HCRI Project Final Report Format

I. Project Title: Watershed Impacts on Maunalua Bay
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II. Executive Summary
   A brief summary of the project.

   On Oahu, Maunalua Bay extends from Diamond Head to Hawaii Kai, and is an important area for marine recreation and ocean activities. The historical changes both on land (within the nine defined sub-watersheds) and in the coastal ocean have been documented, and provide a basis for examining the impacts of urbanization, changes in use patterns, coastal pollution, eutrophication, sedimentation, affects of introduced species and resource exploitation. A range of stakeholders including local businesses, fishers, home owners, canoe paddlers and boaters have joined together to address coral reef health declines, and have requested support from the research community in determining options for mitigation and recovery. Management and policy initiatives to reverse the present trend of coral reef decline in Maunalua Bay depend on the availability and application of sound scientific data. Community/stakeholder engagement and outreach are also needed to support effective policy development and cooperation for the implementation of appropriate actions. HCRI is providing support for this effort through targeted projects that are integrated to achieve overall goals and objectives developed among the participating parties. During the first year of this program, presently underway, data are being collected which need to be synthesized, reviewed and augmented in several areas including the quantity of freshwater discharges, the main classes of pollutants, the residence time of runoff, and the gradients of biological responses to stressors.

III. Purpose
   A. Detailed description of the resource management problem(s) to be addressed.

   Maunalua Bay receives discharges from 9 sub-watersheds, including large quantities of terrigenous sediment and a variety of pollutants. Reductions in water and substratum quality have resulted in the loss of coastal resources, including fishes and corals. The channelization of streams and other human activities within the adjacent watersheds have resulted in extensive habitat degradation and loss.

   B. Detailed description of the question(s) asked to answer the resource management problem(s)

   1) Identifying the primary sources of sediments and pollutants within the watersheds feeding into the bay, and the conduits of transport of these materials and substances.
2) Quantifying gradients of anthropogenic stress from the shore outwards and from the more heavily urbanized watersheds to those less impacted by development.
3) The residence time and flushing rates of sediments and pollutants.
4) The distribution and abundance of fishes, corals, invertebrates, and algae in the bay, including impacts of introduced species, particularly algae, on recruitment patterns of invertebrates and fish.
5) Presence and classes of stressors and pollutants present and overall water quality parameters.
6) Present use patterns and options for marine zoning and marine managed areas to support resource recovery and prevent user conflicts.
7) Community perceptions and aspirations for the area.
8) Mitigation options and alternatives. Along with their relative costs.

C. Overarching goal(s) of the project

To provide research support to the Maunalua community in developing scientifically based management and policy options for addressing the decline of coastal coral reefs and related resources.

D. Hypothesis (if application) and objectives to answer each question.

IV. Approach
Detailed description of the work performed for each objective from III(C), including (but not limited to):

A. list individuals and organizations actually performing the work

Kewalo Marine Laboratory
Malama Maunalua
NOAA Pacific Islands Regional Office
The Nature Conservancy

B. material list

YSI data-logging multi-parameter (salinity, turbidity, pH, depth) meters
Acoustic Doppler current profiler (current meter)

C. construction instructions for anything used to accomplish the III(C) objectives

D. deployment steps

All of the permits (4) have been obtained, the equipment has been programmed and prepared, and we anticipate deployment by late June.

E. data collection procedures
Data from the YSI probes and current meters will be downloaded to our computers monthly, and the data sets will be analyzed as they are available. All data are backed up on portable hard drives, and one is maintained at an “off campus” site.

F. data analysis techniques

We use the proprietary software provided by the manufacturers for both instruments. The data are then entered into our mathematical models (HOME model).

G. photos from research during each stage (construction, in situ, lab)

H. contact information for companies used to purchase items unique to your project (if applicable)

NOTE: If a progress report, describe work performed to date for each objective, then describe work to be performed for the remaining project period.

V. Results

Maunalua Bay Accomplishments:

- We held three meetings with the participation of appropriate local and federal agencies (DLNR/DAR, NOAA/NMFS, USFWS, USGS), UH Researchers (Kewalo Marine Lab, Botany, Zoology, Oceanography) and stakeholder groups (Malama Maunalua, TNC, Malama Hawaii) to define key goals and objectives, roles and responsibilities, timelines, deliverables, knowledge base, available resources (human, financial and institutional) and targeted outcomes.
- The required equipment for the study (current meters, sediment probes) was purchased and has arrived. We are presently performing the final checks and expect to deploy the items into Maunalua Bay starting the week of June 17th.
- We (researchers, agency representatives and community members) have gone into the two targeted sub-watersheds (Kuli‘ou’ou and Wailupe) to identify the land-based sites for data collection and the location of the in-stream gauging stations, as well as gone into the Maunalua Bay to identify sites for the first deployment of the marine sensors.
- Water and sediment samples have been analysed for key contaminants, heavy metals and gradients of toxicants at several locations along the bay.
- The hui (P.I., agency representatives and community groups) have been dialoging with the Army Corps of Engineers regarding their role and options for their consideration in addressing runoff impacts and how best to collaborate.
- A community meeting was held to gather input from stakeholders and to engage them in the project elements.
VI. **Dissemination of Project results:**

Explain, in detail, how the projects results have been, and will be, disseminated.

A. **New fundamental or applied knowledge**

The community and partnering agencies are provided with data and interpretations at regular intervals. We meet as a group monthly, and presentations will continued to be made at community meetings. When the study is completed, we will move on to publication in the peer-reviewed literature.

B. **Scientific publications**

We will be submitting to Estuarine and Coastal Shelf Science and Marine Biology, as in the past.

C. **Patents**

None

D. **New methods and technology**

None.

E. **New or advanced tools (e.g. models, biomarkers)**

We are continuing to refine the HOME model for use in understanding the effects of watershed discharges over gradients of distance. The biomarker work is proposed for Year 2, if additional funds are available.

F. **Workshops**

We will be participating and presenting at a 1 day workshop as part of the Hawaii Conservation Conference on August 1, 2008.

G. **Presentations**

We have already held 3 community presentations in Maunalua, and these will continue at intervals for the duration of the project. The attendance was 65 individuals (including federal, city and state agency representatives).

H. **Outreach activities/products (e.g. website, newsletter articles)**

Our findings are provided to Malama Maunalua, which produces quarterly newsletters and maintains a website.

I. **Partnerships established with agencies or organizations**
VII. **Resource Management Implications**

A. Given the results from VI, what are the implications for resource managers?

Once the data are collected, analyzed and the model for the Bay developed, we will have the baseline needed to develop mitigation options and be able to measure their effectiveness over time.

B. How do these implications and results help to address the resource management problem(s) identified in III(A)?

The baseline data are essential to the development of recommendations and determining if any mitigation measures are working.

C. What recommendations for resource managers can be made based on the implications and results?

We will know the distribution patterns for the runoff and sediment plumes, then be able to perform the biological monitoring to integrate with the physical stressor data.

D. Management outcomes - Societal condition improved due to management action resulting from output; examples:

The goal is to provide the community with scientifically based management options, and then work with them to develop appropriate policy recommendations and implementation plans. Future research will be able to determine the effectiveness in improving habitat quality (water and substratum), which are now degraded. Such improvements are the precursor to resource recovery.