

The saga of community learning: Mariculture and the Bolinao experience

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Food security for the Filipinos

Current population of the Philippines
104.9 Million (2017)

Philippine Fisheries Code RA 8550
10% municipal waters for aquaculture

Bolinao-Anda, Pangasinan

Mariculture of milkfish (bangus) and mussels

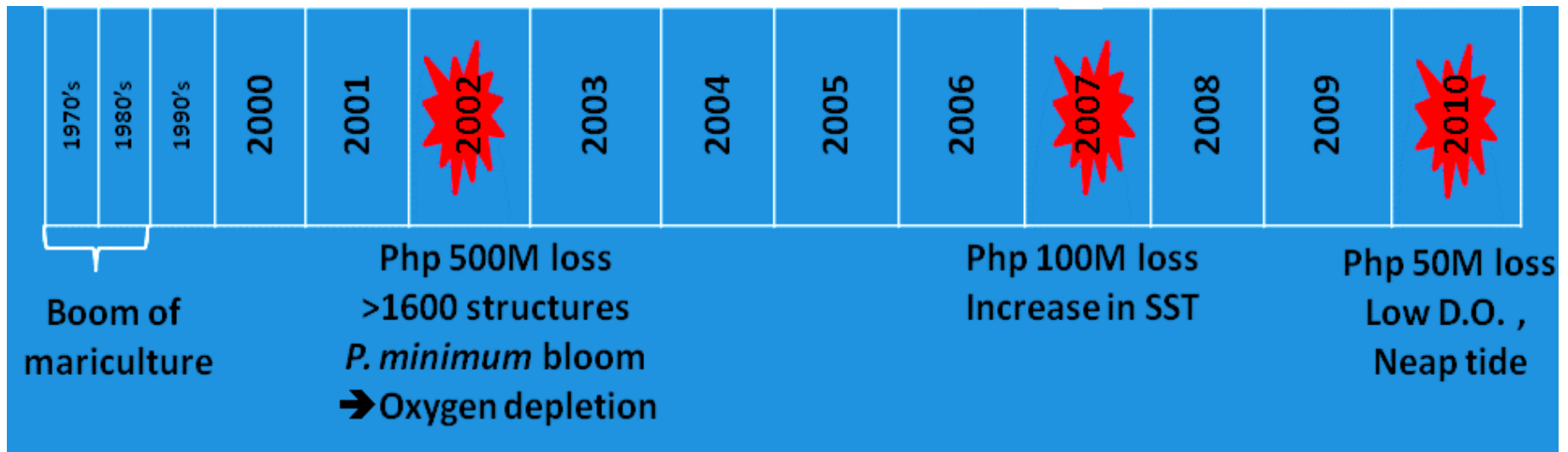
- Began 1970's and 1980's
- Boom in the 1990's

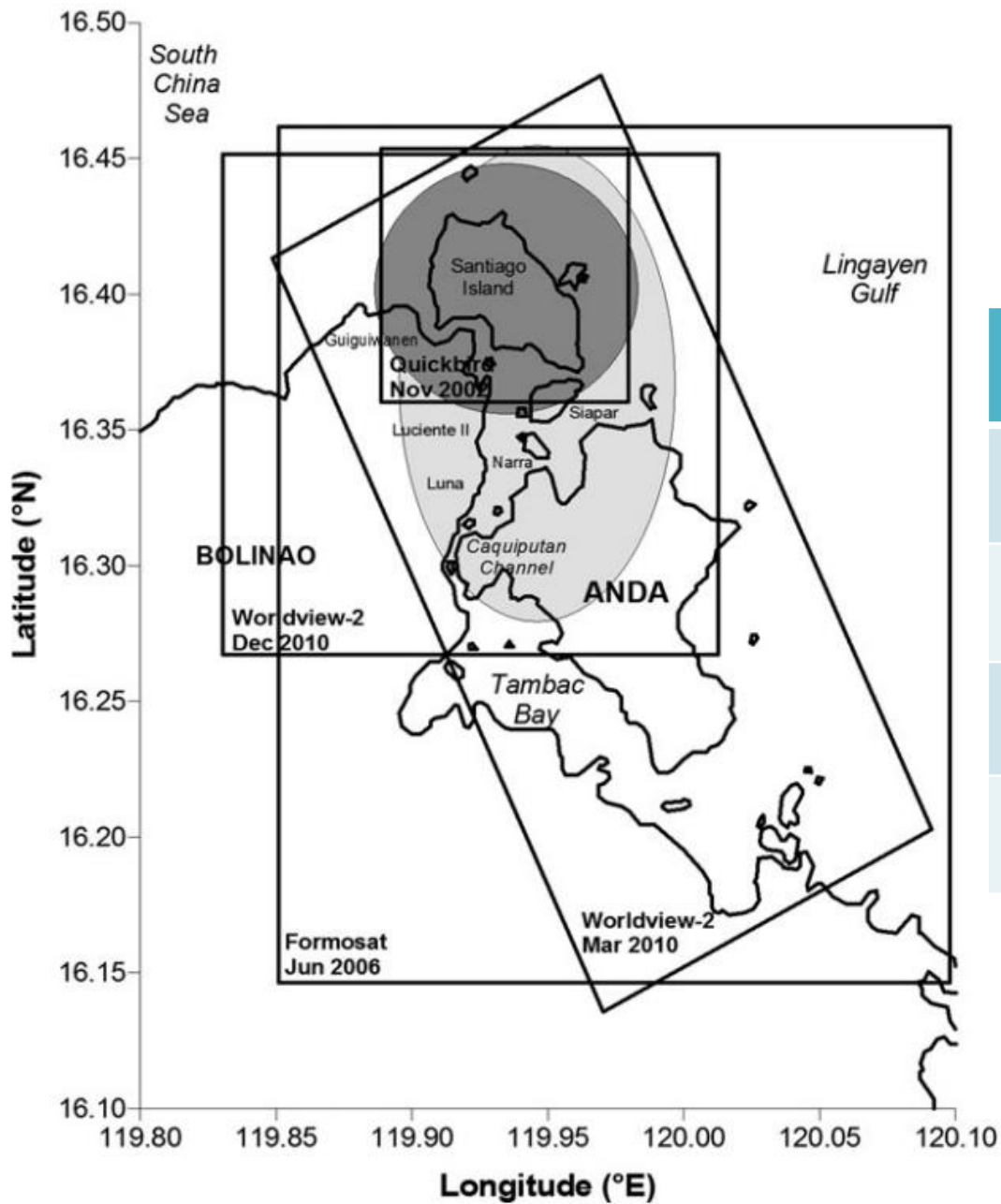


Bolinao Municipal Fisheries Ordinance 1999

Location	18 × 18 m Cage 40 × 100 m Pen	15 × 15 m Cage 40 × 70 m Pen
Pilar (Zone II – 1)	38	55
Luciente I (Zone II – 2)	26	38
Luciente II (Zone II – 3)	75	108
Luciente II (Zone II – 4)	64	92
Luna (Zone II – 5)	107	154
Catungui, Zaragoza (Zone II-6)	6	9
Luc, Salad (Zone II – 7)	30	44
Culang, Tara (Zone II – 8)	30	44
Total Allowable Structures	376	544

Fish kills

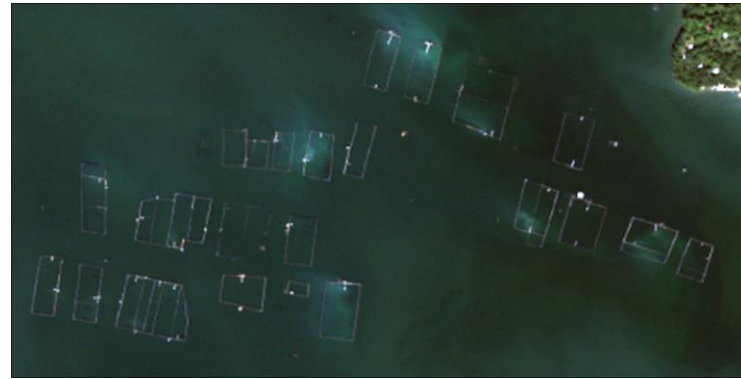




Date of acquisition	Satellite	Spatial resolution
3 November 2002	Quickbird	2.4m
19 June 2006	Formosat (panchromatic)	2m
7 March 2010	Worldview-2	1.84m
12 December 2010	Worldview-2	1.84m



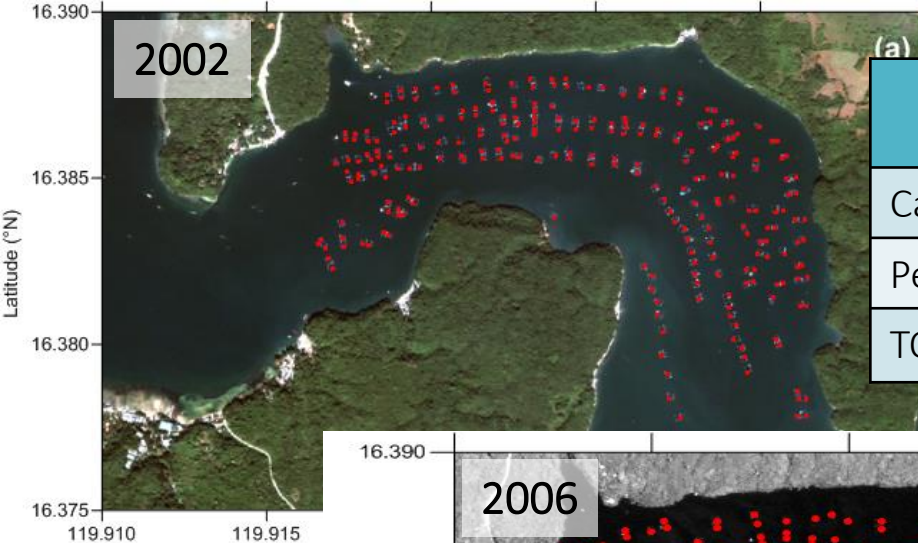
Fish cages



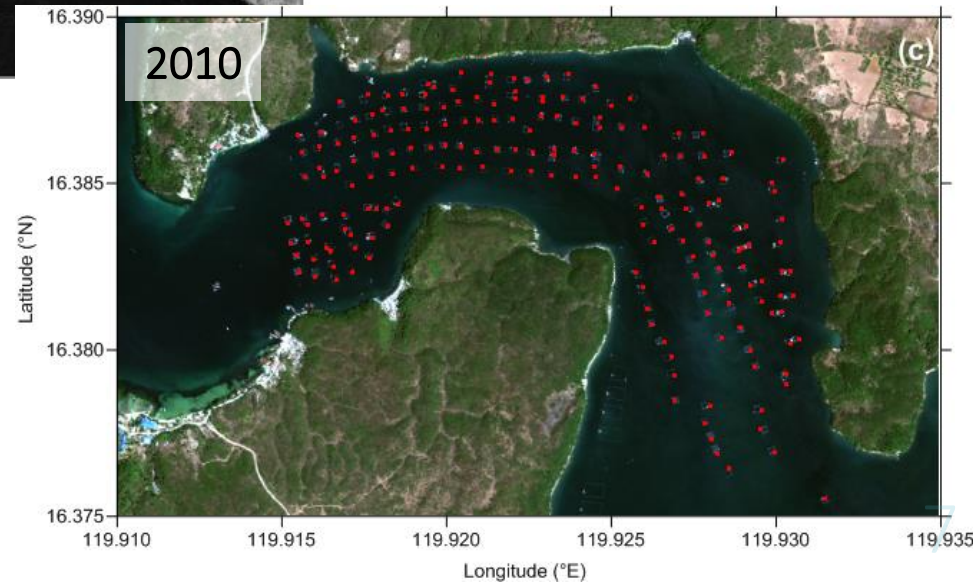
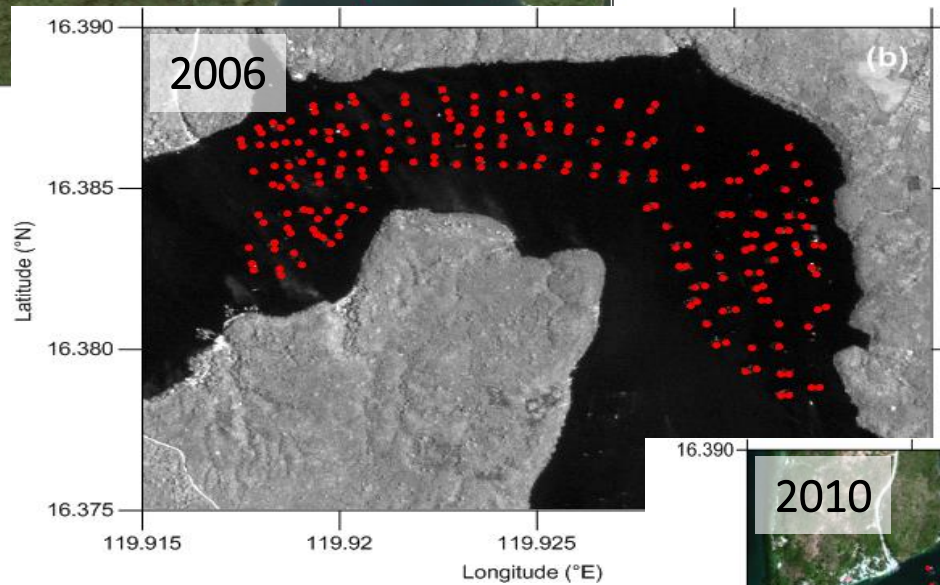
Fish pens



Fyke nets

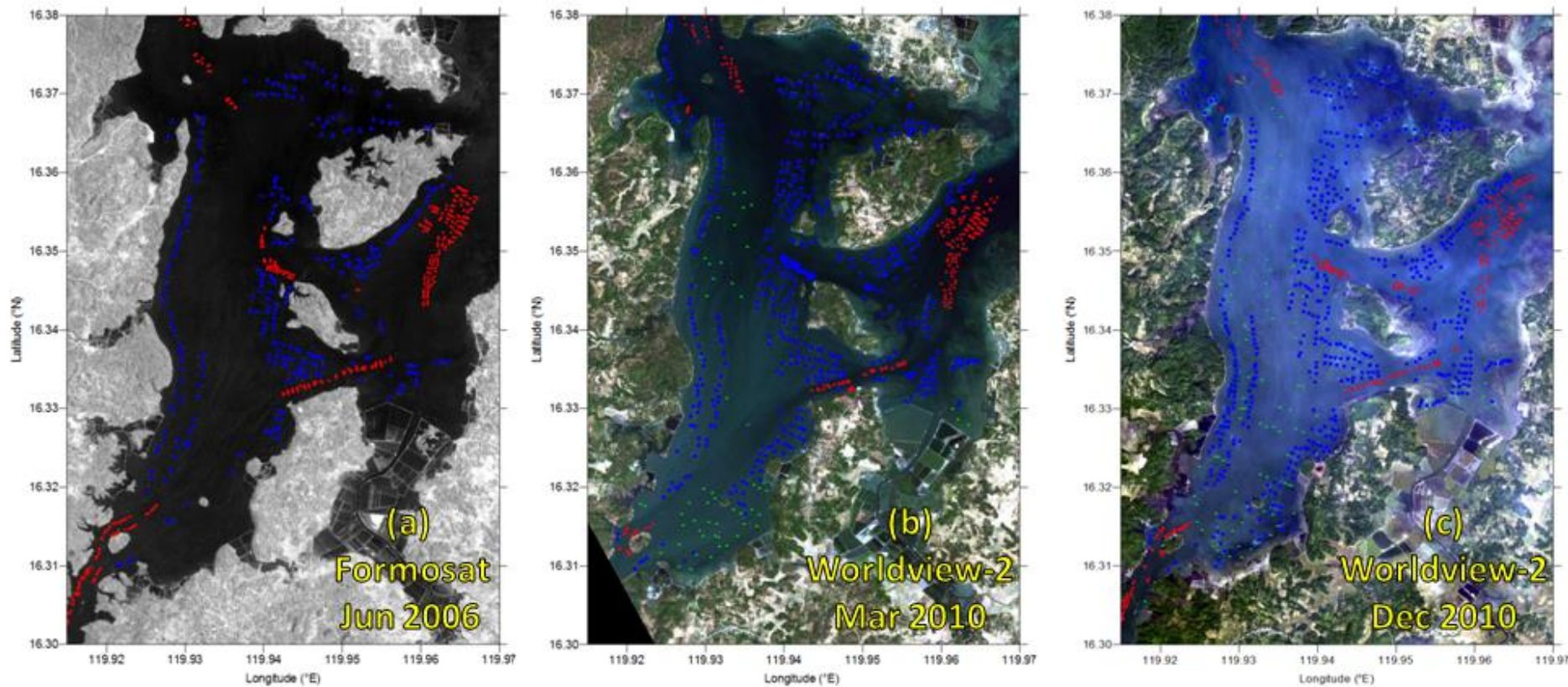


	Quickbird (Nov 2002)	Formosat (Jun 2006)	Worldview-2 (Mar 2010)	Worldview-2 (Dec 2010)
Cages	265	230	213	217
Pens	56	71	167	149
TOTAL	321	301	380	366



Mariculture structures in
Bolinao, Pangasinan

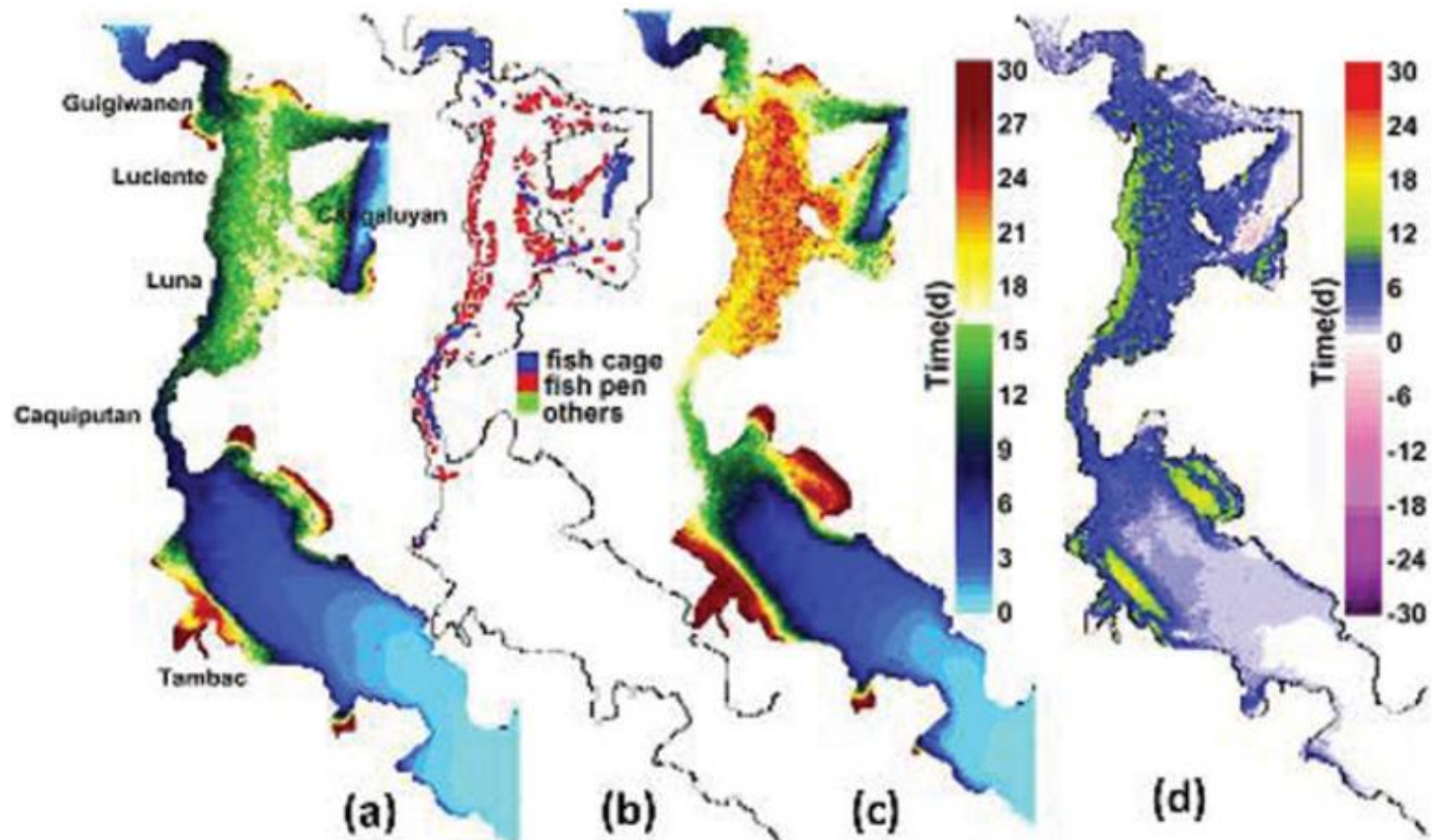
Mariculture structures in Bolinao-Anda, Pangasinan



	Formosat (Jun 2006)	Worldview-2 (March 2010)	Worldview-2 (December 2010)
Cages	342	267	287
Pens	288	507	539
Fyke nets	n/a	53	79
TOTAL	630	827	905

Approaches for sustainable mariculture

Recommendation 1: Reduce density of mariculture facilities to 35% of existing structures



Approaches for sustainable mariculture

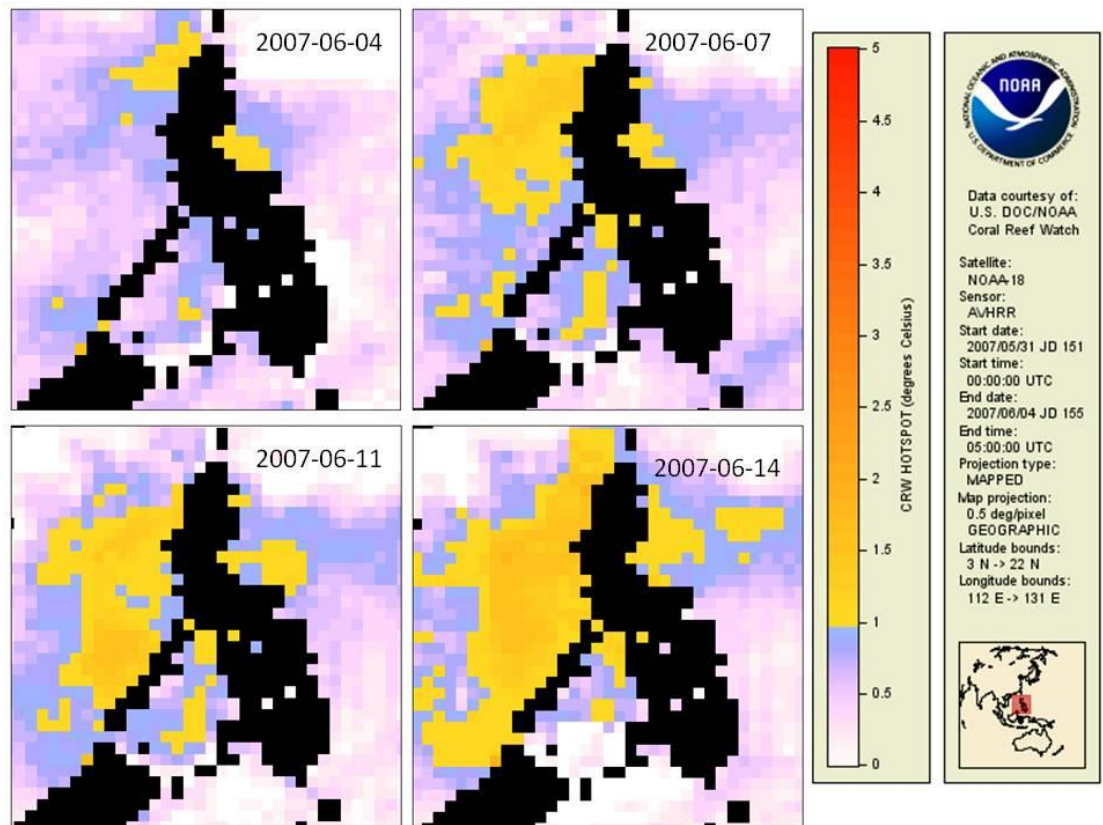
Recommendation 2:

Develop and deploy a multi-sectoral monitoring system

Water Quality Monitoring Teams (WQMTs)

- Nutrients
- Dissolved oxygen
- Plankton
- NOAA CRW hotspot products

- Mariculture operators
- Fishers
- People's Organization



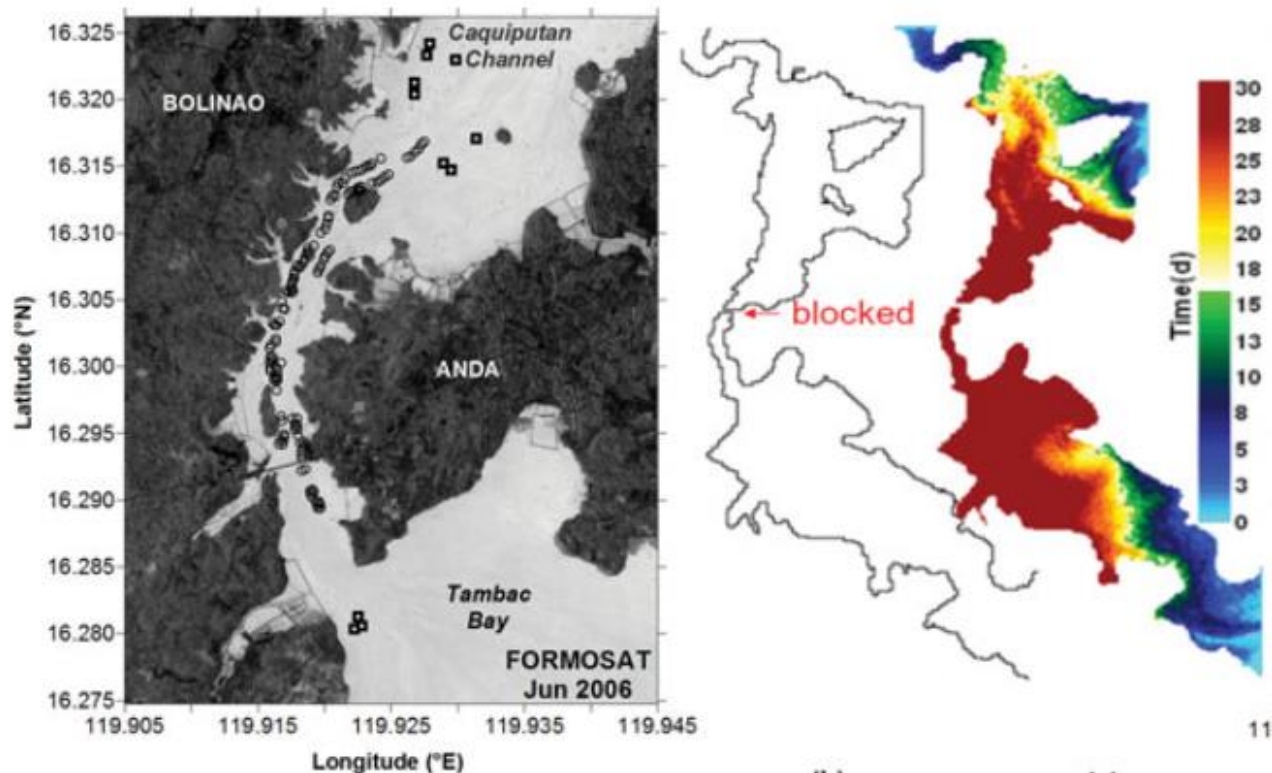


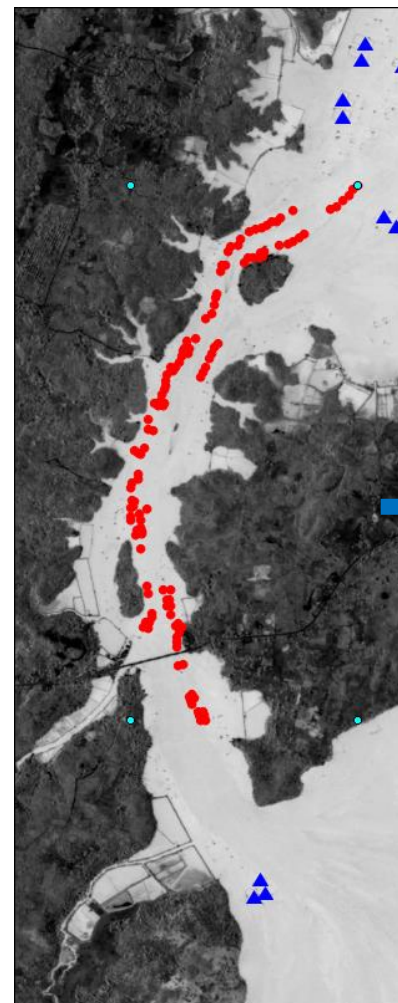
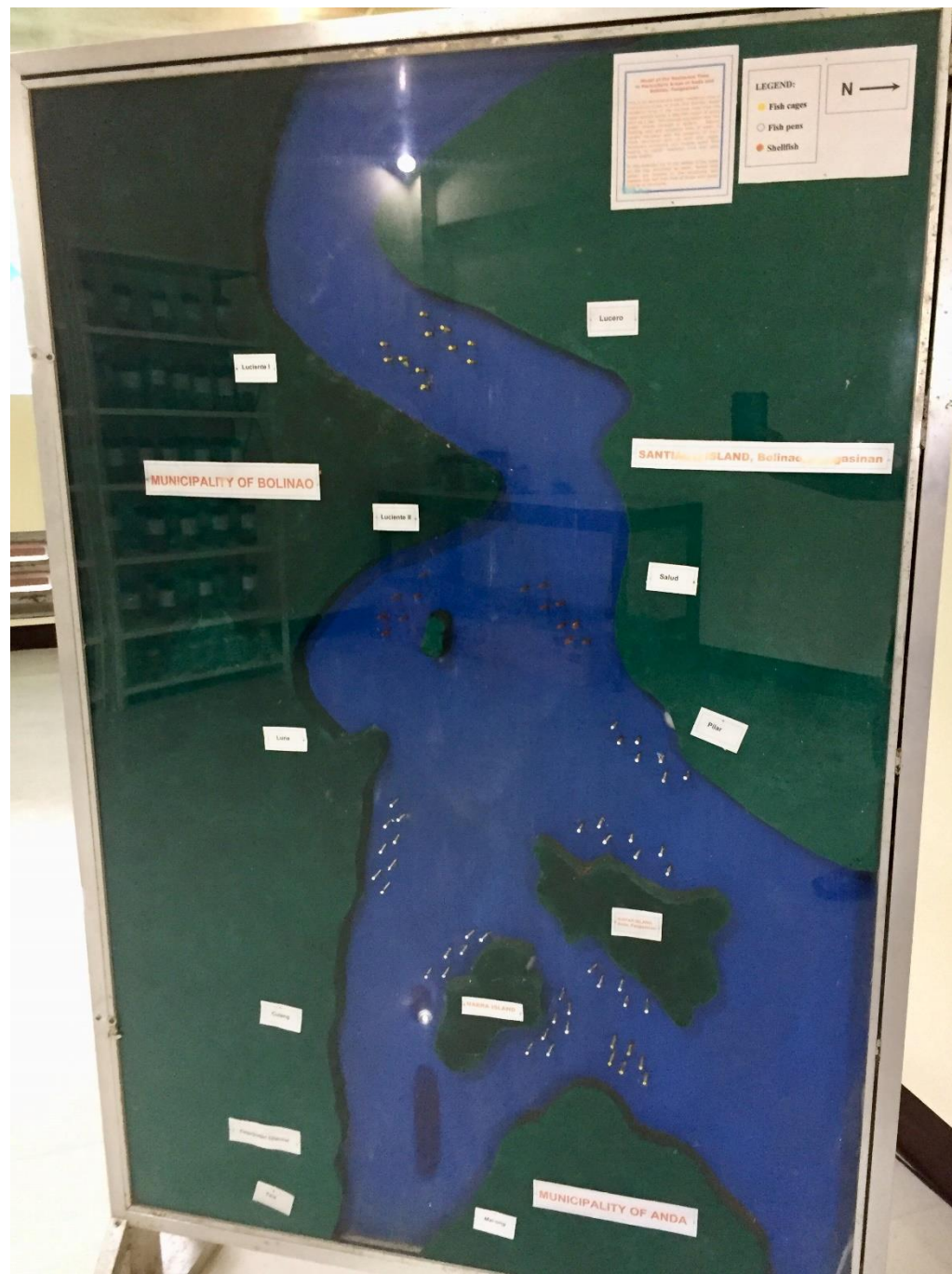
Marine Emergency Response System (MERSys) (Jacinto et al. 2006)

Approaches for sustainable mariculture

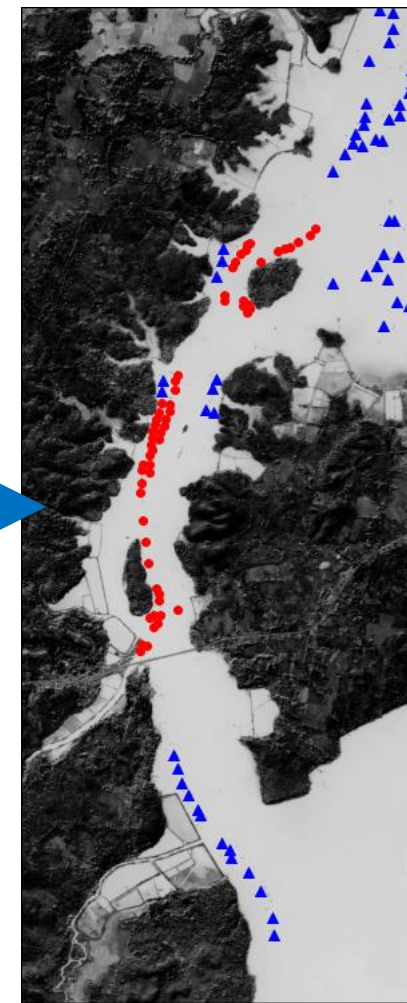
Recommendation 3: Target Caquiputan Channel for mitigation efforts

The Clear Caquiputan Advocacy





2006

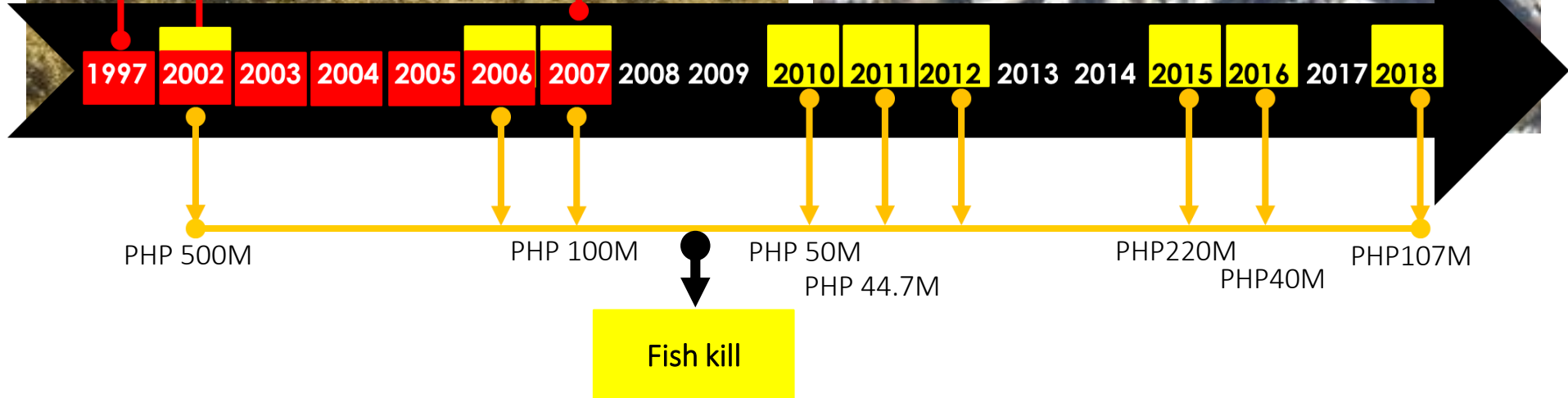


2010

In seeing how the flows were affected, the fishermen themselves suggested on clearing the channel and changing to fish cages instead

Lessons learned

1. Recommendations concentrated on site-specific management interference that would hopefully be acceptable to local stakeholders
2. Local Monitoring essential; Cooperation between concerned LGUs
3. Need for a hands-on demonstration
4. Lessons need to be refreshed frequently
 - influx of migrants
 - short terms of local government officials



2003



2011



2017



	2003	2011	2017
Cages	31	88	108
Pens	84	115	182
Fyke nets	123	170	337
TOTAL	238	373	627

Projects involved

- Community-Based Coastal Resources Management Project-International Development Research Centre [CBCRMP-IDRC]
- Marine Fisheries Resources Management Project [MFRMP]
- Lingayen Gulf Coastal Area Management Commission [LGCAMC]
- Bureau of Fisheries and Aquatic Resources-Fisheries Resource Management Project [BFAR-FRMP]
- Development of Marine Environmental Quality Criteria for mariculture areas (DMEQC)
- Accumulated Sediment Loading in Bolinao, Anda, Bani and Alaminos (ALIBABA),
- Akvaplan-NIVA
- Sagip Lingayen Gulf Project (SLGP)
- Remote Sensing Information for Living Environments and Nationwide Tools for Sentinel Ecosystems in our Archipelagic Seas (ReSILIENT SEAS/ICE CREAM)
- Digital Globe 8-band Research Challenge

Funding

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Thank you very much!
Maraming salamat po!

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