Responding to Climate Change:
A Workshop for Coral Reef Managers

Proceedings of the Workshop:
September 2-5, 2008
Hawai‘i Institute of Marine Biology
Kāne‘ohe Bay, Hawai‘i
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EXECUTIVE SUMMARY

On September 2-5, 2008 Responding to Climate Change: A Workshop for Coral Reef Managers brought together 44 coral biologists, marine managers and educators from across the Pacific, including Palau, Pohnpei, American Samoa, Western Samoa, Aotearoa (New Zealand), and Hawai‘i. The four-day experiential workshop focused on monitoring coral reefs and their response to the impacts of climate change, adaptive management strategies to address the impacts of climate change, and the components of a bleaching response plan. This was the first in its series of workshops to include indigenous knowledge\(^1\) and local perspectives alongside contemporary scientific approaches. NOAA’s Coral Reef Conservation Program and the Office of National Marine Sanctuaries through the Papahānaumokuākea Marine National Monument worked with the Hawai‘i Institute of Marine Biology (HIMB) to co-host the workshop at Kāne‘ohe Bay’s Moku o Lo‘e (Coconut Island). This venue allowed participants to seamlessly move from the classroom to the ocean to conduct hands-on activities in Hawai‘i’s largest barrier reef.

These workshops have stemmed from a large international effort and partnerships to bring together marine resource managers, coral reef scientists, cultural practitioners and other interested stakeholders to expand the current knowledge-base of climate change. The workshop curriculum provides participants with the latest tools and information pertinent to coral bleaching and ocean acidification, as well as a range of topics, including: assessment of ecological impacts, coral resilience, identifying coral bleaching, and the predicting of coral bleaching events. Additionally, every participant contributed to the development of a local coral bleaching response plan as a workshop output.

The Hawai‘i workshop was a refinement to a series of workshops that have been offered in Australia and American Samoa in 2007, and the Florida Keys in early 2008, but it was unique in the sense that it focused primarily on Pacific reefs and integrated multiple knowledge systems in concert with contemporary science and management as a key strategy for developing a coral bleaching response plan. Special presentations were provided by indigenous researchers from the National Institute of Water and Atmosphere in New Zealand, who offered examples of traditional Maori models for tracking and measurement of climate change. HIMB and NOAA scientists also presented current research and initiatives, including partnerships with local community members and cultural practitioners to monitor and assess the health of Hawai‘i’s coral reefs and to obtain data using multiple knowledge systems.

Participants went home with a suite of tools to help merge traditional knowledge and contemporary scientific methodologies, along with an outline of key subject areas and needs for developing successful, comprehensive coral bleaching response plans. Real life comparisons were made between Hawai‘i and places from across the Pacific, yielding a baseline of commonalities faced by Pacific Nations related to climate change. Finally, a strengthened Pacific identity was forged through the use of traditional and scientific knowledge as a foundation to provide solutions to a global challenge. Evaluative comments were mostly positive and constructive in nature. Many requested that the workshop be the first in a series to address

\(^{1}\) Indigenous knowledge is information rooted in culture that has been passed down to many generations. It is often also referred to as traditional knowledge.
climate change issues in the Pacific. Other comments provided feedback on ways to improve the workshop, which will be highly considered and valuable in future workshops.

**BACKGROUND**

In 2006, with contributions from multiple partners, Paul Marshall of the Great Barrier Reef Marine Park Authority (GBRMPA) and Heidi Schuttenberg of National Oceanic and Atmospheric Administration (NOAA) released a guidebook entitled *A Reef Managers Guide to Coral Bleaching*. This guidebook became the framework for the *Responding to Climate Change: A Workshop for Coral Reef Managers* curriculum that was developed through a partnership between NOAA, The Nature Conservancy and GBRMPA. The NOAA Coral Reef Conservation Program and NOAA Coral Reef Watch have taken the initiative to conduct this workshop throughout the world introducing participants to the *Reef Managers Guide* and promoting its use. Their vision is to carry out this workshop in order to see a global network in which managers, scientists, and community members are able to test and refine ideas, have a resilient management community, and see our reefs cope with the impacts of climate change.

Workshop participants discuss the implications of climate change for coral reef ecosystems and the practical steps reef managers can undertake to build resiliency and reduce the impacts of this threat. They investigate how the concept of reef resilience can be incorporated into a manager’s daily work of designing protected areas and assessing the health of coral reefs. The curriculum provides managers with a framework and process to develop a bleaching response plan specific to their own region. Participants are presented with satellite based tools to predict mass coral bleaching, and techniques to rapidly assess the ecological and socioeconomic impacts of a bleaching event. Additionally, managers participate in a field activity to evaluate and discuss characteristics of two coral reefs, score them using qualitative measures of 26 resilience factors, and document ways in which reef resilience variables could be qualitatively and systematically recorded and used to inform management decisions.

Since this workshop began in Australia, two others have taken place in American Samoa in 2007 and the Florida Keys in March 2008. These workshops have provided reef managers with consistent tools and techniques in marine protected area (MPA) decision making, implementation and assessment. It also assists in cross-site and seascape-scale analyses amongst MPA’s worldwide informing national, regional and international processes on MPA development. Hawai‘i was the site chosen to host the fourth in its series of workshops. The next workshops are anticipated to occur in Bonaire and Guam in 2009.
Our Sea of Islands:

Resource managers are becoming increasingly aware of the importance of incorporating traditional knowledge into current management efforts. In Hawai‘i, efforts are underway to learn more about and support the perpetuation of traditional marine knowledge and customary marine management practices. The *Responding to Climate Change: A Workshop for Coral Reef Managers* was one of the first workshops following the Our Sea of Islands forum to include traditional knowledge perspectives alongside contemporary scientific approaches to monitoring and responding to climate change. This workshop supports the call for action to build local capacity within communities in the Pacific, to integrate local indigenous knowledge in all aspects of marine area management, and to strengthen strategic alliances and collaborations to build support for marine managed areas.

The purpose of the Forum was to highlight current efforts to protect important marine areas in Oceania, to share and expand technical expertise, and to develop balanced management practices by incorporating science and customary marine management techniques. Additionally, the forum was an opportunity to build upon established marine managed area networks across Oceania and collaborate with these ongoing efforts. As a part of the six-day event, a communiqué was developed that summarizes forum outcomes and recommendations for actions needed to further marine protection across the region. Through discussions facilitated at the forum, participants affirmed that traditional knowledge and management practices are integral to the maintenance, development and management of Marine Protected Areas throughout Oceania.

The Papahānaumokuākea Marine National Monument recognizes the significant role traditional knowledge plays in the protection of Hawaiian marine resources. Therefore, Monument staff worked with NOAA Coral Reef Watch, the NOAA Coral Reef Conservation Program, and the Hawaii Institute of Marine Biology to integrate traditional knowledge into nearly every aspect of the *Responding to Climate Change* workshop. Evaluation survey results showed that 90% of participants found traditional knowledge useful and would help them with their jobs. This strategy was well received by many and is now a great learning tool for evaluating the effectiveness of incorporating traditional knowledge into Monument programs.
ACKNOWLEDGEMENTS

Workshop Planning Committee
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The workshop planning committee, instructors and staff would also like to thank and acknowledge Ms. Leeann Choy of Pacific Rim Concepts for her outstanding logistical support and Ms. Heidi Guth from the Office of Hawaiian Affairs for providing additional funding support.
WORKSHOP FORMAT

Workshop instruction was delivered through lectures, power-points, hands-on activities, focus group discussions and field exercises. Participants added lively discussion from their personal experience which enhanced the value of the workshop, and also provided several additions that have been incorporated into future workshop curriculum. Instructors from a variety backgrounds and regions were utilized to share the latest information on coral reefs and climate change in the hopes of facilitating coral reef managers to put into practice the tools available in the reference guide, and incorporate additional tools specific to managing their region. Workshop material can be found online at http://coralreefwatch.noaa.gov/satellite/education/workshop/

Participants received a workbook that included all of the presentation slides as well as two CDs with all the presentations and resources that were used throughout the workshop and a comprehensive Hawai‘i and Pacific annotated bibliography. This annotated bibliography summarized efforts in the marine field and was comprised of six major parts: temperature, corals and coral bleaching, reef restoration, ocean acidification, modeling reef response to climate change, invasive species, and disease and immunocompetence. The cited research papers, reports, PowerPoint presentations, models and other references were provided in both word document and pdf format to all workshop participants.

INTRODUCTION & WELCOMING REMARKS

The Responding to Climate Change workshop formally began with Hawaiian protocol led by Ms. Mahina Duarte of the Papahānaumokuākea Marine National Monument. A participant from each of the Pacific regions represented performed a chant or calling to ask permission to enter the Hawaiian community and learn with one another. HIMB staff expressed that the cultural protocol was a strong opening that resonated throughout the workshop.

Following cultural protocol and welcoming remarks, participants and staff gathered in an open circle outside the classroom to formally introduce themselves and share with the group their goals and expectations for the workshop. The following is a list of the goals and expectations workshop participants expressed during the exercise. By the end of the four day workshop, most participants felt that these goals had been met and even exceeded.

- Build on both traditional and western knowledge systems, develop better relationships amongst local practitioners, scientists and managers, and utilize both knowledge systems in marine and other environmental conservation efforts
- Build climate change awareness throughout the Pacific
- Build a better understanding of new approaches to marine management and adaptation to our ever changing environment
- Build both resiliency and resistance into marine management

2 For purposes of this workshop, those additional tools were mainly traditional or cultural tools. Future workshops may customize this workshop curriculum to adapt and incorporate their own tools.
• Build on Hawai‘i’s existing Rapid Response Plan, expand our response plan to neighboring islands, and develop Response Plans for each Pacific region
• Learn the importance of climate change and take this information into our Pacific-wide communities
• Rekindle and build relationships amongst each other
• Expand our knowledge on climate change issues (i.e., ocean acidification)
• Learn what to do about climate change in the South Pacific where it’s affects are strongly felt
• Better understand our connections to the reefs and oceans
• Help our neighboring communities in developing management plans
• Learn to be better stewards in our marine environments
• Facilitate and bring knowledge and information to our elected officials
• Build awareness of coral reefs and support the IYOR campaign
• Build effective communication strategies
• Bring this knowledge into classrooms
• Adjust attitudes in reef and other resource management arenas
• Integrate western and traditional human dimensions
• Learn about Social-monitoring and its impacts
• Build on Socio-economic dimensions to inform policy makers
• Understand how to better work with the South Pacific territories
• Build community support in managing coral reefs
• Promote participatory research
• Build partnerships, share developments in science, and build on spiritual connections
• Learn to appreciate coral reefs and what they can do for us
• Build on this experience to develop future workshops, partnerships and management plans
• Establish next steps on what to do to protect our reefs
• Gain respect for culture and community

Additionally, participants and staff were asked to share their connections to coral reefs in order to better understand why this is an important issue for each person in attendance. Whether it was job-related or related to family values, education, and culture, it was apparent that each shared a deep personal connection and reverence for coral reef ecosystems and that protection of these resources was critical. Coral reefs sustain life throughout the Pacific islands. They are an integral part of the land and sea connection, and without it, an enormous aspect of culture and lifestyle will be lost and this is in part what drives our need to find ways to protect this valuable resource. This open-circle activity allowed participants and staff a chance to see how this connection to the reef, also formed a connection to one another, and emphasized that although they are all from different backgrounds, or have different methods of management or scientific/cultural practices, everyone was there to accomplish the same goal.
Tuesday September 2nd, 2008

Module 1: Coral Bleaching and Climate Change: Causes, Consequences and a Framework for Responding

This section was aimed to provide a general background of mass coral bleaching and climate change threats to reefs and communities that depend on them. Dr. C. Mark Eakin of NOAA Coral Reef Watch provided participants with the workshop vision and framework, the causes of climate change, management interventions and the consequences of climate change and mass coral bleaching on Pacific Island communities and lifestyles.

Dr. Greta Aeby from the Hawai‘i Institute of Marine Biology introduced participants to the bleaching response plan framework and Hawai‘i’s efforts to develop its own bleaching response plan. This was presented early in the workshop so that participants better understood their end goal and the components they would need to develop their own draft bleaching response plan as the workshop progressed. More information regarding Hawai‘i’s bleaching response plan can be obtained by contacting either greta@hawaii.edu or melanier@hawaii.edu

Ms. Mehana Hind from the University of Hawai‘i Hawaiian Studies Program spoke to participants about the importance of coral reefs in Hawaiian culture according to the Kumulipo (An ancient Hawaiian creation chant), and how everything in the universe emerged from the coral polyp. The idea of incorporating traditional and local knowledge into a management framework was introduced by Ms. Mahina Duarte. By incorporating both contemporary and traditional knowledge systems into the workshop, the curriculum provided a sound framework that managers can use to develop response strategies for coping with climate change.

Module 2: Predicting Mass Coral Bleaching

This section provided participants with tools to estimate the risk of coral bleaching based on regional and local forecasted and observed conditions and satellite sea temperatures. These tools allow managers to be the source of timely and credible information about bleaching risk for decision makers, stakeholders, and the media. Important information on impact assessment and management responses was also presented. Ms. Britt Parker of NOAA Coral Reef Watch presented a series of products based on satellite sea surface temperature which are updated twice-weekly and were specifically developed to target areas at risk for coral bleaching. Dr. C. Mark Eakin also discussed a new outlook tool which forecasts the risk of bleaching over the bleaching season.
For more information on how scientists use remote sensing and satellites to predict coral bleaching, visit: http://coralreefwatch.noaa.gov/satellite/education/tutorial/welcome.html

For NOAA Coral Reef Watch Products: http://coralreefwatch.noaa.gov/satellite/

To receive email satellite bleaching alerts for 190 “virtual stations” around the world, visit: http://coralreefwatch.noaa.gov/satellite or email coralreefwatch@noaa.gov

Bleaching weather, or the conditions that result in bleaching, was a main topic of discussion. Major characteristics identified in bleaching weather can include lack of clouds, little to no wind, and weak currents. Upon examining those physical processes, participants were able to look at how they could predict spatial patterns in temperature and thermal stress, and to see how they could use those predictions for coral reef management. Knowing the physical factors influencing the spatial patterns and being able to predict them is useful to incorporate into a reef management plan.

**Wednesday September 3rd, 2008**

During a sunrise activity on Wednesday morning, participants learned about other tools to observe their environment including techniques used in traditional weather predictions. For many generations, Hawaiians were able to voyage, farm, and fish successfully by predicting and understanding short-term, long-term and seasonal changes. By understanding these changes, they were better stewards and managers of the islands natural resources. It provided them with important information needed to assess and respond to the weather. To demonstrate this skill, Ms. Mahina Duarte led a sunrise activity to show participants how cultural practitioners predict weather and elaborated on how to use this skill to help resource managers better assess and predict coral bleaching events. She explained that cultural practitioners are also able to predict weather through long-term cloud formations, wind speed, or several other natural elements that contribute to coral bleaching events. By understanding these concepts, scientists and managers can be more successful to designing management plans that protect natural resources.

**Module 3: Assessing the Ecological Impacts of Mass Coral Bleaching and Identifying Resilient Areas**

The intent of this module was to lay the groundwork for initial response to a mass coral bleaching event. Dr. Jean Kenyon of NOAA Coral Reef Ecosystems Division introduced methods to rapidly assess the extent and severity of coral bleaching in order to make timely and effective management decisions and communicate the situation to communities, stakeholders,
managers, government departments and the media. Participants were introduced to characteristics of bleaching and techniques to postulate causes of coral mortality in order to distinguish between bleaching and other causes of death in coral. Participants learned skills necessary to assess the impacts of bleaching on coral communities and ecosystem processes.

Prior to an in-depth presentation on identifying coral bleaching, Dr. Paul Jokiel of the Hawai‘i Institute of Marine Biology led a “Teaching Bleaching” activity to help participants visually recognize bleaching. Various examples of coral stressors were presented and observers were asked to identify the problem. This helped them distinguish between bleaching and other coral stressors such as tissue loss, fish feeding scars, coral-algal interactions, sediment stress, freshwater kill, and disease.

Dr. Paul Jokiel then provided his expertise on identifying bleaching thresholds to aid in recognizing how the impacts of climate change will likely affect coral reefs. He presented details and supporting evidence to allow better predictions and understanding of bleaching events. Data from field studies and manipulative experiments on thermal limits for corals were shown along with research findings on regional variation and geographic differences in thermal tolerances. This led to a summary of techniques for assessing bleaching including the special considerations that apply specifically to bleaching as compared to other types of monitoring. Appropriate statistical design, objectives, resources and expertise were emphasized. The Florida Reef Resilience Program’s (FRRP) field methodology, disturbance response monitoring, and follow-up surveys were used as a valuable example. Other local and international survey protocols were also briefly described. A case study from the Great Barrier Reef Marine Park Authority highlighted the importance of early warning, first observations, broad-scale and detailed surveys, and communication in the development of a bleaching response plan.

Familiarity with factors that confer ecological resilience are key to understanding areas susceptibility to bleaching events. Participants were provided with information on the Reef Resilience toolkit, designed by The Nature Conservancy, to help answer questions on resiliency factors: cooling, shading, screening, and stress tolerance, and also helpful for identifying resilient areas. The Reef Resilience toolkit can be found at http://www.reefresilience.org/home.html. Another good source of information, The Hansen, Hoffman, and Biringers Users Manual to Building Resilience and Resistance to Climate Change and Natural Systems, can be found online at: http://assets.panda.org/downloads/buyingtime_unfe.pdf

The day concluded with participants and staff taking part in a field activity snorkeling over two reef sites in Kāne‘ohe Bay. The selections of these sites was based on their proximity to Moku o Lo‘e (Coconut Island) and differences in the range of resiliency of each of the sites. All participants were encouraged to assess and score aspects of the two coral reefs using qualitative measures of 26 resilience factors. Scores were later discussed, compared, and evaluated.
KHNL, a local news station, covered this field activity as part of its *Earth and Sea Project*. The *Earth and Sea Project: Going Green in Hawai‘i* is a year-long series of environmental reports that focuses on environmental protection and preservation of Hawai‘i’s natural resources. To date, approximately 150 stories have been produced through this ongoing series, including everything from coral preservation, to shipwreck features in the Northwestern Hawaiian Islands, “green” surfboards, a new environmentally-friendly dorm at the University of Hawai‘i – Mānoa, beach clean-ups, marine mammal features, whale photo contests, and more. All stories are archived on the KHNL website under the *Earth and Sea Project* at [www.khnl.com](http://www.khnl.com).

**Thursday September 4th, 2008**

Day three started with HIMB scientist, Dr. Ku‘ulei Rodgers, and Paepae o He‘eia (He‘eia Fishpond) Director, Hi‘ilei Kawelo, presenting the development of a joint project to culturally and biologically assess the health of Kāne‘ohe Bay’s coral reefs. The development of an ecological index using biological and environmental indicators to assess the condition of and compare Hawaiian reefs was presented by Dr. Rodgers. The foundation of this ecological gradient model was subsequently used by Ms. Kawelo to develop a similar index using cultural and biological indicators.

Hawaiian cultural indicators have developed over centuries through a plethora of observations and have proven to have practical uses in marine management throughout Hawaiian history. Due to major shifts in social, political and cultural systems over the past century, Hawai‘i has gradually developed a western form of marine and environmental management. Few aspects of the traditional system of marine management remain today. However, recent interest to incorporate some of these traditional practices into the existing management system has arisen. Integrating the large knowledge base, stewardship principles, and management practices of the native people with contemporary science can strengthen the ability of modern managers to insure the sustainability of marine resources. This project serves as a valuable example of the benefits of merging the efforts of traditional and contemporary science to improve management techniques and protect valuable marine resources.

**Module 4: Predicting and Assessing the Socioeconomic Impacts of Climate Change**

Impacts of climate change affect coastal communities that depend on reefs for a range of protection, goods, services, and cultural practices. Management actions aimed at promoting reef resilience can also inadvertently incur social and economic impacts. An understanding of how management decisions can affect the livelihoods of these communities can assist in designing plans that address not only ecological factors, but socioeconomic ones as well. Participants were invited to share personal experiences from their communities and several case studies from Guam, the Philippines, Palau, the Indian Ocean, and Hawai‘i were presented to explore how communities have taken on these challenges and the outcomes of these efforts. This module was useful in helping participants identify socially resilient areas and incorporate socioeconomic monitoring tools into their bleaching response plans.
A new section incorporated into this workshop was the climate witness community toolkit (http://assets.panda.org/downloads/cw_toolkit.pdf) created by the World Wildlife Fund South Pacific. This toolkit is a result of a process undertaken in Fiji to document local impacts of climate change and to devise appropriate adaptation measures that local communities can implement themselves. The methodologies within the toolkit are an adaptation of participatory techniques World Wildlife Fund South Pacific has used over the years in community resource conservation and development projects, which should give facilitators a clear sense of process when trying to illicit information specific to impacts of climate change and developing appropriate community response.

Module 5: Responding to Mass Bleaching Events: Management Interventions

This section provided participants with intervention strategies that can be instituted during and after a mass bleaching event to reduce stress on corals. A few strategies mentioned include limiting light exposure by shading, managing turbidity and managing recreational impacts. Dr. Paul Jokiel provided participants with examples of how Hawai‘i’s scientists have intervened through reef restoration projects in Guam and Hawai‘i. He showed how scientists have transplanted coral onto degraded reefs to grow coral colonies and build reef recovery. He provided evidence of the futility of this effort in areas where stressful conditions still exist. Other community projects such as the sewage removal in Kāne‘ohe Bay were mentioned as an indirect method to involve stakeholders in reef management and recovery (bibliographic references on are included on the workshop CD).

Module 6: Communicating about Mass Bleaching and Climate Change

In this section, Dr. Christy Loper and Ms. Pauline Sato discussed the importance of communicating to various audiences about mass bleaching. Participants were provided tools on how to identify various audiences, including media, fishermen, and other local stakeholders, and how to tailor messages to each audience. Participants were able to discuss lessons learned while communicating with local communities, cultural practitioners, educators, as well as outreach and education strategies.
As an activity, Ms. Mahina Duarte and several of Kāne‘ohe Bay’s local residents worked with participants to prepare Thursday evening’s meal. This exercise showed participants how cultural practitioners manage fish spawning seasons to sustain fish populations and utilize our natural resources, such as algae and other natural foods, to prepare their own meals. More importantly, it showed how local communities work together to sustain themselves and our natural resources and was an exercise in communication and sharing with people from various backgrounds.

**Friday September 5th, 2008:**

The final day of the workshop began with Dr. Charles Birkeland from the Hawai‘i Cooperative Fisheries Unit, U.S. Geological Survey who provided an update on outcomes and themes from the recent 11th International Coral Reef Symposium (ICRS) held in Fort Lauderdale, Florida in June 2008. The “Reefs of the Future” themed conference provided a venue for scientists and managers from around the world to present and discuss research primarily focused on aspects of climate change that affect coral reefs. Increases in temperature, sea level, and carbon dioxide are creating unfavorable conditions for many coral reef ecosystems worldwide. This symposium facilitated the exchange of research and ideas while providing a platform to further develop management approaches and advance the understanding of existing and emergent stressors. Dr. Birkeland stressed the urgency of action through research and education to address the effects of climate change.

**Module 7: Building Resilience into Coral Reef Management**

In this section, Dr. Risa Oram discussed how to incorporate resilience strategies into coral reef management. She provided participants with a framework for incorporating ecosystem resilience monitoring into their bleaching response plans and discussed ways in which information from monitoring can be used to adapt management planning.

Dr. Janna Shackeroff then discussed socio-economic resilience in the context of coral reef management. Participants were provided a range of strategies for incorporating socio-ecological resilience into coral reef management, and were introduced to socio-ecological impacts on local communities throughout Hawai‘i. Participants found this section to be very interesting and requested to spend more time discussing the topic.

**Module 8: Developing a Bleaching Response Plan**

With her experience in the development and formulation of Hawai‘i’s bleaching response plan, Dr. Greta Aeby concluded the four day workshop by helping participants assemble all the concepts and strategies learned throughout the workshop into a framework for a comprehensive bleaching response plan specific to their region of management. This framework will provide a starting point for each participant to take back to their region and flesh out into a complete bleaching response plan that will help managers, scientists and practitioners better prepare and respond effectively to the rapid onset of a mass coral bleaching event.
WORKSHOP EVALUATION & NEXT STEPS

Upon completing the workshop, participants and staff members filled out evaluation forms. The results of these forms show that 90% of participants found this workshop to be interesting, useful, clearly delivered, and that the information will help them with their jobs.

Overall, there is great interest in carrying out further support and training on traditional management practices and incorporating traditional knowledge into future workshops. There was also great interest amongst participants to support NOAA’s effort in seeing a global network in which managers, scientists, and community members are able to test and refine ideas, have a resilient management community, and see our reefs cope with the impacts of climate change.

Through reviewing participant’s comments and feedback, some areas of improvement listed were:

1. There wasn’t enough time to conduct all activities, lectures, and discussions in the current four day timeframe,
2. There needs to be more information on how scientists and managers may communicate and work better with each other as well as communities,
3. There needs to be further discussions regarding semantics of how to talk about traditional knowledge in order to fully integrate it into all knowledge systems,
4. There was a general consensus on the need to better link coral bleaching and traditional knowledge systems,
5. Include information on management actions beyond just documenting and monitoring coral reefs.

The Papahānaumokuākea Marine National Monument is currently in the process of designing a coral bleaching response plan for the Northwestern Hawaiian Islands. As requested by several participants, Monument staff will follow-up with participants to evaluate the progress of designing a network of bleaching response plans throughout the Pacific and build awareness of climate change effects. Monument staff have also proposed that the results and information from this workshop be shared at the Pacific Science Inter-congress in Tahiti in March 2009 and at the Annual Hawai‘i Conservation Conference in July 2009.
## APPENDIX A
### WORKSHOP AGENDA

**Monday September 2nd, 2008**

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<tr>
<th>Time</th>
<th>Activity</th>
<th>Facilitator(s)</th>
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<tr>
<td>8:00-10:30</td>
<td>Opening &amp; Welcome Address</td>
<td>Mahina Duarte, Aulani Wilhelm, JoAnn Leong</td>
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<td>Participant Introductions – Open Circle</td>
<td>Mahina Duarte, Kimo Carvalho</td>
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<td>10:30 – 10:40</td>
<td>Break</td>
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<td>10:40-12:00</td>
<td>Motivation &amp; Goals of the Workshop</td>
<td>Mark Eakin</td>
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<td>Module 1.2: Climate Change, Ocean Acidification &amp; Coral Reefs</td>
<td>Mark Eakin</td>
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<td>Module 1.3: Mass Bleaching: Causes &amp; Consequences</td>
<td>Mark Eakin</td>
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<tr>
<td>12:00-1:00</td>
<td>Lunch</td>
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<tr>
<td>1:00-3:00</td>
<td>Module 1.4: Management Strategies</td>
<td>Mark Eakin</td>
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<tr>
<td></td>
<td>Understanding the Kumulipo, the coral polyp and its connection to traditional marine practices</td>
<td>Mehana Hind</td>
</tr>
<tr>
<td>1:00-3:00</td>
<td>Module 1.5: Introduction to Bleaching Response Plan Framework</td>
<td>Christy Loper</td>
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<tr>
<td></td>
<td>Rapid Response Plan – Efforts in Hawaii to date</td>
<td>Greta Aeby</td>
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<tr>
<td></td>
<td>Case Study: Northwestern Hawaiian Islands Bleaching events</td>
<td>Jean Kenyon</td>
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<tr>
<td></td>
<td>Module 2.1: Predicting Mass Coral Bleaching</td>
<td>Britt Parker</td>
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<td></td>
<td>Modules 2.2 – 2.4: Measuring Sea Surface Temperature from Satellite</td>
<td>Britt Parker</td>
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<tr>
<td>3:00-3:10</td>
<td>Break</td>
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<tr>
<td>3:10-5:30</td>
<td>Modules 2.5-2.8: HotSpot &amp; Degree Heating Weeks, Satellite Bleaching Alerts &amp; Virtual Stations, Bleaching Outlooks, and Bleaching Weather</td>
<td>Britt Parker</td>
</tr>
<tr>
<td></td>
<td>Hawaiian Framework for predicting seasonal changes and Introduction to Maori Cultural Monitoring Tool</td>
<td>Darren King, Apanui Skipper</td>
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</tbody>
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## Tuesday September 3\textsuperscript{rd}, 2008

<table>
<thead>
<tr>
<th>Time</th>
<th>Activity</th>
<th>Facilitator(s)</th>
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</thead>
<tbody>
<tr>
<td>5:45-6:30</td>
<td>Sunrise Activity: Weather Observations/Predicting Weather</td>
<td>Mahina Duarte</td>
</tr>
<tr>
<td>07:00-08:00</td>
<td>Breakfast</td>
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<tr>
<td>8:00-10:00</td>
<td>Workshop Logistics &amp; Feedback</td>
<td>Christy Loper</td>
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<tr>
<td></td>
<td>Activity: You make the call using satellite tools to predict bleaching</td>
<td>Britt Parker</td>
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<tr>
<td></td>
<td>Module 3.1.1: Assessing Ecological Impacts</td>
<td>Jean Kenyon</td>
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<tr>
<td></td>
<td>Module 3.1.2: Estimating the extent and severity of Bleaching</td>
<td>Jean Kenyon</td>
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<td></td>
<td>Activity: Identifying Coral Bleaching</td>
<td>Jean Kenyon, Paul Jokiel</td>
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<tr>
<td></td>
<td>Module 3.1.3: Identifying Bleaching Thresholds</td>
<td>Paul Jokiel</td>
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<td></td>
<td>Module 3.1.4: Techniques for Bleaching Assessments</td>
<td>Paul Jokiel</td>
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<tr>
<td>10:00-10:15</td>
<td>Break</td>
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<tr>
<td>10:15-12:30</td>
<td>Module 3.2.1: What is Ecological Resilience</td>
<td>Mark Eakin</td>
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<td></td>
<td>Module 3.2.2: Factors that Confer Resilience</td>
<td>Mark Eakin</td>
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<td></td>
<td>Module 3.2.3: Identifying Resilient Areas</td>
<td>Mark Eakin</td>
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<td></td>
<td>Module 3.2.3: Monitoring for Resilience</td>
<td>Mark Eakin</td>
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<tr>
<td></td>
<td>Activity: Monitoring and Reporting Bleaching Conditions &amp; Discussion</td>
<td>Mark Eakin, Christy Loper</td>
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<tr>
<td></td>
<td>Introduction to Field Activity</td>
<td>Kuulei Rodgers, Christy Loper</td>
</tr>
<tr>
<td>12:30-1:30</td>
<td>Lunch &amp; Gather Equipment</td>
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<tr>
<td>1:30-5:45</td>
<td>Field Activity</td>
<td>Kuulei Rodgers</td>
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<tr>
<td>6:30-7:30</td>
<td>Dinner</td>
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**Wednesday September 4\textsuperscript{th}, 2008**

<table>
<thead>
<tr>
<th>Time</th>
<th>Activity</th>
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<tbody>
<tr>
<td>8:00-8:15</td>
<td>Group Photo</td>
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<tr>
<td>8:15-10:15</td>
<td>Workshop Logistics &amp; Feedback</td>
<td>Britt Parker</td>
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<tr>
<td></td>
<td>Biological &amp; Cultural Health Index</td>
<td>Kuulei Roders, Hiilei Kawelo</td>
</tr>
<tr>
<td></td>
<td>Module 5.1: Implementing Management Interventions</td>
<td>Mark Eakin</td>
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<tr>
<td></td>
<td>Module 5.2: Reef Restoration</td>
<td>Paul Jokiel</td>
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<tr>
<td>10:15-10:30</td>
<td>Break</td>
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<tr>
<td>10:30-12:00</td>
<td>Module 4: Assessing Socioeconomic Impacts of Bleaching and Climate Change</td>
<td>Christy Loper</td>
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<td></td>
<td>Module 4: Case Studies</td>
<td>Christy Loper</td>
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<tr>
<td>12:00-1:00</td>
<td>Lunch</td>
<td></td>
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<tr>
<td>1:00-2:30</td>
<td>Activity: Socioeconomic Considerations &amp; Impacts of Management interventions with Discussion</td>
<td>Christy Loper</td>
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<tr>
<td></td>
<td>Module 6: Communicating about Mass Bleaching and Climate Change</td>
<td>Pauline Sato</td>
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<tr>
<td>2:30-2:45</td>
<td>Break</td>
<td></td>
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<tr>
<td>2:45-5:30</td>
<td>Discussion: Communication/Education/Outreach strategies that have worked (Lessons Learned)</td>
<td>Pauline Sato, Christy Loper</td>
</tr>
<tr>
<td></td>
<td>Activity: Communication Strategy</td>
<td>Christy Loper</td>
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<td></td>
<td>Discussion: Working together – Community groups, Federal Agencies, and Scientists</td>
<td>Mahina Duarte</td>
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<td></td>
<td>Activity: Methods and the importance of communicating with cultural practitioners and community organizations in your area; developing partnerships through</td>
<td>Mahina Duarte</td>
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<tr>
<td>6:00-7:00</td>
<td>Dinner</td>
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### Friday September 5th, 2008

<table>
<thead>
<tr>
<th>Time</th>
<th>Activity</th>
<th>Facilitator(s)</th>
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</thead>
<tbody>
<tr>
<td>8:30-9:45</td>
<td>Workshop Logistics &amp; Feedback</td>
<td>Britt Parker</td>
</tr>
<tr>
<td></td>
<td>Module 7.1: What is Socio-Ecological Resilience</td>
<td>Janna Shakeroff</td>
</tr>
<tr>
<td></td>
<td>Module 7.2: Building Social Resilience into Reef Management</td>
<td>Janna Shakeroff</td>
</tr>
<tr>
<td></td>
<td>Module 7.3: Building Ecological Resilience into Reef Management</td>
<td>Risa Oram</td>
</tr>
<tr>
<td>9:45-10:00</td>
<td>Break</td>
<td></td>
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<tr>
<td>10:00-12:00</td>
<td>Activity: MPA Design – Adapting Coral Reef Management in the Face of Climate Change and Integrating Resilience into MPA Design</td>
<td>Risa Oram</td>
</tr>
<tr>
<td></td>
<td>Consensus on Reef Resilience – Mini Symposium from 11th Annual International Coral Reef Symposium</td>
<td>Chuck Birkeland</td>
</tr>
<tr>
<td>12:00-1:00</td>
<td>Lunch</td>
<td></td>
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<tr>
<td>1:00-3:30</td>
<td>Module 8: Developing a Bleaching Response Plan</td>
<td>Greta Aeby</td>
</tr>
<tr>
<td></td>
<td>Activity: Bringing it All Together, Finalizing your Bleaching Response Plans – based on the framework used throughout the Workshop</td>
<td>Greta Aeby</td>
</tr>
<tr>
<td></td>
<td>Activity: Sharing your Bleaching Response Plans</td>
<td>Greta Aeby</td>
</tr>
<tr>
<td>3:30-4:00</td>
<td>Course Evaluations &amp; Closing Remarks</td>
<td>Mark Eakin</td>
</tr>
<tr>
<td>4:00-7:30</td>
<td>Closing Reception</td>
<td>RtCC Staff</td>
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Appendix B

MEDIA & PRESS RELEASES

Workshop Held to Address Effects of Coral Bleaching and Climate Change in the Pacific
Press Release
Submitted by: Carlie Wiener
HIMB-PMNM Research & Outreach Coordinator
Phone: (808) 236-7496
Email: cwiener@hawaii.edu

This week marine conservationists are meeting to address the threat of climate change to coral reefs in the Pacific. NOAA’s Coral Reef Conservation Program and the Office of National Marine Sanctuaries through the Papahānaumokuākea Marine National Monument are working with the Hawai‘i Institute of Marine Biology to train coral reef managers, scientists and community members to address coral bleaching and climate change in their communities.

A four-day workshop is designed to bring together participants from Hawai‘i and across the Pacific to identify successful management strategies for marine managed areas. The workshop is taking place at the Hawai‘i Institute of Marine Biology (HIMB) on Moku O Lo‘e (Coconut Island) following the 2008 U.S. Coral Reef Task Force (CRTF) meeting held in Kona last week.

“Climate change is an emerging threat to our marine managed areas and this workshop is designed to support managers in protecting coral reefs in the Pacific,” said ‘Aulani Wilhelm, NOAA’s superintendent for the Papahānaumokuākea Marine National Monument.

This workshop will present tools to predict mass coral bleaching and rapidly assess the ecological and socioeconomic impacts of bleaching events. “HIMB recognizes the importance of combining Western science and traditional knowledge to address critical management questions necessary for the conservation of coral reef ecosystems,” said Jo-Ann Leong, director of HIMB.

This workshop was initially developed by NOAA and Australia’s Great Barrier Reef Marine Park Authority (GBRMPA) and has been customized to address Pacific reefs and the vital role traditional knowledge plays in managing coral reefs. Since its inception, two additional workshops have taken place in American Samoa and the Florida Keys.
Workshop addresses the future of Pacific coral reefs
KHNL Channel 8 News Station, Honolulu, Hawaii
Air Date: September 1st, 2008

In an effort to save and protect Pacific coral reefs from predicted mass coral bleaching, marine conservationists from Hawai‘i and across the Pacific will be getting together this week on Moku O Lo‘e, (Coconut Island) to train coral reef managers, scientists and members of the community on the issue.

Members from the Hawai‘i Institute of Marine Biology, the National Ocean and Atmospheric Administration (NOAA) and the Office of National Marine Sanctuaries will lead a four day workshop on the topic of coral bleaching and the effects of Global warming.

"Climate change is an emerging threat to our marine managed areas and this workshop is designed to support managers in protecting coral reefs in the Pacific," said 'Aulani Wilhelm, NOAA’s superintendent for the Papahānaumokuākea Marine National Monument.

Through the workshop the marine organizations hope to design a specific strategy for successful marine management.

An emphasis will also be placed on the role traditional knowledge plays in maintaining and preserving coral reefs.

This workshop was initially developed by NOAA and Australia's Great Barrier Reef Marine Park Authority (GBRMPA) and has been customized to address Pacific reefs.

This report can be viewed online at: http://www.khnl.com/global/story.asp?s=8934052
Coral Reef Bleaching  
KHON Channel 2 News Station, Honolulu, Hawaii  
Air Date: September 22nd, 2008  
By: Kathy Muneno

Coral reefs cover just one-percent of the earth and that one-percent is at risk.

Moku O Lo'e, also known as Coconut Island, is where a kind of emergency response team is gathering scientists, marine resource managers, non-profit representatives, policy makers and cultural practitioners.

Ku'ulei Rodgers HIMB assistant researcher says, "The purpose of the workshop here is to look at all the different tools and develop a response plan to what's going to occur if a major bleaching event comes here to the islands."

Coral gets its nutrients and color from an algae, but when ocean temperatures rise, the corals start to lose that algae, basically bleaching the coral and leaving behind a white skeleton. "As the severity and the frequency of these temperatures continue to increase and it multiplies upon each other then we're going to see more widespread bleaching throughout the islands."

Scientists say the last coral bleaching event in Hawai‘i was in 2004 here in Papahānaumokuākea, the northwestern islands...and in 1998 here in the southern Hawaiian Islands. The corals recovered as temperatures returned to normal...not so in the Caribbean and Florida...and in the Western Pacific it's a crisis as they depend on the reef to catch their food.

Ben Namakin, from the Conservation Society of Pohnpei says, "I've met up with many elders in the village and I ask them about what they've seen in the change in the environment in their community and most of the response I get is that they're experiencing something that has never happened in the past."

"My aunty them remember when the beaches along Kāne'ohe bay was white, white sand at Kualoa." –Hi‘ilei Kawelo speaking in the classroom

Papahānaumokuākea Resource Manager, Kimo Carvalho says, "We wanted to bring cultural and traditional practitioners to the table to better develop how we're going to incorporate traditional knowledge into marine management."

This workshop also looks at which corals are more resilient and why and the bigger picture, preventing the warming of sea temperatures, which scientists say is caused by the burning of fossil fuels.

This report can be viewed online at: http://www.khon2.com/news/local/29648939.html
APPENDIX C

GROUP PHOTO

From left to right.
Standing: Greta Aeby, Kana Uchino, Arielle Levine, Darla White, Margaret Akamine, Linda Priskitt, Steve Cotton, Misaki Takabayashi, Makani Gregg, Marion Ano, unk, Charles Birkeland, Paul Jokiel, Joseph Aitaro, Alan Everson, David Krupp, Ben Namakin, Russell Amimoto, Jeremy Goldberg, Koa Shultz, Apanui Skipper, Darren King, unk, Carlie Wiener
Sitting: Mahina Duarte, Mark Eakin, Britt Parker, Kuʻulei Rodgers, Christy Loper, ʻAulani Wilhelm, Juney Ward, unk, Judy Lemus, Pauline Sato, Ann Mooney, Kimo Carvalho
APPENDIX D

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Aulani Wilhelm  
Superintendent  
Papahānaumokuākea Marine National Monument  
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Thierry Work, PhD.  
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US Geological Survey  
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APPENDIX E

PARTICIPANT EVALUATION OF WORKSHOP

Module 1:

Participants were asked to rank on a scale of 1-5 (1=strongly agree, 5=strongly disagree) whether or not:
a) The information was interesting
b) The information was useful
c) The information will help them in their jobs
d) The information was clearly delivered and easy to understand

98% of participants who evaluated this section agreed or strongly agreed that this section was interesting, useful, would help them in their jobs, and was clearly delivered and easy to understand.

Written Comments:
- I am a Coral Biologist, which is no the target audience of this workshop. Most of modules 1,2,3&4 were redundant for me
- Excellent presentation – Got the message clearly
- Mehana was great, appreciated her candor
- Great Introduction
Module 2:

Participants were asked to rank on a scale of 1-5 (1=strongly agree, 5=strongly disagree) whether or not:
- a) The information was interesting
- b) The information was useful
- c) The information will help them in their jobs
- d) The information was clearly delivered and easy to understand

89% of participants who evaluated this section agreed or strongly agreed that this section was interesting, useful, would help them in their jobs, and was clearly delivered and easy to understand.

Written Comments:
- I am a Coral Biologist, which is no the target audience of this workshop. Most of modules 1,2,3&4 were redundant for me
- Good products, well presented. Good practical applications
- I did not know much about tools NOAA had before
- A lot of info to digest
- Need to break up this section – Lots of info. Or combine them into fewer modules so that it seems like less information. I suggest more thorough explanation, description then various products and applications. It was rushed and a bit confusing
- The field activity helped in the identification of coral bleaching
Module 3:

Participants were asked to rank on a scale of 1-5 (1=strongly agree, 5=strongly disagree) whether or not:

a) The information was interesting
b) The information was useful
c) The information will help them in their jobs
d) The information was clearly delivered and easy to understand

90% of participants who evaluated this section agreed or strongly agreed that this section was interesting, useful, would help them in their jobs, and was clearly delivered and easy to understand.

Written Comments:

- This is empowering information.
- J. Kenyon did a great job.
- I am a Coral Biologist, which is no the target audience of this workshop. Most of modules 1,2,3&4 were redundant for me.
- Great examples given – resilience concept very useful.
- Paul was a great instructor choice. Great model of living his work. Jean’s experience on the Kupuna Islands was fantastic, as was Greta – Good to see strong women in science.
- Jean’s talk was not relevant to my work and I felt the relevance to managerial outputs was not clearly defined. Interesting stuff, but not for this workshop.
Module 4:

Participants were asked to rank on a scale of 1-5 (1=strongly agree, 5=strongly disagree) whether or not:

a) The information was interesting  
b) The information was useful  
c) The information will help them in their jobs  
d) The information was clearly delivered and easy to understand

63% of participants who evaluated this section agreed or strongly agreed that this section was interesting, useful, would help them in their jobs, and was clearly delivered and easy to understand.

Written Comments:

- This will be the info that gets the attention of the public.
- I am a Coral Biologist, which is not the target audience of this workshop. Most of modules 1, 2, 3, & 4 were redundant for me.
- I think more examples rather than graphs and wordy slides.
- Would like to know more.
- This is still an emerging area that will develop more in the next years.
- I think it would be important for us to initiate studies on how coral bleaching affects the economy for people living in the regions. This may help us to communicate our message of coral bleaching to our communities.
Module 5:

Participants were asked to rank on a scale of 1-5 (1=strongly agree, 5=strongly disagree) whether or not:

a) The information was interesting
b) The information was useful
c) The information will help them in their jobs
d) The information was clearly delivered and easy to understand

95% of participants who evaluated this section agreed or strongly agreed that this section was interesting, useful, would help them in their jobs, and was clearly delivered and easy to understand.

Written Comments:
- Restoration sounds great and people have locked onto the sound byte, but it is not necessarily realistic given the lack of manpower and resources.
- Again – Yeah Paul!
- Should include disaster management.
Module 6:

Participants were asked to rank on a scale of 1-5 (1=strongly agree, 5=strongly disagree) whether or not:
   a) The information was interesting
   b) The information was useful
   c) The information will help them in their jobs
   d) The information was clearly delivered and easy to understand

94% of participants who evaluated this section agreed or strongly agreed that this section was interesting, useful, would help them in their jobs, and was clearly delivered and easy to understand.

Written Comments:
- Tools are so important! I sincerely appreciate all the tools, links and papers toward this end.
- I think that we should incorporate hands-on training in communication skills (At least spoken communication) into the workshop.
- I think something to address in future workshops is how scientists and managers can communicate with each other as well as communities.
- A specific discussion on regional issues/examples would be beneficial, i.e. assist in the development and distribution of materials. Need more real world examples of effective campaigns.
- I would like to explore other options of communication in addition to the media. I believe the media is useful, but we all know the whole story is never told. It would be useful to learn how to have our messages be told in the way we want them to be told.
**Module 7:**

Participants were asked to rank on a scale of 1-5 (1=strongly agree, 5=strongly disagree) whether or not:

a) The information was interesting
b) The information was useful
c) The information will help them in their jobs
d) The information was clearly delivered and easy to understand

92% of participants who evaluated this section agreed or strongly agreed that this section was interesting, useful, would help them in their jobs, and was clearly delivered and easy to understand.

**Written Comments:**

- Some of the biggest work is here, so a lot of emphasis should be placed on this section.
- Great information and action – Just wondering how to get the manager on board.
- This was the most exciting part of the workshop.
- Likes Janna’s presentation.
- Both ecological/environmental and socio-economic components were outstanding.
- Janna’s presentation was very interesting and useful. There needs to be more time for this component.
- The connection with climate change can be improved and strengthened.
- I think more time should be spent on local issues, management and applications. Good overview on the topic but it needs more practical relevance to our work.
- It would be great to have another session focused on this (2-4 hour meeting) sharing any social-economic framework or schemes that managers, communities, scientists, or practitioners, want to begin implementing.
**Module 8:**

Participants were asked to rank on a scale of 1-5 (1=strongly agree, 5=strongly disagree) whether or not:

a) The information was interesting  
b) The information was useful  
c) The information will help them in their jobs  
d) The information was clearly delivered and easy to understand

**98% of participants who evaluated this section agreed or strongly agreed that this section was interesting, useful, would help them in their jobs, and was clearly delivered and easy to understand.**

**Written Comments:**

- This is a productive and necessary exercise, but two things: 1) The last day is kind of tough – maybe try to do this early on and review and revise it on the last day, and 2) I’m still feeling pretty small in the face of it all when it comes to the action part. I guess we just are.
- We came away with an action plan that can start being implemented. This was empowering – rather then leaving with information overload, we are leaving with the motivation to get started.
- I have to develop NWHI bleaching response plan with others here in the Main Hawaiian Islands – great tools, steps and discussions.
- Useful practical info to add to Hawaii LAS and fun interaction.
- More time would be better.
- More research or discussion should take place regarding efforts that we can implement in our own lives to reduce our carbon footprint. We need to challenge ourselves to embody a conservation vision. We can include social change, messaging, and education in bleaching response plans.
Traditional Knowledge Integration:

Participants were asked to rank on a scale of 1-5 (1=strongly agree, 5=strongly disagree) whether or not:
   e) The information was interesting  
   f) The information was useful  
   g) The information will help them in their jobs  
   h) The information was clearly delivered and easy to understand

93% of participants who evaluated this section agreed or strongly agreed that this section was interesting, useful, would help them in their jobs, and was clearly delivered and easy to understand.

In addition to the standard questions participants were asked for each individual module, participants were also asked to answer the two following questions to better evaluate the traditional knowledge integration for this workshop:
   1. How can traditional/indigenous knowledge be better integrated into the workshop framework?
   2. What are the benefits/value-additives to integrating existing traditional/indigenous knowledge into the workshop format?

Written Comments:

- I especially appreciated and benefited from local Hawaiians integrating cultural practices into the meeting and sharing their sight, themselves and projects. I think some local Kupuna coming to share a story of their experience would be a powerful addition. I also think a “collection” of traditional/cultural conservation practices would be helpful.
- Great, learned lots. Good presentations. Early morning exercise was not that informative or useful. Need to have many different groups of traditional peoples represented, especially in the Pacific. What about the rest of the US? But yes this will help me in working with the community.
- On integration of TEK, in addition to integrating contents (which seemed difficult) an idea is to offer western knowledge and experiential, locally specific ways of learning. These tend to be very effective teaching/learning methods anyway. Perhaps managers or outreach educators can take the teaching methods as well as contents home? The integration of knowledge systems is absolutely essential to future management and workshops. Thank you for initiating this.
- Bringing TEK to the discussions is very appropriate – keep it up! Develop it more!
- I think more discussion regarding semantics and how to talk about traditional knowledge is key to really being able to integrate the systems. The terms we use do not make a lot of sense. Western Science? What about the rest of the world? Just my own soap box.
- I strongly agree that this component was very useful and interesting. I learned a great deal and desire to learn much more in this area, it will be essential to my job. This info was clear, but much more time should have been devoted to covering this body of knowledge. I don’t know how to better integrate indigenous knowledge, but I would be happy to help – from the western, Haole science perspective with a deep respect and interest in
indigenous knowledge and ways, integrating indigenous knowledge and ways is critical. We must learn from all world views and history and integrate this into all of our actions (Larry Bacsh).

- I found it difficult to integrate TEK and still stay focused on the science.
- Connection with climate could be stronger.
- Traditional/cultural stuff was a definite useful highlight. Well done. Very beneficial and useful.
- We could spend a whole day working on integrating schemes and how and where to implement these schemes. Integrating TEK requires us to look inside ourselves and ask ourselves why and what we do this kind of work for – to me, it makes sense.
- I have trouble seeing how TEK really helps contribute to addressing climate change or bleaching. Sure it is trendy and very relevant to many resource management issues, but climate is a different basket of worms. I feel it is like saying you should put out a fire with a rain dance – rain dances may be culturally important but they won’t put out a fire. Also the info from New Zealand was interesting but there is NO CORAL in New Zealand so it seemed tangential to the focus of the workshop. TEK is crucial to resource management in general but not the right tool for climate change/bleaching in particular. Integrating TEK can help by giving a different view to get the same (Scientific) message across to a more traditional and local community.
Overall Evaluation of Workshop:

General Comments:

- Should hand out this form at the beginning so could fill out as go along.
- I especially appreciated and benefited from other pacific cultures attending and giving examples of their project challenges and successes as well as the opportunity to interact in a relaxed atmosphere.
- Wonderful workshop – gave us some things we feel we can do at the local level. With local considerations, the traditional knowledge/management was timely and insightful. The only disappointment, while was not your fault, was that the local managers (state!) were not here. But, hopefully, this info will trickle to them. Thanks for all your hard work and professionalism.
- Like to reiterate Darren’s comment that challenges participants of the workshop to consider integrating indigenous environmental knowledge approach into their management plans for their reefs. Indigenous coastal communities have more than a vested interest in the management of the coral reefs. These communities have been residing in these areas from time immortal so it pays to invite these communities to support, assist, and even to provide guidance. Other individuals can come and live in the area but they can also leave. The indigenous people do not move. They are connected at all levels to this environment. Congratulations to the organizing committee, much appreciated the opportunity to learn and share with everyone.
- A wonderful, informative, stimulating and practically useful experience. The presenters were excellent and the course materials provided are probably the best and most useful I have received in ANY forum. The venue couldn’t have been better. Having a captive audience on an island led to many unexpected connections which probably would not have occurred otherwise. Thank you and Aloha.
- Thanks for the opportunity to work with you folks. I’m looking forward to staying in touch.
- Instructors of all modules were outstanding. Great thanks to all of you.
- Great job NOAA, keep up the good work.
- More informal discussion/time would be better, (i.e. exchange of ideas, swap experiences, etc). Lots of knowledge to share, too little time. Find how to maintain this momentum – set up a listserv, blog, etc.
- Activities were good. No ideas on how to improve. Having printouts of the PPT presentations was very good. It helped us pay better attention, taking fewer notes, listening more.
- As while the conference was very organized and I learned a lot about climate change and things that need to be done to address these issues, coral bleaching, rising sea temperatures and levels are of great concern to me because a changing ocean and disappearing landscapes will impact Oceania and its people forever. There’s a need for each one of us to take back these messages and tools learned to the larger communities and hopefully this will motivate our communities to mobilize. Implementing traditional management schemes alongside modern management schemes where and when necessary can create great results and a living ocean for future generations.
- Right now the response plans focus almost exclusively on monitoring and bleaching. Please provide guidance for management actions beyond just documentation.