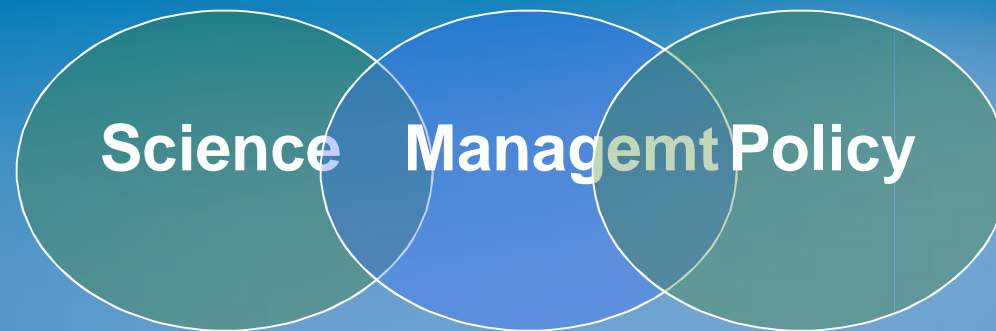


# The Coral Reef Targeted Research & Capacity Building for Management Program

An update to ICRI, January 12, 2010





Improvements in environmental policy to sustain coral reef ecosystems

Increasing emphasis on management relevance and application

Targeted Investigations as a foundation to support management

Phase 1

Phase 2

Phase 3

2004-2009

2010-2014

2015-2020

*Time*





# Proactive vs. Reactive Sequenced collaboration

Knowledge as empowering  
...effectively communicated

- Global Environment Facility & the World Bank
- Three Phases over 15 years
- More than 70 scientists
  - And a network of 50+ students – “Future Leaders”
- Phase 1 examined knowledge gaps under six key themes:
  - Coral Bleaching
  - Disease
  - Connectivity
  - Restoration
  - Remote Sensing
  - Modeling and Decision Support
- Building Capacity through Four Centers of Excellence



## Coral Reef Targeted Research Capacity-Building Centers of Excellence



So what kinds of information have been uncovered?

What have we learned so far?

- Technical (i.e. scientific progress)
- Experiential (or enhancing capacity)

[www.gefcoral.org](http://www.gefcoral.org)



# Science (examples)



- Connectivity
  - Larval durations & dispersal kernels
  - Lobster
  - Heightened Importance of nearshore habitat quality
- Good and Bad Ecological Drivers
  - crucial role of grazers (Belize legislation)
  - new data on the role of MPAs (i.e. they DO protect higher grazer populations in the Caribbean which lead to coral reef benefits)



# Science (examples)

- Disease
  - Global Disease Assessment
  - SML layer – its role in disease (previously unexplored)
  - Microbial connections to nutrient enrichment
  - role of MPAs
  - Has supported ICRI – Disease WG
- Restoration techniques
  - coral nursery technologies
  - direct deployment of coral fragments and of nursery reared corals to degraded reefs in a cost-effective manner
  - issue of scale and restoration potential

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## Coral Reef Restoration Trials in Bolinao, Philippines - Phase 1 CRTR



Before



After

# Science (examples)

- Physiology & Ecology
  - Role of light in coral/algal symbiosis and significance of disturbance to growth and reproduction
  - Populations of endosymbionts and the possibility that they cannot adapt to thermal stress (stresses importance of local management)
  - Reduction in calcification (CO<sub>2</sub> and temperature and CO<sub>2</sub>)
  - Winners and losers in size classes from climate-related events

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# Well positioned in Phase 1 in advance of disturbance events

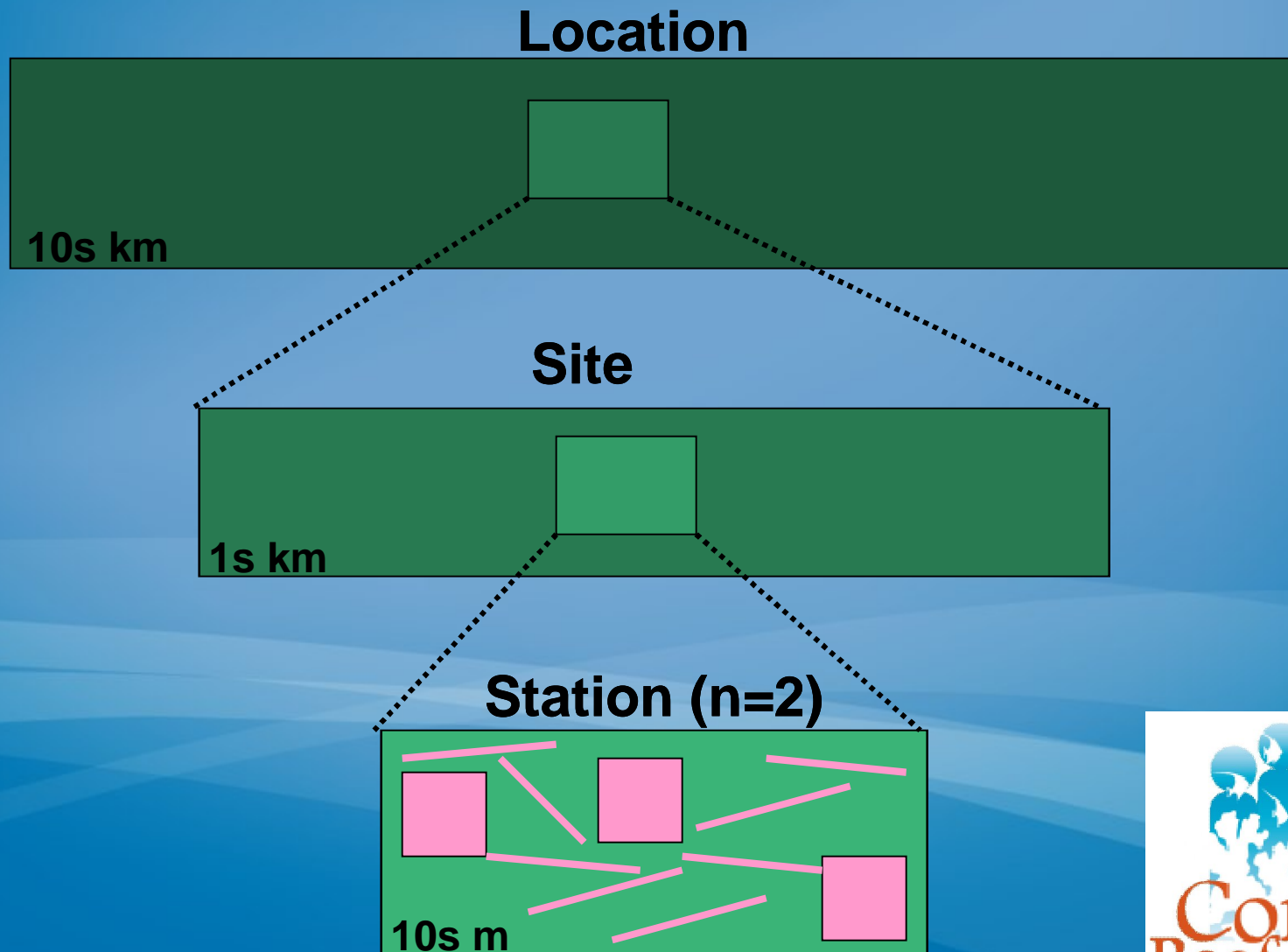
- Hurricanes in the Caribbean
- Tropical Cyclones in the Philippines
- Bleaching Events
  - Caribbean
  - Australia
  - Philippines
- Disease outbreaks
  - Palau
  - Caribbean
- Crown of Thorns Starfish outbreaks
  - Philippines
  - Zanzibar

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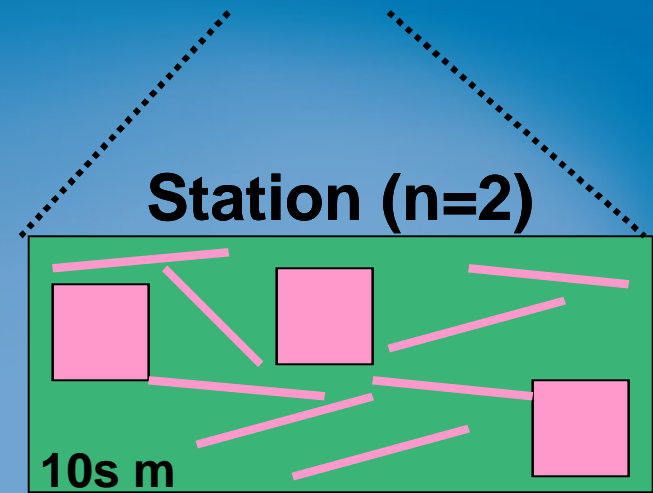
# Hierarchical approach of repeated measures



# Two-tiered approach

- 1) Random belt transects
- 2) Permanent quadrats

- PROCESS variables: coral recruitment, coral growth and mortality rates, rates of herbivory, disease prevalence and rates of progression.
- STATE variables: coral cover, macroalgae cover, coral size frequency.



# Enhancing Capacity

- Spill-over effect – not with MPAs & Fisheries, but with people
- Five generations of researchers – working together
- Future Leaders (December, 2007 & the ICRS)
- Detailed workshops at each of the Centers of Excellence



# Enhancing Capacity

- More than 25 scientific training and capacity enhancing workshops held across all COEs during Phase 1
- More than 390 publications that include refereed journal articles, books and book chapters, and symposium proceedings
- Information products translated for different policy and management audiences
- Local Government Initiative

[www.gefcoral.org](http://www.gefcoral.org)





**Coral Reef**  
Targeted Research &  
Capacity Building for Management

# Center of Excellence: Findings that relate to management & policy

- Mesoamerican Region
  - Coastal defense
  - Coastal Groundwater Quality



# Center of Excellence Findings that relate to management & policy

- Southeast Asia Region
  - The significance of local communities in gaining acceptance of restoration projects and ownership
  - Environmental audits & using CRTR-derived information

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# Linking Science with Management &

## Local Government Initiative

*Environmental Compliance Assessment as an Approach to Improving Coastal Governance* (18 Oct 2007, Alaminos City, Pangasinan)



Atty. Antonio Oposa, Jr. commencing the seminar/workshop



Vice-Mayor Bobby Eamilao of Masinloc (in printed shirt) at mid-level at right



Mayor Nestor Pulido of Anda (extreme right) and Vice-Mayor Hannibal Olores of Bani (extreme left)

# Global Environment Facility, 5<sup>th</sup> Replenishment

- Every four years, contributions by member governments
- Three possible funding options for GEF 5
  - Low, Medium & High Levels (5, 7, or 10 B)
  - IW Component for any of these is likely to be \$500 Million (for all IW programs)
- CRTR Phase 1:
  - \$11 million GEF
  - \$3m World Bank
  - \$2.9 m (\$AUD) University of Queensland



# Key Services provided by coral reefs (both ecosystem & economic)

- Protein (fisheries yield)
- Important repositories of Biodiversity
- Role in Tourism
- Coastal Defense

