Marine Reserves in the Philippines: Challenges, Success and Perspectives

Helping Build Resilience in the Face of Climate Change

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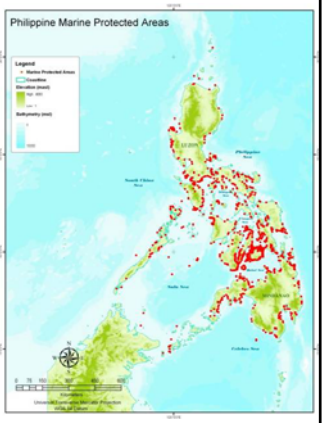
Marine Protected Area (MPA) – general term applied, to any defined marine area established for conservation and protection, where activities are managed based on specific rules and guidelines

Marine Reserve - an MPA where all uses are controlled or regulated to the extent necessary. e.g. Apo Island Marine Reserve, El Nido Marine Reserve

Marine Park - an MPA where multiple uses are allowed through zoning regulations like a marine reserve and where conservation-orientated activities are emphasized, e.g., Tubbataha Reef National Marine Park, Apo Reef Natural Park

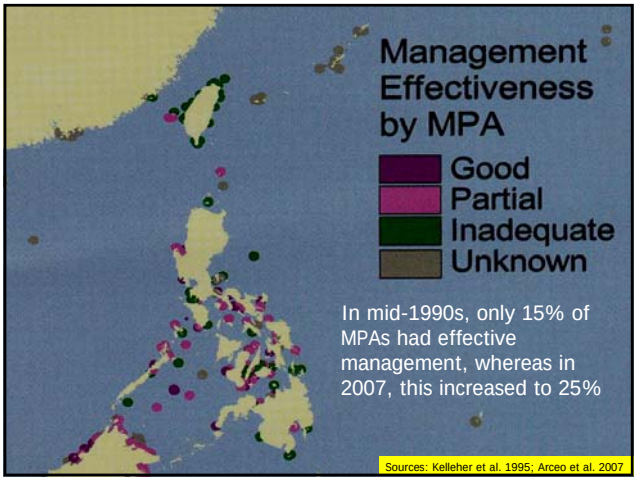
Marine Sanctuary – synonymous with "No-Take Zones" (NTZs) and may be located within a marine reserve or marine park, e.g., Turtle Island Wildlife Sanctuary, Pulong Bato Fish Sanctuary Verde Island.



Definitions: Campos et al. 2003, Miclat & Ingles; Map: UPMSI Database

Institutional/Legal Frameworks in the Establishment of MPAs in the Philippines

- Local Government Code of 1991 (Republic Act 7160)
- National Integrated Protected Areas System of 1992 (Republic Act 7586)
- Fisheries Code of 1998 (Republic Act 8550)
- Integrated Coastal Management (Executive Order 533 series 2006)
- Dept. of Agriculture Memoranda
- Municipal Ordinances



Economic benefits from MPAs:

• sustain food and livelihood resources

1 hectare of mangrove = **680 kg of fish/year**

1 km² of healthy coral reef = **20,000 kg of fish/year**

Enough to feed 400 people with 50 kg fish per year!

Source: White and Trinidad (1999)

Economic benefits from MPAs:

MPA User Fees in the Philippines

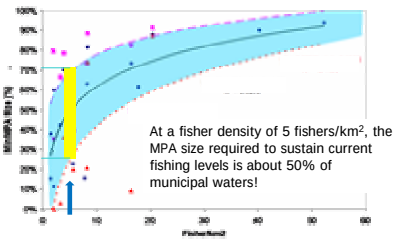
- accrue to LGUs w/budget for MPA management

1. Tubbataha Reefs National Marine Park (Palawan)
   Entrance fees: foreigners $50; locals $25
2. Gilutungan Marine Sanctuary (Cebu)
   Entrance fees: PHP25/person/day
   Operator fees: PHP1,000/year
3. Apo Island Marine Reserve
   PHP20/person/day (swimming)
   PHP50/person/day (snorkeling)
   PHP150/person/day (diving w/o camera)
   PHP200 (diving w/ camera)
   PHP250 (diving w/ videocam)
   Annual income: PHP6 million
4. Boracay* (*Willingness to Pay survey)
   Entrance fees: $5 - $20

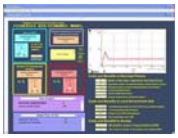
From various sources

Marine Protected Areas:

entry-point for biodiversity conservation



At a fisher density of 5 fishers/km², the MPA size required to sustain current fishing levels is about 50% of municipal waters!



Using the Fisheries Information for Sustainable Harvests – BioEconomic model (FISH-BE)

But single MPAs may not be enough for protection at larger scales!

Source: Licuanan et al. (2007)

Local anthropogenic threats

1. Increasing population & coastal settlement
2. Habitat modification & coastal pollution
3. Illegal fishing
4. Destructive fishing

Houses on stilts on Danajon Reef, Philippines

Conversion of mangrove areas (J.H. Primavera)

Fish pens & cages in the Philippines (Photo: G.S. Jacinto)

Map-based (GIS) Assessment of Food Demand

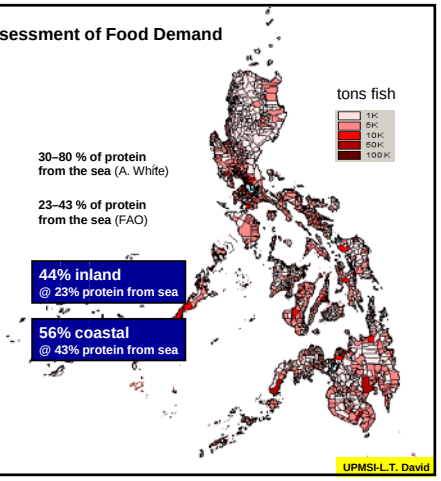
Protein Requirement –
Phil RDA 51.5 g/day
(M. A. R. Quisumbing, UPLB)

30–80 % of protein from the sea (A. White)

23–43 % of protein from the sea (FAO)

44% inland
@ 23% protein from sea

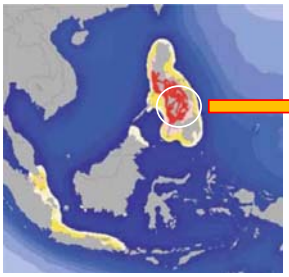
56% coastal
@ 43% protein from sea



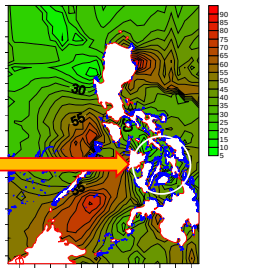
UPMSI-L.T. David

Signs of the times...

Fish biodiversity declines in the Philippines → the Visayan Seas



Pattern of species richness based on sampling in early to mid 1900s (Carpenter and Springer 2005)

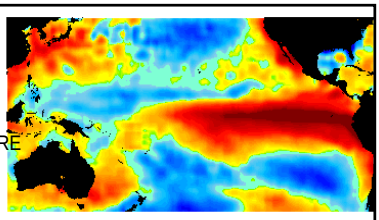


Interpolated species diversity map of fish species in the Philippines from fish visual census data, 1990s to 2008 (Nañola et al, in prep.)

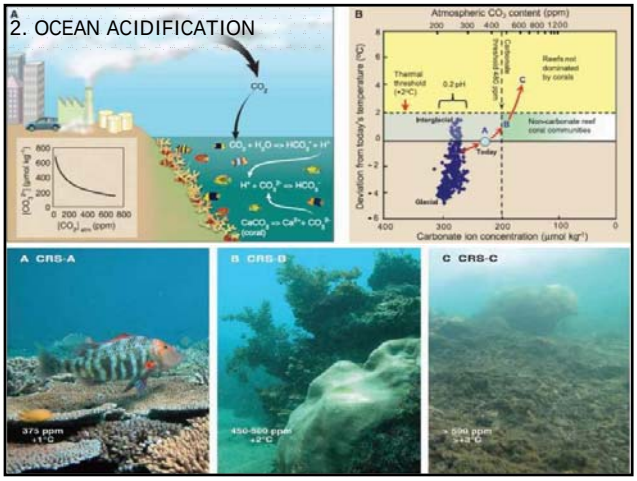
Global threat

Climate change

1. ELEVATED TEMPERATURE & LIGHT INTENSITY

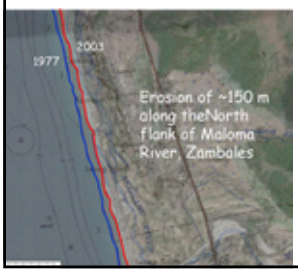


2. OCEAN ACIDIFICATION



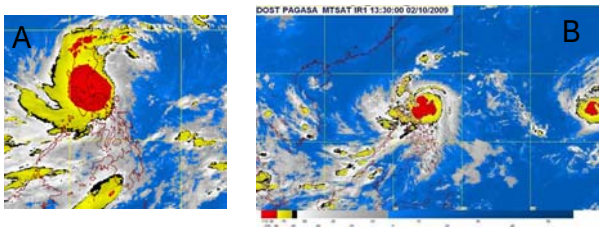
3. SEA LEVEL RISE

Anecdotal accounts:
as much as **40 m erosion in one storm event**.



UPMSI-F.P. Siringan

4. INCREASED INTENSITY OF TROPICAL STORMS

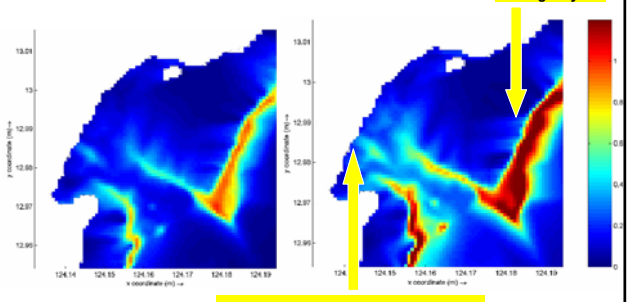


(A) Tropical storm **Ketsana** ('Ondoy); (B) Tropical storms **Parma** ('Pepeng') and **Melor** ('Quedan') (Source: DOST PAGASA) – Sept. and Oct. 2009, Western Pacific

Coastal Hazard – physical oceanography

Increase intensity of storms or higher sea level = bigger waves (sample model for Bagacay, Philippines)

Reef system continues to protect most of Bagacay



But the coast in front of channel receives more wave energy

Source: UPMSI-Villanoy

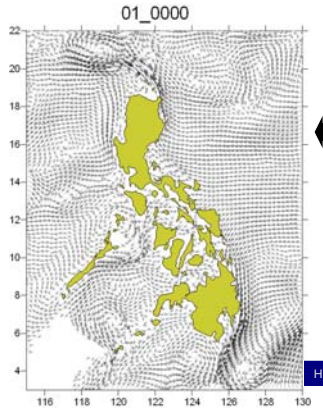
What should we do?

- Address immediate anthropogenic threats to the ecosystems
- Improve the health of the ecosystems for better chances of recovering from the adverse effects of global change (**ecosystem resilience**)

How do we improve ecosystem resilience?

- Reduce fishing effort
- Eliminate destructive fishing
- Reduce coastal pollution
- **Establish marine protected areas (MPAs) and MPA networks**

Bases for MPA establishment



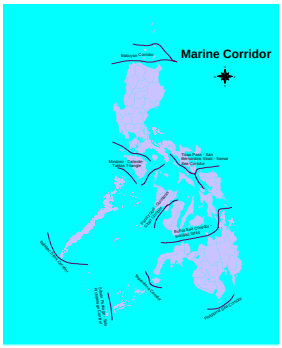
- **habitats**
- **connectivity features** (based on numerical modeling of water circulation & dispersion)
- **entrainment**
- **climate exposure**
- **threats**
- **vulnerability**

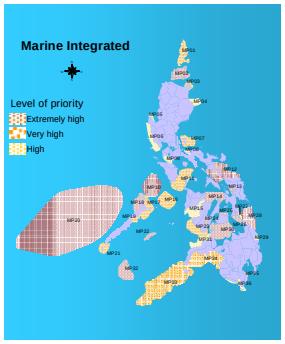
HYCOM + DISPERSAL

Source: UPMSI-C.L. Villanoy

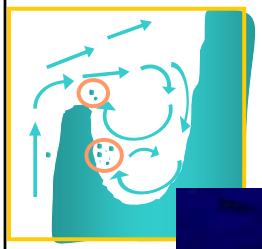
From Simulations to Action

Priority marine biodiversity conservation areas

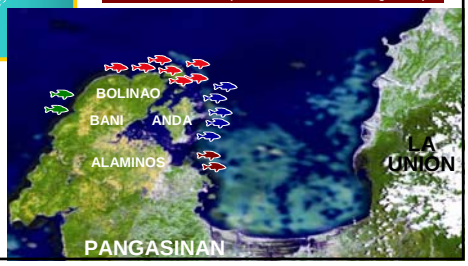




Sectoral networks of municipalities, e.g., ABBA in Lingayen Gulf



Anda - 5 MPAs (mean=21 has)
Bani - 2 MPAs (mean=28 has)
Bolinao - 7 MPAs (mean=16 has)
Alaminos - 2 MPAs (mean=328 has including HINP)



Source: Sagip LG Project

Benefits derived from inter-LGU collaboration

Cost of Coastal Law Enforcement (CLE) operations/sq. km of municipal waters

LGU 1	LGU 2	LGU 3	LGU 4	LGU 5
$11.50	$48.20	$18.03	$278.00	$6.40

LGUs enforcing the law individually

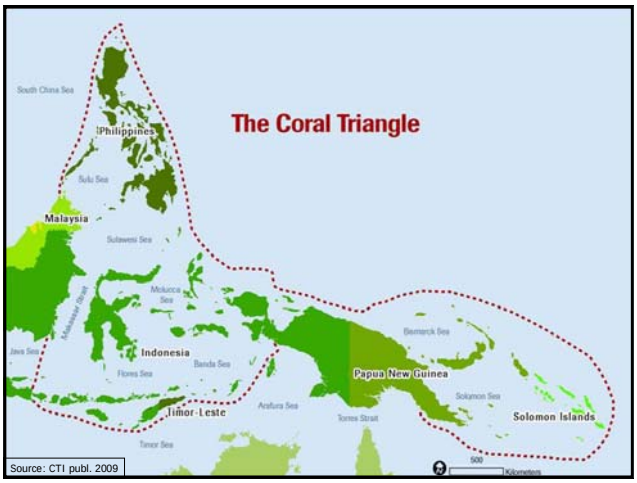
(effective enforcement up to 5 kilometers)

LGU 1	LGU 2	LGU 3	LGU 4	LGU 5
$10.17	$23.80	$9.11	$146.62	$5.27

LGUs enforcing the law collectively

(effective enforcement up to 10 kilometers)

...cost reduced by 50%; area increased by 100%



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