Coral Reef Systems and Compensatory Mitigation Strategies in the 21st Century: Watershed Approaches in Pacific.

Cindy S. Barger and Connie L. Ramsey
U.S. Army Corps of Engineers
Honolulu District

October 25, 2007
Pacific Chapter of the Western Dredging Association Fall 2007 Conference

Defining Watershed Approaches

- Baseline inventory of resources.
- Identify the primary “root causes” of coral degradation.
- Identify priority restoration sites and activities.
- Focus mitigation and restoration at priority locations.
- Where possible, co-locate activities for greater potential success.
- Watershed or mega-watershed scale.

Why Watershed Approach for Corals?

- Coral degradation linked to in-water and upland activities:
  - Land based pollution
  - Recreational overuse
  - Invasive species introduction
  - Over-fishing
- Based on 2005 Caribbean Bleaching Event - coral resiliency to catastrophic events improved with large scale protected areas (100 km^2).
- System-based and collaborative approaches encouraged by recent policies.

Economic & Ecological Importance

- **Economic:**
  - For Hawaii, estimate to generate $800 million gross revenue annually.
  - Tourism and Recreation,
  - Fisheries,
  - Coastal Protection,
  - Research and Education, etc.
- **Ecological Importance:**
  - Fish Nurseries,
  - Marine Food Web,
  - Unique Habitat/Special Aquatic Site,
  - Water Quality,
  - Habitat for Protected Species, etc.

Developmental Pressures on Coral Reefs

Island Communities Result in Unavoidable Impacts to Corals:

- **Lost of Habitat from Port Expansion.**
- **Impact to Recovery from Regular Port Maintenance.**
- **Impairment to Recruitment from Sediment & Storm-water Runoff with Urbanization.**
- **Impairment to Recruitment & Recovery from freshwater runoff with Flood Damage Reduction activities.**

Hanalei Bay Reef Wall, 2006

Laws, Regulations and Policies

- Clean Water Act Section 404(b)(1)
  - Avoid and Minimize
  - "Least Damaging Practicable Alternative"
- Corps Regulatory Guidance Letter (RGL) 02-02 on Mitigation
  - "No Net Loss of Aquatic Resources"
  - Focus on Watershed Approach, Functional Assessments and National Research Council Mitigation Guidelines.
- Fish and Wildlife Coordination Act Section 2(b)
  - Corps Planning Projects required to implement FWS approved mitigation where practicable (ER 1105-2-100).
- EO 13089 Coral Reef Protection
  - "No Degradation" of Corals by Federal Actions.
- Endangered Species Act
  - Protection of Listed Coral Species in Caribbean (*Acropora* sp.)

Other Associated Laws, Regulations, Policies for Coral Impact Assessments

- National Environmental Policy Act
- Rivers and Harbors Act
- Marine Mammal Protection Act
- Coastal Zone Management Act
- Magnuson-Stevens Fishery Conservation Management Act (Essential Fish Habitat)
- SIKES Act
- Endangered Species Act
- National Marine Sanctuaries Act
- Oil Pollution Act,
- Coral Reef Conservation Act
- EO 13158 Marine Protected Areas
- EO13112 Invasive Species
- EO 12962 Recreational Fisheries
- National Academy of Science "National Mitigation Action Plan"

Corps Planning Perspective
12 Actions for Change

1. Employ ***integrated, comprehensive and systems-based*** approach.
2. Employ ***risk-based concepts*** in planning, design, construction, operations, and major maintenance.
3. Continuously ***reassess and update*** policy for program development, planning guidance, design and construction standards.
4. Employ dynamic independent review.
5. Employ ***adaptive planning*** and engineering systems.
6. Focus on ***sustainability***.
7. Review and inspect completed works.
8. Assess and modify organizational behavior.
9. Effectively communicate risk.
10. Establish public involvement risk reduction strategies.
11. Manage and enhance technical expertise and professionalism.
12. ***Invest in research***.

Corps Mitigation Perspective Proposed Rule

- Mitigation *location* should be driven by assessment of *Watershed needs*.
- Mitigation *objectives* should address *watershed needs*.
- *Measurable & enforceable performance standards* needed to show success.
- Regular *monitoring* to confirm success achieved.
- Mitigation needs to be based on *aquatic ecosystem science*.
- *Science-based assessment procedures* needed to evaluate extent of potential impact and success of compensation measures.
- *Promote* the use of existing *mitigation banks*.
- More predictable process for establishing *new mitigation banks*.

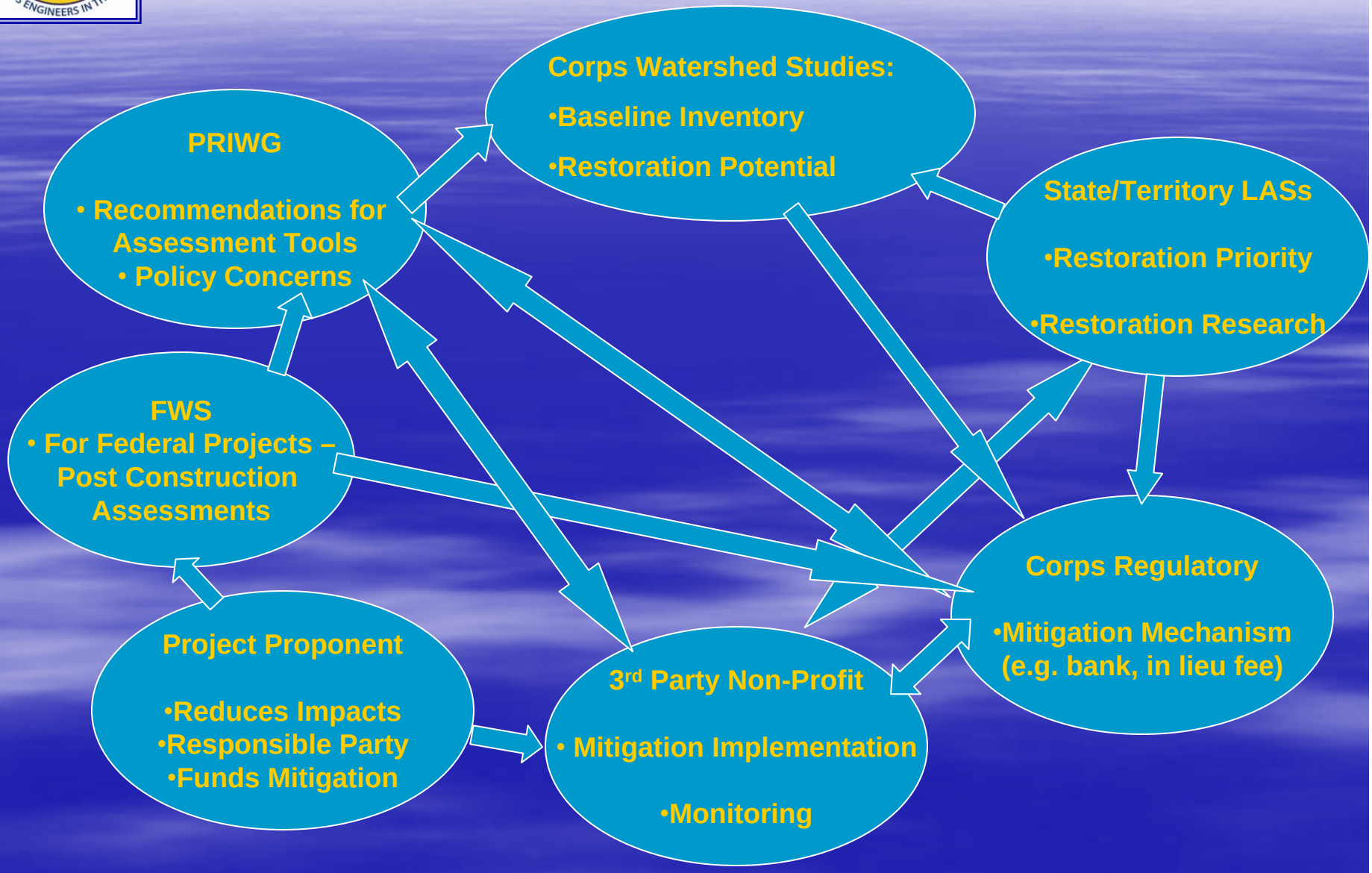
Constraints/Difficulties of Coral Reef Mitigation in the Pacific

- Understanding Extent of Impacts. Limited data to:
  - Quantify extent and duration of sediment impacts.
  - Quantify duration of temporary disturbances (e.g. anchor drag)
  - Quantify benefits of in-water structures (e.g. jetties/piling)
- Identifying Mitigation
  - Limited success with coral transplantation in the Pacific. (species, size, type, and tolerance dependent).
  - Limited availability of appropriately sized on-site orphaned sites.
  - Limited information on alternative technologies.
- Ensuring Success
  - Measuring success limited by slow coral growth & understanding external influences.
  - Site protection limited by public aversion to Marine Protected Areas (MPAs) .

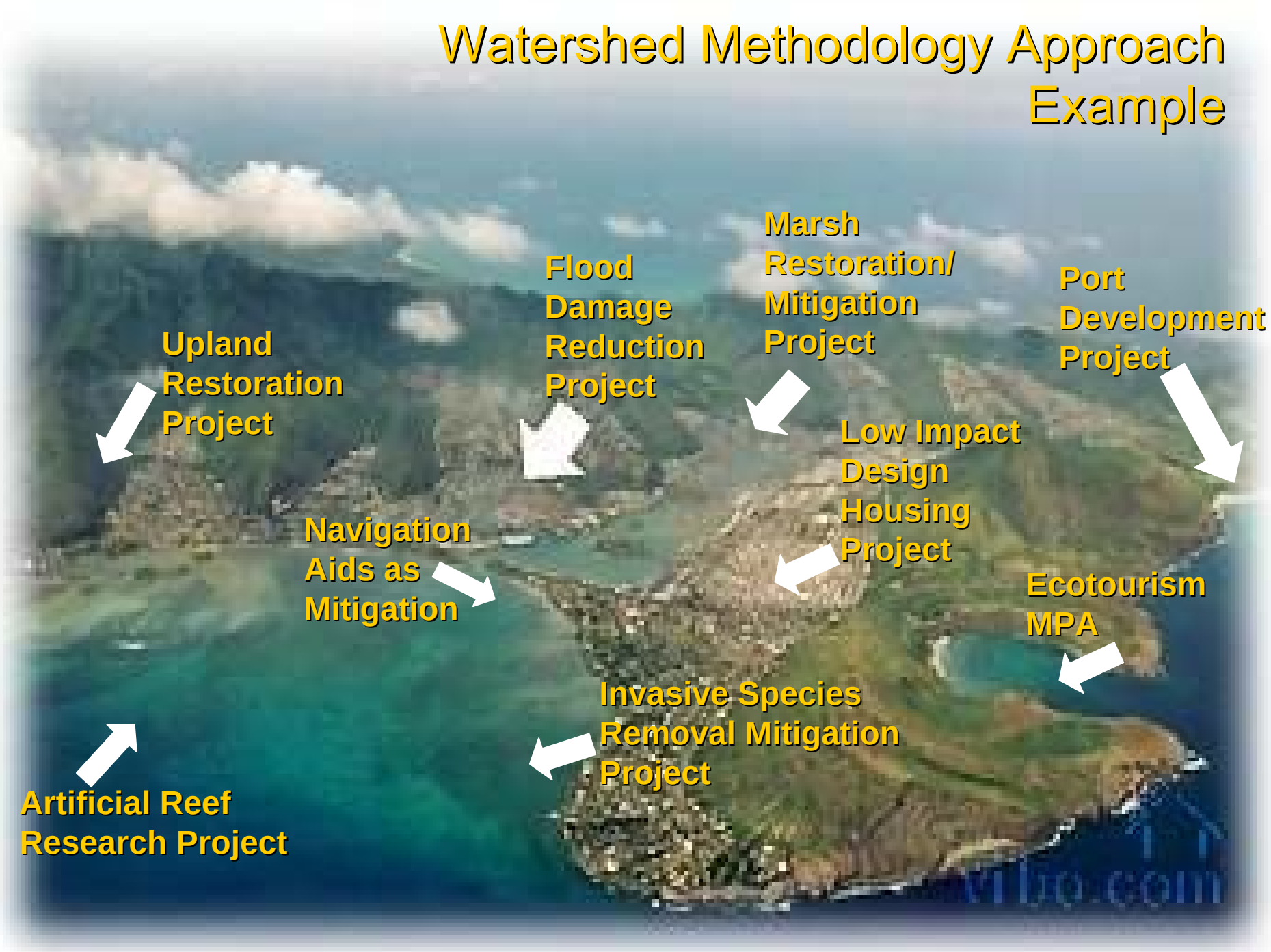
Opportunities in Coral Reef Mitigation in Pacific

- **Pacific Region Interagency Working Group for Coral Reef Mitigation (PRIWG)**
  - Collaborative discussion forum Federal, State and Territorial Agencies.
- **State & Territory Local Action Strategies (LAS) for Threats to Coral Reefs**
  - Locally-drive collaborative & cooperation process.
  - Partners: government, academia, non-profit, donors and private sector/industry.
  - Organized by threat
    - Land based pollution, fisheries, invasive species, recreation, lack of awareness.
  - Components in the LAS
    - Scientific research & monitoring.
    - Site specific actions & BMPS.
    - Education and outreach.
- **FWS Impact Assessments using Habitat Equivalency Analysis (HEA).**
  - Constraint of HEA is that it is only a comparative tool vs. an assessment tool.
- **Utilizing models & lessons learned from other regions & habitats.**

Watershed Methodology Programmatic Approach



Watershed Methodology Approach Example



Issues for Watershed Approach

- Out-of-Kind Mitigation Opportunities may be limited by:
  - Relational Ecological Function.
  - Regulatory Requirements.
- Off-Site Mitigation Opportunities may be limited by:
  - Existing and Future Land-use.
  - Jurisdiction and land ownership.
- Potential Risks of Failure:
  - Unique functions or values lost on-site that can't be recaptured off-site.
  - Lack of precedence - testing new methodologies.
  - Shifting Baselines - Separating mitigation action from outside influences.
  - Identifying realistic and measurable performance criteria within policy timelines (average 10 years).

Summary

- **Watershed approach provides opportunity to address primary threats to coral degradation.**

- **However, it presents difficulties in**:
  - Defining “watershed” for coral reefs.
  - Linking out-of-kind mitigation goals and successes with the lost coral functions and values.
  - Staying within Corps Regulatory and Planning Authorities.
  - Accommodating present and future land-use patterns.
  - Ensuring benefits in perpetuity.
  - Linking monitoring successes to policy and science.

- **Lessons learned from other disciplines, policies, programs, and resources are helping move us forward.**

- **Interagency coordination and cooperation is essential**.

Acknowledgements

- Mahalo Nui Loa:
  - The Pacific Region Interagency Working Group on Coral Reef Mitigation.
    - FWS, NOAA, EPA, Navy, State of Hawaii, and Government of Guam.
  - US Army Corps of Engineers, Honolulu District
  - Dr. Bob Richmond, University of Hawaii at Manoa
  - Dr. Kathy Chaston, State of Hawaii, Division of Aquatic Resources
  - Terri Jordan & Penny Cutt, US Army Corps of Engineers, Jacksonville District
  - Russ Kaiser, US Army Corps Regulatory HQ
  - Thom Lichte, US Army Corps, Pacific Ocean Division
  - Mike Lee, US Army Corps of Engineers, Institute of Water Resources

- For more information, contact:
  - Cindy S. Barger, US Army Corps of Engineers, Honolulu District
    (808) 438-8521, e-mail: Cindy.S.Barger@usace.army.mil