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Global Climate Change Initiatives

Prepared by: Hawai‘i CZM Program
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Purpose:

The purpose of this document is to assist the Hawai‘i Coastal Zone Management (CZM) Program and others in the preparation for upcoming policy changes and challenges related to global climate change. Included is a list of agencies and organizations in Hawai‘i that are involved in researching and/or responding to the impacts of global climate change. This document also serves to identify entities working in Hawai‘i that will be affected by, or can contribute to, the effort. Three examples of climate change initiatives from Maryland, Delaware and California are also examined to draw on other successful coastal management strategies that address sea level rise and climate change. Overall, this document is comprised of a brief overview of Hawaii's climate change initiatives, three examples of other State initiatives in this area, additional website and document resources, opportunities for future collaboration with others, and key contacts involved in climate change research and advocacy for addressing the issue.

Note: This document will be updated as new information is made available. Please send updates to mmeyer@dbedt.hawaii.gov.

Involved Entities within Hawai‘i:

- Governor's Office
  - Greenhouse Gas Emissions Reduction Task Force
- Hawai‘i Department of Health (DOH)
- Department of Business, Economic Development, & Tourism (DBEDT)
  - CZM – ORMP Working group & Policy group
  - Strategic Industries Division – Energy Branch
- Department of Land & Natural Resources (DLNR)
  - Office of Conservation & Coastal Lands (OCCL)
- Counties of Hawai‘i, Maui, Kauai, Honolulu
- County Civil Defense Agencies
- State Civil Defense
- Hawaiian Electric Company (HECO)
- Pacific Disaster Center
- National Oceanic & Atmospheric Administration (NOAA)
  - Pacific Services Center (PSC)
  - Office of Ocean & Coastal Resource Management (OCRM)
  - IDEA Center
  - Pacific Risk Management Ohana (PRiMO)
- University of Hawai‘i at Manoa
  - Sea Grant Program
  - SOEST/HiOOS/PacIOOS
  - East-West Center

- Social Science Research Institute
- Manoa Climate Change Commission

Hawai‘i’s Initiatives:

- **Governor’s Office** – Developed the Clean Energy Initiative which is an innovative partnership with the U.S. Department of Energy (DOE) that aims to have at least 70 percent of Hawaii’s power come from clean energy within one generation – by 2030; In June 2007, the Governor signed the Global Warming Solutions Act, or Act 234, which established a task force to assess greenhouse gas emissions in Hawai‘i and develop a regulatory scheme to significantly reduce emissions to the 1990 level by the year 2020.

- **DOH**– under Act 234, DOH must adopt administrative rules to achieve the greenhouse gas emissions limits by December 31, 2011.

- **DBEDT**
  - **CZM** – Responsible for SMA Permits; creation of an Atlas of Natural Hazards in the Hawaiian Coastal Zone; developed Hawai‘i and Maui County Wind Speed Maps & Building Code Amendments. The ORMP working group is currently working on a legislative proposal to address impacts of sea level rise and global climate change in Hawai‘i.
  - **Strategic Industries Division –** Energy Branch, focuses on clean energy initiatives, energy efficiency and conservation, renewable energy technologies, and transportation fuel options.

- **DLNR: OCCL** – The Hawai‘i Coastal Lands Program (CLP) is a program within the Office of Conservation and Coastal Lands (OCCL), a division of the State Department of Land and Natural Resources (DLNR). The CLP is the lead coastal resource management agency regulating land use and development activities in the state’s shoreline and marine waters. The CLP is involved with a variety of regulatory and management issues including public trust issues and related public and private property issues, coastal land use, coastal hazard mitigation, coastal erosion control, and beach and dune conservation and restoration. Examples of initiatives and related documents are listed below:
  - Coastal Subsidence in Kapoho, Puna (January 2007);
  - Natural Hazard Considerations for Purchasing Coastal Real Estate in Hawai‘i (August 2006);
  - Kuhio Beach Improvements (January 2005);
  - Erosion Management Alternatives for Hawai‘i (July 2004);
  - Beach Management Plan for Maui (December 1997); and
  - Coastal Erosion Management Plan (COEMAP)

- **Counties**
  - **Hawai‘i** – Energy Sustainability Plan, Tsunami Education Plan, and Coastal Subsidence in Kapoho
  - **Maui** - Shoreline setback rules, projects entitled “Prioritizing Beach and Shoreline Resource Conservation” and “Project Impact”

- **Kauai** - Shoreline setback ordinance
- **Honolulu** – Tsunami map viewer

- **County Civil Defense Agencies**
  - State of Hawai‘i Multi-Hazard Mitigation Plan, 2007 Update
  - County of Kauai Multi-Hazard Mitigation Plan, 2003
  - City & County of Honolulu Multi-Hazard Mitigation Plan, 2003
  - County of Maui Multi-Hazard Mitigation Plan, 2005
  - County of Hawai‘i Multi-Hazard Mitigation Plan, 2003

- **State Civil Defense** – The Hawaii State Civil Defense works to lead the State in prevention, protection, and rapid assistance during disasters with a full range of resources and effective partnerships. The State Hazard Mitigation Forum is the primary planning mechanism for hazard mitigation planning for State Civil Defense and makes recommendations to State Civil Defense. Established in 1998, the Hawai‘i Statewide Hazard Mitigation Forum was formed to raise public awareness about how to mitigate property loss due to natural hazards.

- **HECO** - Hawaiian Electric is committed to taking direct action to mitigate the contributions to global warming from electricity production. HECO has recently signed an agreement with the State & DBEDT to move the state forward to a clean energy driven economy by accelerating regulatory changes. See the 2007 Corporate Sustainability Report for more on Hawaiian Electric activities such as their Renewable Energy Projects, rebate programs, and Hawai‘i’s Energy Future Campaign.

- **NOAA**
  - **PCS** - PSC works collaboratively to improve the resilience and adaptive capabilities of island communities in preparing for and addressing the risks associated with climate change and variability. After the Indian Ocean tsunami, PSC worked on governance issues to determine the main problems with land management and knowledge of tsunami risk. Recently, they have developed a training program called Planning for Climate Change in Coastal Environments.
  - **OCRM** – Oversees six major programs in coastal management (CZM), coral reef conservation, environmental technology, estuarine research, land acquisition (CELCP), marine protected areas (MPAs), and nonpoint pollution that assist states in managing, preserving, and developing their marine and coastal resources.
  - **IDEA Center** – focus is on climate change research, operate the Pacific Climate Information System (PaCIS) which provides a programmatic framework to integrate ongoing and future climate observations, operational forecasting services and climate projections, research, assessment, data management, outreach, and education to address the needs of Pacific Islands, started the Pacific Region Integrated Climatology Information Products (PRICIP) project, and developed the Pacific Islands Regional Assessment of the Consequences of Climate Variability and Change – Preparing For a Changing Climate (October 2001). Currently working to downscale global & regional climate models to have better resolution data for the Hawaiian Islands.

- **PRiMO** - network of partners and stakeholders involved in the development and delivery of risk management–related information, products, and services in the Pacific.

- **UHM**
  - **Sea Grant** – Conduct research on coastal erosion, beach restoration, sea level rise and hazards-related research. Forming a Center on Island Resiliency and Climate Policy in January 2009.
  - **SOEST/HiOOS/PacIOOS** – Conduct research on global climate change, sea level rise, coastal resiliency and climate variability. Conduct research with the International Pacific Research Center whose goal is to discover how global climate change affects the Asia-Pacific region.
  - **East-West Center** – Current projects in environmental studies are encompassed by the theme: Environmental Change, Vulnerability and Governance. Work in this thematic area seeks to describe and assess (both quantitatively and qualitatively) environmental change and vulnerability in the Asia Pacific region and to facilitate appropriate policy responses. Research focuses on several critical aspects of the human-environment nexus in the Asia Pacific Region: air and water quality, environmental risk, natural disasters, environmental economics and policy, land use change, and the Pacific RISA Program.
  - **Pacific Disaster Center** – PDC is an applied science, information and technology center managed by UHM that works to reduce disaster risks and impacts to peoples' lives and property. The mission of the center is to provide applied information research and analysis support for the development of more effective policies, institutions, programs and information products for the disaster management and humanitarian assistance communities of the Asia Pacific region.
  - **Social Science Research Institute** – facilitates and supports interdisciplinary, applied research that addresses critical social, behavioral, economic, and environmental problems primarily in Hawai'i and the Asia Pacific region. Current research is being conducted on the Hazards, Climate, & Environment Program.
  - **Manoa Climate Change Commission** – promotes a multidisciplinary approach to conducting critical research and advancing outreach programs regarding the nature, causes and consequences of climate change. The Commission is made up of UHM professors and researchers who provide leadership to measure and reduce campus greenhouse gas emissions.

Others to involve:

The following is a list of state agencies and organizations that will be affected by global climate change issues and should be involved in future efforts.

- Hawai‘i Tourism Authority
- Department of Transportation
- DOH – Environmental Planning Office
- City & County of Honolulu
- The Nature Conservancy
- Greenhouse Gas Emissions Task Force
- Department of Agriculture
- Hawai‘i Conservation Alliance

- Board of Water Supply

3 Examples of Other State Initiatives:

1. Maryland:

Maryland is one of the leading coastal states in addressing and planning for climate change and sea level rise. Maryland's Department of Natural Resources published *A Sea Level Response Strategy for the State of Maryland* in 2000. This paper provides an assessment of Maryland's vulnerability to sea level rise and presents a strategy aimed at reducing vulnerability over time. The Strategy was developed through: (1) an extensive review of related technology, data and research; (2); an assessment of Maryland's vulnerability based on the range and magnitude of impact, the physical characteristics of the coastline, and population and growth patterns; and, (3) an assessment of Maryland's existing response capability. The Strategy is comprised of four components: outreach and engagement; technology, data and research support; critical applications; and, state-wide policy initiatives. Each component will build upon the others to achieve the desired outcome within a five-year time horizon. The Maryland Coastal Program has also created an interactive web portal, *Shorelines Online*, which centralizes information and data on coastal hazards, coastal erosion, and sea level rise management. The website showcases recent studies on a sea level rise economic cost study, historic shoreline position maps, erosion rates, and an inventory of Maryland's shoreline features and resources.

On April 20, 2007, Governor Martin O'Malley signed an Executive Order establishing the Maryland Climate Change Commission (MCCC) charged with collectively developing an action plan to address the causes of climate change, prepare for the likely consequences and impacts of climate change to Maryland, and establish firm benchmarks and timetables for implementing the Commission's recommendations. A recent report to the MCCC is *Global Warming and the Free State: Comprehensive Assessment of Climate Change Impacts in Maryland*, July 2008. This report provides a detailed assessment of the possible consequences of global climate change on Maryland's natural and human resources.

A scientific and technical working group was formed with members representing academia, business, industry, environmental groups and many levels of government. It was staffed jointly by the Maryland Department of the Environment and Department of Natural Resources in coordination with other state agencies. The working groups were directed to develop a Plan of Action and prepare for likely impacts. This assessment of impacts is the most thorough of any yet attempted at a state level but its findings are consistent with other international, national and regional assessments. It is based on extensive review of the scientific literature and climate projections through the 21st century using the same models used by the Nobel prize-winning International Panel on Climate Change (IPCC).

The MCCC released its *Climate Action Plan* in August 2008. The Action Plan includes: 1) a scientific assessment of climate change impacts; 2) an analysis of the cost of inaction; 3) a greenhouse gas and carbon reduction strategy; 4) a strategy for reducing Maryland's vulnerability to climate change with a primary focus on protecting Maryland's

property and citizens from rising sea levels and changing weather patterns; and, 5) key recommendations for building a state-federal climate partnership. The Action Plan concludes that Maryland would see significant economic and environmental benefits from taking early, immediate actions to reduce global warming pollution and that the goals proposed by the Commission are achievable and would help spur innovation.

For more info on the Maryland Commission on Climate Change:
http://www.mdclimatechange.us

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2. Delaware:

The State of Delaware developed a report on *Striking a Balance: A Guide to Coastal Dynamics and Beach Management in Delaware*, 2004, which incorporates sea level rise, beach erosion control measures, and the benefits and costs of different management options. The four management options outlined in the report are: 1) no action; 2) shoreline hardening; 3) strategic retreat; and 4) beach nourishment. Another successful initiative of the Delaware Sea Grant program and the Delaware Department of Natural Resources was to host workshops and community presentations on sea level rise and coastal inundation to initiate coastal resiliency programs and future planning strategies. www.dnrec.state.de.us

In 2000, the Delaware Climate Change Consortium comprised of representatives of state government, business, labor, environment and community groups, adopted a state climate action plan that calls for reducing the state's global warming pollution by seven percent below Delaware's 1990 emissions by 2010. The plan was prepared by the University of Delaware's Center for Energy and Environmental Policy (CEEP). The project's primary goals were: 1) to identify cost-effective opportunities for reducing Delaware's greenhouse gas emissions; 2) to raise the awareness of climate change; and 3) to create an action plan with practical, analytically-based strategies to reduce greenhouse gas emissions. The project was sponsored by the Delaware State Energy Office and the U.S. EPA's State and Local Climate Change Program. To reach their emissions target, the Delaware Climate Change Action Plan recommends cost-effective measures for each sector of the Delaware economy that, cumulatively, could reduce emissions by 15 percent.

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3. California:

In 2005, the Governor of California signed an Executive Order which established climate change emission reduction targets for the state and set in motion a process to ensure the targets are met. This Executive Order also recognized the importance of preparedness by directing the Secretary of the California Environmental Protection Agency (Cal/EPA) to lead an effort to evaluate the impacts of climate change on California and to examine adaptation measures that would best prepare the state to respond to the adverse consequences of climate change. In March 2006, the California Environmental Protection Agency published a "*Climate Action Team Report to the Governor and the Legislature*," which evaluated three scenarios for reducing the amounts of greenhouse gases released into the atmosphere over the next century. Depending on whether and how much these emissions can be brought under control, the report projects that by 2100 average temperatures in California will rise between 3 and 10.5 degrees Fahrenheit.

One of the most publicized impacts of global warming is a predicted acceleration of sea level rise. Depending which end of the range of projected temperature increases occurs, the California Climate Action Team (composed of the Secretary of the California Environmental Protection Agency (CalEPA) in coordination with the Secretary of the Business, Transportation and Housing Agency; Secretary of the Department of Food and Agriculture; Secretary of the Resources Agency; Chairperson of the Air Resources Board; Chairperson of the Energy Commission; and President of the Public Utilities Commission) found that water levels in San Francisco Bay could rise an additional five inches to three feet, or nearly one meter, by the end of this century.

Using GIS data, San Francisco Bay Conservation and Development Commission (BCDC) has prepared illustrative maps showing that a one-meter rise in the level of the Bay could flood over 200 square miles of land and development around the Bay. BCDC is working in partnership with the Pacific Institute, with financial support from Caltrans, to determine the value of the development threatened with inundation. Initial estimates indicate that over $100 billion worth of public and private development could be at risk. The Commission has taken the initiative to formulate a broad outline of a comprehensive strategy for addressing climate change in the Bay region and identified changes that are needed in state law so that the BCDC can play a productive role in implementing such a strategy. The proposed plan would include the following:

A Four-Year Work Program

- In year one, BCDC prepares detailed maps of the areas around the Bay and the Suisun Marsh likely to be inundated by sea level rise within the next 50 and 100 years.
- Within two years, BCDC should be required to determine:
    - (a) The social and economic value of all existing and permitted built resources within the area expected to be impacted by sea level rise;
    - (b) The cost of protecting these resources from inundation through the construction of seismically-safe levees or sea walls, raising the elevation of infrastructure or implementing ecologically-sustainable shoreline protection strategies;

    - (c) The economic and ecological value of all natural resources expected to be impacted by sea level rise;
    - (d) The cost of acquiring any upland areas needed to allow wetlands to migrate as sea levels rise or otherwise mitigating the impacts of sea level rise on wetlands and other important habitats; and
    - (e) The cost of removing or relocating the resources that are projected to be inundated in those areas where BCDC has determined that the cost of protection exceeds the value of the resources.
- Within four years, BCDC should be required to prepare an adaptation plan that includes a strategy for adapting to sea level rise in San Francisco Bay and the Suisun Marsh over the next 50 years. The plan should take full advantage of ecosystem-based management principles to ensure that future development, shoreline retreat, flood protection and wetland enhancement strategies will be coordinated to achieve a vibrant, healthy Bay that co-exists with sustainable communities around the Bay. The plan should determine the measures needed to adapt to projected sea level rise by identifying:
    - (a) The most significant structural, environmental, aesthetic, social, cultural and historic resources that must be protected from inundation;
    - (b) Those areas that are inappropriate for protection from inundation;
    - (c) Those areas that are most suitable for wetland restoration, habitat enhancement and other opportunities that would enhance the biological productivity of the Bay;
    - (d) Undeveloped uplands that are suitable for marsh migration; and
    - (e) Strategies and techniques that will make future conservation and development projects more resilient to climate change.

For more information about the initiative:

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San Francisco Bay Conservation and Development Commission
Email: travis@bcdc.ca.gov
Direct: 415/352-3653
http://www.bcdc.ca.gov/planning/climate_change/strategy_SF_bay_region.shtml

For information on general climate change policies in California:
www.climatechange.ca.gov

Additional Resources:

Hawai‘i Specific Documents:

- DBEDT Hawai‘i Climate Plan (November 1998)
- USEPA Climate Change and Hawai‘i (September 1998)
- Pacific Islands Regional Assessment of the Consequences of Climate Variability and Change – Preparing For a Changing Climate (October 2001)
- USGS Atlas of Natural Hazards in the Hawaiian Coastal Zone (January 2002)

- UHM Sea Grant Publication – Building Community Resilience to Coastal Hazards (Spring 2008)
- Hawaii Bar Journal – Act 234: Hawaii's Climate Change Law (May 2008)

Regional & National Documents:

- US Climate Change Science Program (CCSP) Preliminary review of adaptation options for climate-sensitive ecosystems and resources (June 2008)
- CSO Climate Change Report: The Role of Coastal Zone Management Programs in Adaptation to Climate Change (September 2007)
- CSO Second Annual Report of the Coastal States Organization's Climate Change Work Group (September 2008)
- Climate Impacts Group (CIG) Preparing for Climate Change: A Guidebook for Local, Regional, and State Governments (September 2007)
- American Planning Association – Policy Guide on Planning & Climate Change (April 2008)
- The Pew Center on Climate Change: Adaptation Planning – What U.S. States and Localities are Doing (September 2008)

State & Regional Websites:

- UH SOEST Program
- Hawaii Ocean Observing System (HiOOS)
- Pacific Services Center
- Pacific RISA
- Pacific Risk Management Ohana (PRiMO)

Federal Websites on Climate Change:

- U.S. EPA Climate Change Site
- Energy Emissions by State—US EPA
- Goddard Institute for Space Studies
- NOAA Climate Homepage
- NOAA's National Climatic Data Center
- NOAA Coastal Services Center
- National Sea Grant Program
- US Department of Energy—Climate Change
- EIA—Official Energy Statistics from the US Government

National Organizations:

- Coastal States Organization
- Center for Climate Strategies
- Heinz Center's Global Change Program
- Association of State Floodplain Managers
- Western Governors' Association
- South Pacific Regional Environment Program (SPREP) Climate Change Portal
- USGS – Global Climate Research Program
- US Climate Change Science Program

- US Global Change Research Program
- SCRIPPS CO2 Program
- Natural Resources Defense Council—Climate Change
- Union of Concerned Scientists—Climate Change

International Organizations:

- Intergovernmental Panel on Climate Change (IPCC)
- Food and Agriculture Organization of the United Nations (FAO)
- United Nations Environment Program—Climate Change (UNEP)
- World Health Organization—Climate Change and Human Health (WHO)
- Pew Center on Global Climate Change

Opportunities for Future Collaboration:

- UH DURP Program - Dr. Karl Kim currently has funding to conduct an economic modeling study of sea level rise impacts to Oahu's coastal infrastructure.
- UH Pacific RISA – Coordinating the 2009 Pacific Year of Climate Change.
- NOAA SARP Program – Funds climate related research for risk and opportunity.
- NOAA IDEA Center – May host a climate meeting in Hawai'i in 2009 that focuses on the State of Science related to climate change.
- Hawai'i Conservation Alliance (HCA) – 2009 convention focused on climate change impacts in Hawai'i, opportunities to have a climate change workshop with NOAA PSC or participate in a DLNR sea level rise panel at the conference.

Key Contacts:

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