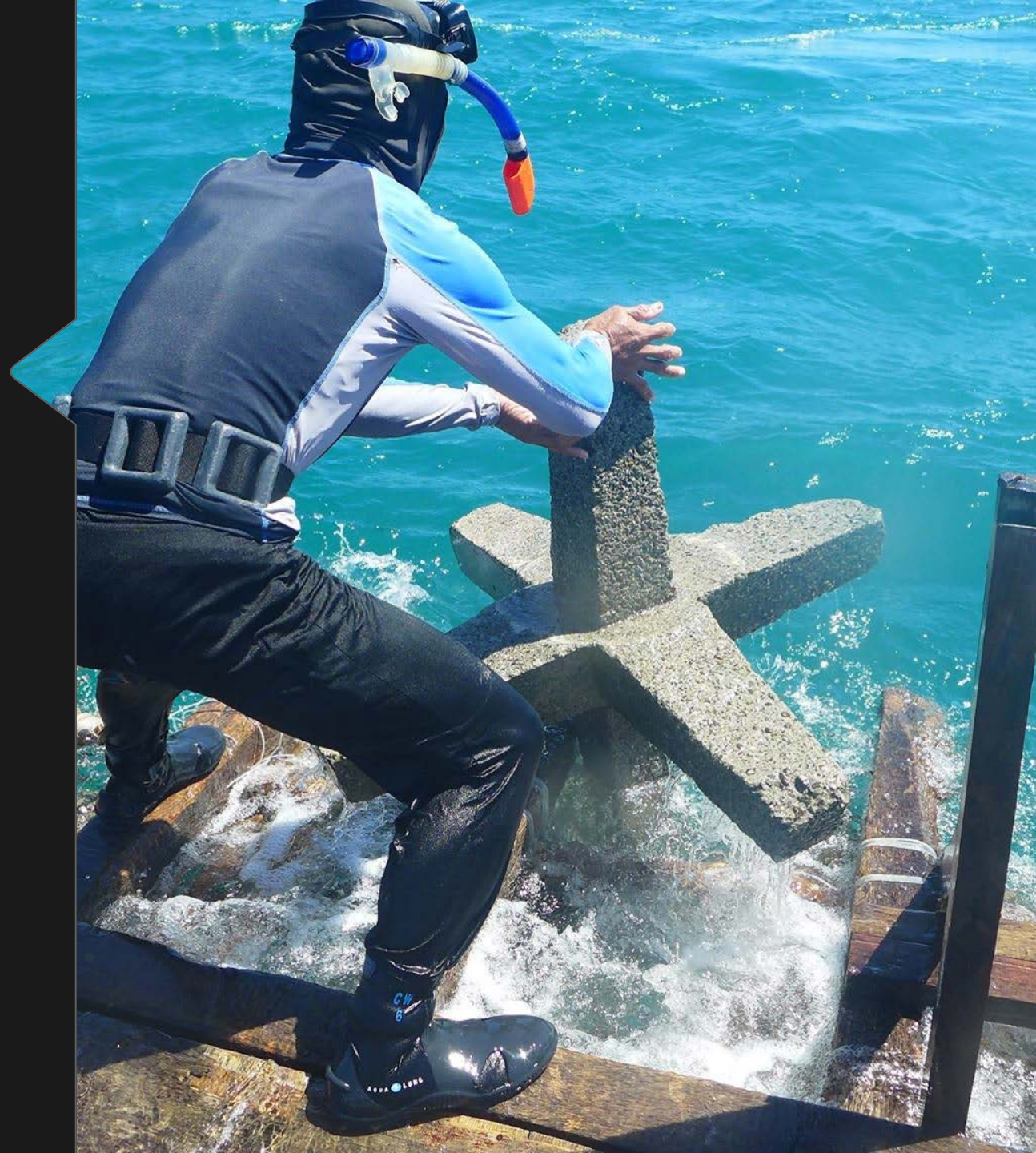
Do-no-harm principle
also applies in ecosystem
restoration



Decision tree 2: Designing activities for coral reef rehabilitation



Artificial reefs must be located in marine protected areas (MPAs)



Demand-side
management in the use of
marine and coastal
resources for infrastructure:
regulation of the use of
sand and coral stones for
rehabilitation infrastructure



Ecosystems restoration must consider the web/network of ecosystems (ie integrated ecosystems for reef restoration)

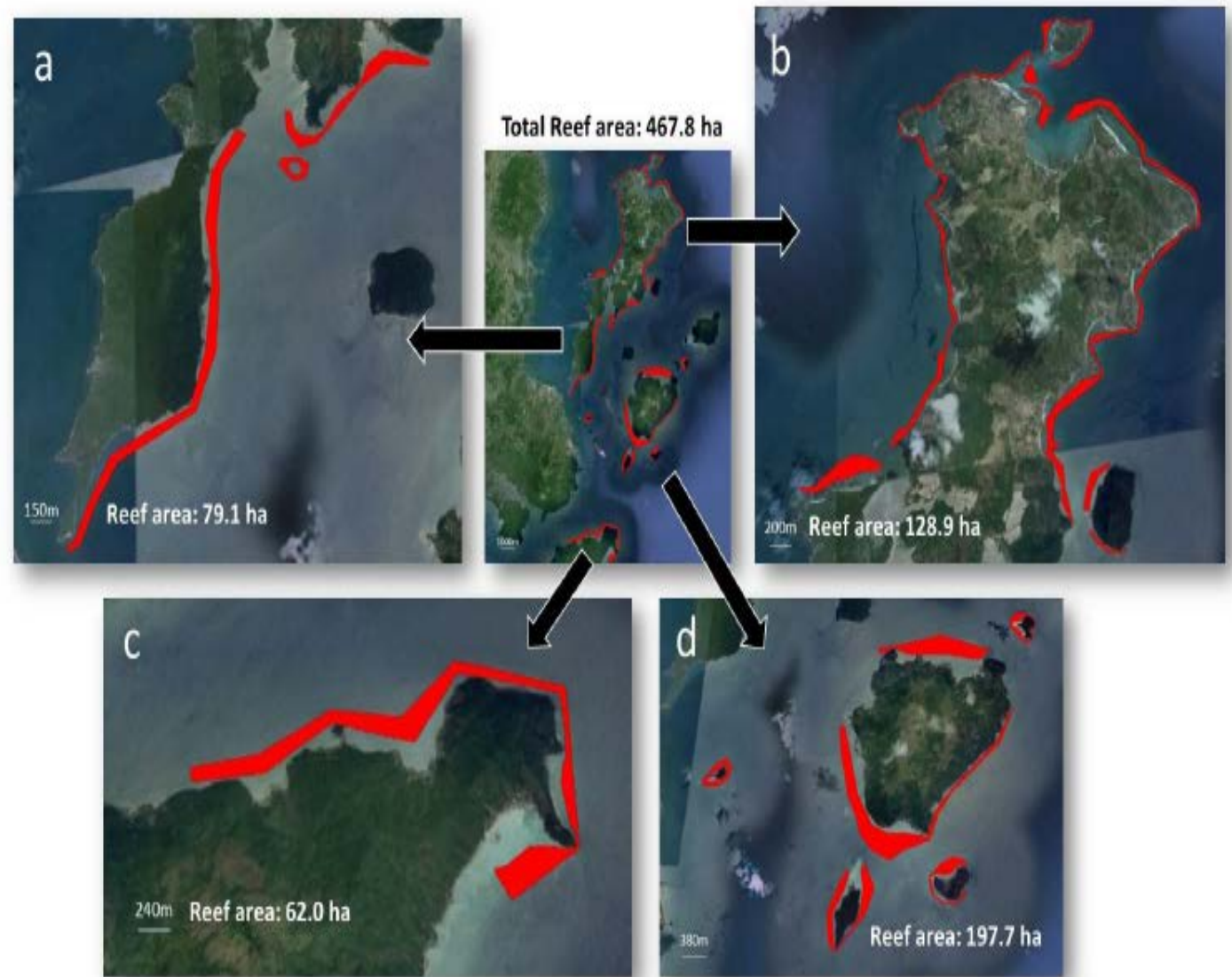


Figure 11. The estimated extent of reef areas in Concepcion, Iloilo based on the Manta Tow surveys conducted. a) eastern side of Tago Island, Pal-Ak and eastern side of Park, b) around Pan de Azucar and Butlog Gamay, c) Tagubanhon, and d) BagoAbo, Bulobadiangan, Takut-Lutaw, Agho and Igbon Islands.

Community
participation in the
protection and
monitoring of reefs



Enabling local capacities in
enhancing resilience of marine
ecosystems : science and
technology applications in
resource management



Ecosystems restoration must be seen in the context of the broader recovery process:

Natural, economic, social recovery --- using a **systems dynamics approach in recovery rather than sector-specific approaches**

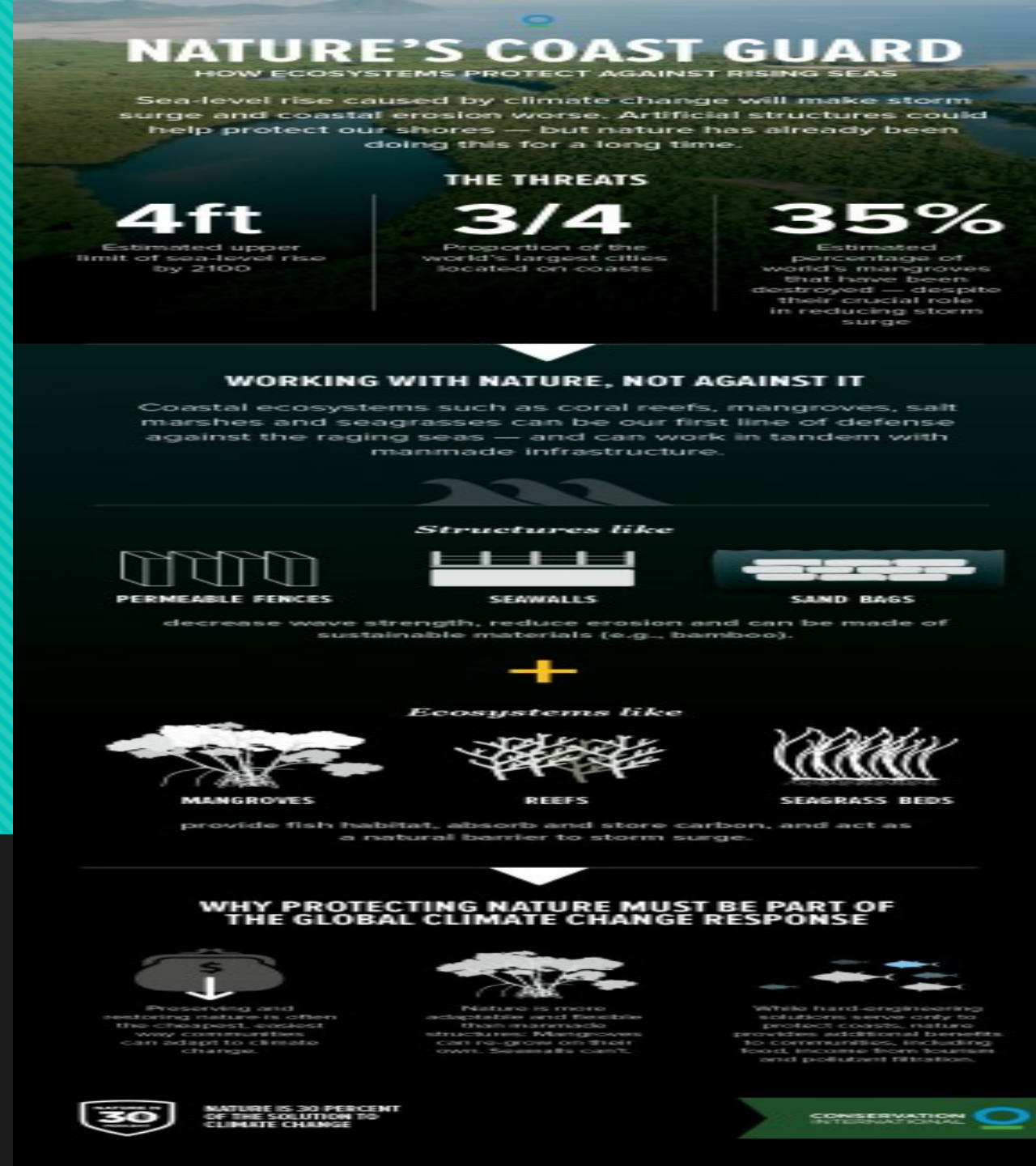
(Note: increased number of fishing boats increased the pressure on dwindling marine resources)



The 601 Habit. Photo by Marcelino Serdena III



Sustaining the work in ecosystems restoration



Philippines Green Grey Launch v.2.pptx