

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
Office of Conservation and Coastal Lands
Honolulu, Hawaii

AUG - 8 2014

Board of Land and
Natural Resources
State of Hawaii
Honolulu, Hawaii

REGARDING: MEMORANDUM OF AGREEMENT between the Department of Land and Natural Resources and the University of Hawaii, School of Ocean, Earth Science and Technology

APPLICANT: Department of Land and Natural Resources, Office of Conservation and Coastal Lands and the University of Hawaii School of Ocean, Earth Science and Technology

BACKGROUND/PROPOSED ACTION:

The purpose of this Memorandum of Agreement (MOA) is to formalize a relationship by which the University of Hawaii, School of Ocean and Earth Science and Technology (SOEST) will provide for the development, management and dissemination of coastal data and research products to the DLNR, but chiefly for use by the DLNR Office of Conservation and Coastal Lands (OCCL) to help carry-out its efforts to protect and conserve beaches, dunes, and coastal communities from the deleterious effects of coastal erosion and sea-level rise (SLR). The MOA is attached herein as **Exhibit 1**.

Beaches and coastal areas are part of Hawaii's culture and heritage. They provide enjoyment, ocean access, and spiritual fulfillment to Hawaii's people. Beaches are the backbone of Hawaii's multi-billion dollar visitor economy that provides the majority of the state's jobs and income. Beaches and adjoining sand dunes are critical for flood and erosion prevention serving as a natural buffer to prevent or reduce property damage from storm waves and surge, tsunami, SLR, and seasonal high surf. Beaches and dunes are important elements of our shoreline environment and are critical to the health of coastal marine ecosystems. Unfortunately, sandy beaches in Hawaii have been lost at an alarming rate due to natural processes as well as poor management practices including; the construction of shoreline armoring, sand mining, the destruction of coastal sand dunes, the inferred impacts of SLR, and imprudent siting of structures in close proximity to eroding shores.

As beaches narrow and disappear due to SLR, human impacts, and other causes of sediment deficiency, shoreline properties become increasingly vulnerable to numerous coastal hazards. Scientific data on sea-level change indicates global sea level is rising and the rate of rise is accelerating and is expected to increase this century. This will contribute to accelerated coastal erosion, and increasingly expose coastal communities to marine inundation during storms, tsunamis, high swell, and even high tides. Government needs to continue to assess the impact of coastal erosion on beach management, coastal communities and public infrastructure in low-lying areas.

The OCCL is in charge of the Coastal Lands Program within the DLNR. SOEST and the Coastal Lands Program jointly developed the Coastal Erosion Management Plan ("COEMAP"), which was adopted by the Board of Land and Natural Resources in 2000 as the State's policy to manage coastal erosion and conserve beaches statewide. COEMAP was also endorsed by other state, federal and county agencies. The OCCL and SOEST have been involved in numerous other publications and projects to provide non-regulatory and regulatory tools to protect beaches and coastal communities from erosion damage. SLR is a new and significant challenge that we will need to incorporate into our research and planning frameworks. The OCCL has found that having a source of scientific expertise and related data and derivative products has enhanced the state's ability to manage the shoreline and protect beaches and associated ecosystems.

Due to the recent projections for increasing SLR, it is clear that shoreline hazards will extend beyond beach systems and will affect every aspect of life in Hawaii. Thus we must expand our applied research efforts beyond coastal ecosystems to include built systems. It is preferable to deal with all aspects of SLR within an integrated research and management paradigm that provides us with the necessary information to underpin an acceptable "Climate" adaptation strategy.

Act 83, Session Laws of Hawaii 2014 ("Act 83" - the Hawaii Climate Adaptation Initiative Act) established an Interagency Climate Adaptation Committee (ICAC) that is Co-Chaired by the Chairperson of the DLNR and the Director of the Office of Planning, or their designees. Act 83 charges the ICAC with the development of an Interagency Sea Level Rise Vulnerability and Adaptation Report (SLR Report) to be completed by December 31, 2017

The ICAC will be responsible for the preparation of the State's first SLR Report. The report should be supported by the most up-to-date field data and modeling techniques for SLR effects on beaches, wetlands, coastal infrastructure and coastal communities (i.e., both natural and built systems). Over the next three years, the OCCL Coastal Lands Program will focus on supporting the State Interagency Climate Adaptation Committee's efforts to create the SLR Report.

The OCCL lacks the technical resources to produce and maintain high-level coastal data. The Coastal Lands Data Program can act as an extension of the OCCL to promote sustainable coastal development and beach conservation practices via the provision of data and scientific observations and interpretations that improve our understanding of shoreline change trends, beach processes, human impacts, coastal sediment characteristics, and the latest findings and implications of global warming (e.g., changes in storminess, SLR, ocean acidification, and others), and the potential impacts of SLR on coastal communities and infrastructure. This program would also enhance current DLNR/UH Sea Grant College Program partnerships in place that provide a technical resource to the DLNR on coastal hazards and coastal land use related subjects.

SOEST has devoted much of its effort to the field of applied coastal science and has provided direct assistance, in the form of research products and data, to regulatory agencies such as OCCL, the U.S. Army Corps of Engineers, and the respective county governments to improve beach and coastal erosion management. A list of some of these products is provided below for reference:

1. Coastal Erosion Management Plan for the State of Hawaii;
2. Coastal hazard risk maps and shoreline erosion maps;
3. Sandy substrate analysis to support the Kuhio Beach sand pumping project;
4. Training in global change impacts and shoreline processes;
5. Communication of advances from technical journals and other research groups outside Hawaii;
6. Digital map products useful for shoreline planning such as LiDAR data, undistorted aerial photographs, historical aerial photographs, computer simulations of coastal processes, and composite map products using TMK nos., erosion rate data, and other useful GIS layers;
7. Written reports;
8. *Ad hoc* recommendations in problem-solving situations as part of serving on technical committees;
9. Public extension and outreach on issues related to climate change, beach processes, beach management, and coastal hazards in Hawaii and globally;
10. Beach profiling and benthic surveys to support the Waikiki Beach Maintenance Project, 2012.
11. Providing an expert and independent presence at various meetings, and interagency discussions; and
12. Maintaining a public website, and a parallel password protected website for agency use, that serves erosion data, maps, historical photos, and derivative products.

This Agreement will ensure a consistent and continuous stream of relevant scientific data and research products to OCCL, which will improve OCCL's ability to implement the Coastal Lands Program, manage beach restoration projects, evaluate erosion management alternatives, and protect beaches from inappropriate development. This Agreement will also provide the necessary authority for the DLNR to utilize SOEST assistance to develop next generation coastal erosion maps, as well as serve as the clearinghouse for the development of data products and maps necessary to support the Hawaii SLR Vulnerability and Adaptation Report. The Coastal Lands Program's efforts will be significantly enhanced and expanded by continued support from SOEST and establishment of a **Coastal Lands Data Program**.

Under the proposed MOA, the parties will do the following:

A. The OCCL will:

1. Provide funds to SOEST in an amount to be determined on an annual basis, based on available OCCL funds. Funding shall not be in excess of \$200,000 annually and shall be determined based on specific project needs and scope. The specific project needs and scope shall be developed jointly between SOEST and the OCCL, but will be related to one or more of the elements listed below.

B. The School of Ocean and Earth Science and Technology will:

1. Provide information and research products to the OCCL in conformity with the provisions of this Agreement.
2. Create, manage and disseminate coastal erosion rate data and SLR data.
3. Create data streams, web products, and mapping products useful for integrated shoreline management.
4. Provide a link between OCCL and the scientific and engineering coastal community at large.
5. Provide expertise in various project-specific problem-solving situations.
6. Respond quickly in situations needing scientific expertise such as rapid mapping, advice, and analysis.
7. Provide training and technology transfer as requested.
8. Make available enhanced computer capability, modeling skill, and field monitoring expertise that is not available in OCCL.
9. Provide technical support to facilitate the development sea level rise vulnerability and adaptation report.
10. Provide a team of researchers in support of technician activities in the area(s) of coastal modeling, statistics, beach processes, and other relevant areas.
11. Provide a team of graduate students and undergraduate students assisting in the research enterprise.

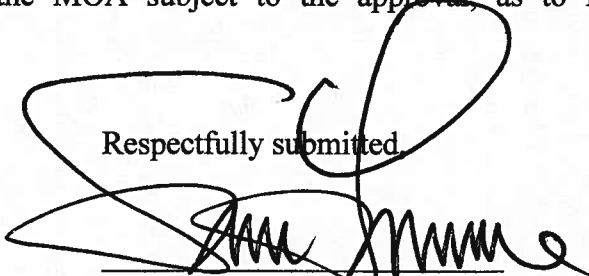
12. Provide a link to the full expertise of faculty in the university community to collaborate on projects and problem-solving in keeping with OCCL objectives;
13. Deliver to OCCL at the end of each year, an annual report of products and services completed;
14. Deliver to OCCL a work plan for the coming calendar year, which must be provided prior to the transfer of funds. The work plan for the coming year shall include a budget to be agreed upon by SOEST and OCCL. This annual statement of work to be done and the budget will be a collaborative product of the OCCL and SOEST and reflect the needs of the OCCL; and
15. At the end of the calendar year, the OCCL may require SOEST to return any funds for products or services not provided in accordance with the work plan for that year.

The MOA has been reviewed and preliminarily approved by the Department of the Attorney General. The MOA will remain in effect for five years from the date of final signature.


RECOMMENDATION:

Based on the preceding analysis, staff recommends that the Board of Land and Natural Resources (Board) APPROVE this MOA between DLNR and SOEST, and authorize the Chairperson to finalize and sign the MOA subject to the approval, as to form, by the Department of the Attorney General.

Respectfully submitted,


Samuel Lemmo, Administrator
Office of Conservation and Coastal Lands

Approved for submittal:


WILLIAM J. AILA, JR.
Chairperson, Board of Land and Natural Resources

MEMORANDUM OF AGREEMENT
Between the
Department of Land and Natural Resources
and the
University of Hawaii, School of Ocean and Earth
Science and Technology

THIS "MEMORANDUM OF AGREEMENT entered into this ____ day of _____, 2014 (hereinafter referred to as "Agreement"), by and between the Board of Land and Natural Resources by and through its Department of Land and Natural Resources (hereinafter "DLNR") and the University of Hawaii, School of Ocean and Earth Science and Technology, (hereinafter "SOEST") supersedes the Memorandum of Agreement between DLNR and the SOEST Coastal Geology Group dated August 19th 2008, under the premises, mutual understandings, and conditions as set forth below.

WHEREAS, the DLNR and SOEST (as its Coastal Geology Group) previously entered into an Agreement toward the successful creation of a Coastal Lands Data Program; and

WHEREAS, melting of the Greenland and Antarctic ice sheets, heating of the oceans, and melting of alpine glaciers around the world are all contributing to global sea level rise; and

WHEREAS, according to estimates, Hawaii's sea level has risen 6 inches over the past century. According to the Fifth Assessment Report (AR5) of the IPCC – the Intergovernmental Panel on Climate Change – a scientific body established in 1988 by two United Nations organizations (the World Meteorological Organization and the United Nations Environment Programme), at the current rate of greenhouse gas production, global mean sea level is likely to rise a mean of 1 foot by mid-century and over 2 feet by the end of the century. The National Science Foundation, the United States Army Corps of Engineers, and the National Oceanic and Atmospheric Administration (NOAA) predict the possibility of even higher sea levels by the end of the century. If the West Antarctic Ice Sheet collapses, sea level will continue to rise unabated for centuries; and

WHEREAS, the impacts of accelerated sea level rise (SLR) include an increase in an already dominant trend of coastal erosion, increased severity and frequency of flooding events by heavy rains and large waves, increased vulnerability to tsunami and hurricane damage, and potential adverse effects to groundwater and coastal wetlands, and beaches; and

WHEREAS, Act 286, Session Laws of Hawaii 2012, established climate change adaptation priority guidelines. The Governor's plan, "A New Day in Hawaii," also recognizes the importance of planning in adapting to climate change and SLR. The 2013 update of the Ocean Resources Management Plan (ORMP) required under Haw. Rev. Stat. § 205A-3 also identifies climate change and SLR as major priority areas; and

WHEREAS, Act 83, Session Laws of Hawaii 2014 (“Act 83” - the Hawaii Climate Adaptation Initiative Act) established an Interagency Climate Adaptation Committee (ICAC) that is Co-Chaired by the Chairperson of the Department of Land and Natural Resources (Department) and the Director of the Office of Planning, or their designees. Act 83 charges the ICAC with the development of an Interagency Sea Level Rise Vulnerability and Adaptation Report (SLR REPORT) to be completed by December 31, 2017; and

WHEREAS, there is considerable interest in the conservation and preservation of important coastal lands including high value recreational beach areas; and

WHEREAS, there is considerable interest in the effects of SLR on coastal communities and coastal infrastructure; and

WHEREAS, due to the potential negative impact of SLR, there is a need to integrate coastal data products in a way that supports the development of a comprehensive integrated shoreline policy that incorporates SLR projections into actionable planning products; and

WHEREAS, effective shoreline management and conservation practices require additional research and data products in order to carry out these objectives; and

WHEREAS, the DLNR, under the Office of Conservation and Coastal Lands is involved with the protection and preservation of coastal lands statewide and additional financial and technical expertise are required to assist with this effort; and

WHEREAS, the Office of Conservation and Coastal Lands has been charged with the development of a Sea Level Rise Vulnerability and Adaptation Report as part of the State’s Climate Adaptation Initiative; and

WHEREAS, the OCCL is uniquely positioned to create data products that synthesize coastal conservation and coastal hazard mitigation in an integrated planning and adaptation framework; and

WHEREAS, SOEST is currently providing data and technical support services to the DLNR and several counties and federal agencies in the areas of shoreline erosion, beach restoration, sea level rise, and dune management; and

WHEREAS, the DLNR and SOEST may combine their respective resources to create a special program entitled the “Coastal Lands Data Program” in order to better utilize existing technical support from SOEST as well as other local experts; and

WHEREAS, it is the intent and purpose of this Agreement to set forth the cooperative relationship between the parties, which establishes mutual duties and

responsibilities with respect to the development of the Coastal Lands Data Program under this Agreement by services provided by the DLNR and SOEST as funding allows;

NOW, THEREFORE, in consideration of the mutual promises contained in this Agreement, the DLNR and SOEST agree as follows:

I. PARTIES AND PURPOSE

This Agreement is between the Department of Land and Natural Resources, and the University of Hawaii, School of Ocean and Earth Science and Technology.

The purpose of this Agreement is to formalize a relationship by which the University of Hawaii, School of Ocean and Earth Science and Technology will provide for the development, management and dissemination of coastal data and research products to the Department of Land and Natural Resources, but chiefly for use by the DLNR's Office of Conservation and Coastal Lands ("OCCL") to help carry-out its efforts to protect and conserve beaches, dunes, and coastal communities from the deleterious effects of coastal erosion.

The OCCL will be responsible for the preparation of the State's first Sea Level Rise Vulnerability and Adaptation Report. The report should be supported by the most up-to-date field data and modeling techniques for SLR effects on beaches, wetlands, coastal infrastructure and coastal communities (i.e., both natural and built systems).

SOEST is uniquely positioned to be the clearinghouse for such data due to its proven history in providing data products that are easily transferable to government agencies to improve shoreline management. An example includes the "Hawaii Historical Coastal Erosion Data" that was provided to State and County agencies to support "Variable Erosion Rate Based Setbacks."

Over the next three years, the Coastal Data Program will focus on supporting the State Interagency Climate Adaptation Committee's efforts to create a SLR Vulnerability and Adaptation Report.

It is anticipated that this will be accomplished by initiating a number of actions in partnership with other State, Federal, and County resource agencies, such as the U.S. Army Corps of Engineers and U.S. Geological Survey. For instance, the State's existing erosion data will be supplemented by new information (e.g., new aerial photographs and LiDAR measurements from 2013). Existing erosion rate data will be recast with 2013 data to form the baseline for new erosion rate projections. While this data can stand alone to serve as the baseline for shoreline setbacks around the state, this data will also be used for coastal evolution modeling projections/predicting future shoreline positions due to SLR projections/predictions. Wave overtopping data will eventually be added as an additional layer to establish the baseline for identifying areas, resources, and infrastructure that are vulnerable to SLR over the century.

II. BACKGROUND

Beaches and coastal areas are part of Hawaii's culture and heritage. They provide enjoyment, ocean access, and spiritual fulfillment to Hawaii's people. Beaches are the backbone of Hawaii's multi-billion dollar visitor economy that provides the majority of the state's jobs and income. Beaches and adjoining sand dunes are critical for flood and erosion prevention serving as a natural buffer to prevent or reduce property damage from storm waves and surge, tsunamis, sea level rise, and seasonal high surf. Beaches and dunes are important elements of our shoreline environment and are critical to the health of coastal marine ecosystems. Unfortunately, sandy beaches in Hawaii have been lost at an alarming rate due to poor management practices, including the construction of shoreline armoring, sand mining, the destruction of coastal sand dunes, unpredicted sea level rise, and imprudent siting of structures in close proximity to eroding shores.

Due to the recent IPCC projections for SLR, it is clear that shoreline hazards will extend beyond beach systems and will affect every aspect of life in Hawaii. Thus we must expand our applied research efforts beyond coastal ecosystems to include built systems. It is preferable to deal with all aspects of SLR within an integrated research and management paradigm that provides us with the necessary information to underpin an acceptable "Climate" adaptation strategy.

The OCCL is in charge of the Coastal Lands Program within the DLNR. SOEST and the Coastal Lands Program jointly developed the Coastal Erosion Management Plan ("COEMAP"), which was adopted by the Board of Land and Natural Resources in 2000 as the State's policy to manage coastal erosion and conserve beaches statewide. COEMAP was also endorsed by other state, federal and county agencies. The OCCL and SOEST have been involved in numerous other publications and projects to provide non-regulatory and regulatory tools to protect beaches and coastal communities from erosion damage. SLR is a new and significant challenge that we will need to incorporate into our research and planning frameworks. The OCCL has found that having a source of scientific expertise and related data and derivative products has enhanced the state's ability to manage the shoreline and protect beaches and associated ecosystems.

The OCCL lacks the technical resources to produce and maintain high-level coastal data. The Coastal Lands Data Program can act as an extension of the OCCL to promote sustainable coastal development and beach conservation practices via the provision of data and scientific observations and interpretations that improve our understanding of shoreline change trends, beach processes, human impacts, coastal sediment characteristics, and the latest findings and implications of global warming (e.g., changes in storminess, sea level rise, ocean acidification, and others), and the potential impacts of sea level rise on coastal communities and infrastructure. This program would also enhance current DLNR/UH Sea Grant College Program partnerships that provide a technical resource to the DLNR on coastal hazards and coastal land use related subjects.

SOEST has devoted much of its effort to the field of applied coastal science and has provided direct assistance, in the form of research products and data, to regulatory agencies such as OCCL, the U.S. Army Corps of Engineers, and the respective county governments to improve beach and coastal erosion management. A list of some of these products is provided below for reference:

1. Coastal Erosion Management Plan for the State of Hawaii;
2. Coastal hazard risk maps and shoreline erosion maps;
3. Sandy substrate analysis to support the Kuhio Beach sand pumping project;
4. Training in global change impacts and shoreline processes;
5. Communication of advances from technical journals and other research groups outside Hawaii;
6. Digital map products useful for shoreline planning such as LiDAR data, undistorted aerial photographs, historical aerial photographs, computer simulations of coastal processes, and composite map products using TMK nos., erosion rate data, and other useful GIS layers;
7. Written reports;
8. *Ad hoc* recommendations in problem-solving situations as part of serving on technical committees;
9. Public extension and outreach on issues related to climate change, beach processes, beach management, and coastal hazards in Hawaii and globally;
10. Beach profiling and benthic surveys to support the Waikiki Beach Maintenance Project, 2012.
11. Providing an expert and independent presence at various meetings, and interagency discussions; and
12. Maintaining a public website, and a parallel password protected website for agency use, that serves erosion data, maps, historical photos, and derivative products.

This Agreement will ensure a consistent and continuous stream of relevant scientific data and research products to OCCL, which will improve OCCL's ability to implement the Coastal Lands Program, manage beach restoration projects, evaluate erosion management alternatives, and protect beaches from inappropriate development. This Agreement will also provide the necessary authority for the DLNR to utilize SOEST assistance to develop next generation coastal erosion maps, as well as serve as the clearinghouse for the development of data products and maps necessary to support the Hawaii SLR Vulnerability and Adaptation Report. The Coastal Lands Program's efforts will be significantly enhanced and expanded by continued support from SOEST and establishment of a **Coastal Lands Data Program**.

III. SCOPE OF WORK AND FUNDING

The Department of Land and Natural Resources, Office of Conservation and Coastal Lands and the University of Hawaii, School of Ocean and Earth Science and Technology, now referred to as the "Parties," hereby agree in accordance with their respective

budgets, laws, and missions, with the following terms and conditions regarding the scope of work and funding:

A. The OCCL will:

1. Provide funds to SOEST in an amount to be determined on an annual basis, based on available OCCL funds. Funding shall not be in excess of \$200,000 annually and shall be determined based on specific project needs and scope. The specific project needs and scope shall be developed jointly between SOEST and the OCCL, but will be related to one or more of the elements listed below.

B. The School of Ocean and Earth Science and Technology will:

1. Provide information and research products to the OCCL in conformity with the provisions of this Agreement.
2. Create, manage and disseminate coastal erosion rate data and SLR data.
3. Create data streams, web products, and mapping products useful for integrated shoreline management.
4. Provide a link between OCCL and the scientific and engineering coastal community at large.
5. Provide expertise in various project-specific problem-solving situations.
6. Respond quickly in situations needing scientific expertise such as rapid mapping, advice, and analysis.
7. Provide training and technology transfer as requested.
8. Make available enhanced computer capability, modeling skill, and field monitoring expertise that is not available in OCCL.
9. Provide technical support to facilitate the development sea level rise vulnerability and adaptation report.
10. Provide a team of researchers in support of technician activities in the area(s) of coastal modeling, statistics, beach processes, and other relevant areas.
11. Provide a team of graduate students and undergraduate students assisting in the research enterprise.
12. Provide a link to the full expertise of faculty in the university community to collaborate on projects and problem-solving in keeping with OCCL objectives.
13. Deliver to OCCL at the end of each year, an annual report of products and services completed.
14. Deliver to OCCL a work plan for the coming calendar year, which must be provided prior to the transfer of funds. The work plan for the coming year shall include a budget to be agreed upon by SOEST and OCCL. This annual statement of work to be done and the budget will be a collaborative product of the OCCL and SOEST and reflect the needs of the OCCL.
15. At the end of the calendar year, the OCCL may require SOEST to return any funds for products or services not provided in accordance with the work plan for that year.

IV. DURATION OF AGREEMENT, AMENDMENTS, OR TERMINATION

- A. This Agreement will become effective on the date of the final signature of the Parties and will remain in effect for five years from that date.
- B. The Parties will review the Agreement every year to determine whether it should be continued, revised, or terminated.
- C. This Agreement may be amended within its scope or renewed prior to the expiration date, through written mutual consent of the Parties.
- D. This Agreement may be terminated by: (1) written mutual consent; or (2) one Party's written notice to the other Party six months in advance. Upon termination of the Agreement, all funds not expended or committed for payment purposes shall be returned to OCCL. All products, whether partially or entirely completed, shall be turned over to OCCL upon termination of the Agreement.
- E. Correspondence may be directed to:

School of Ocean and Earth Science
and Technology
University of Hawaii
1680 East-West Road
Honolulu, HI 96822

Department of Land and Natural
Resources
Office of Conservation and
Coastal Lands
Post Office Box 621
Honolulu, HI 96809

V. OTHER PROVISIONS

- A. The Parties recognize that the provision of any product or service under the Agreement is subject to available funds.
- B. The Parties realize that provisions on the part of SOEST are dependent upon external grants and other funding sources in support of the intent of this Agreement.

[The remainder of this page is intentionally left blank]

IN WITNESS WHEREOF, the Parties have caused this Agreement to be executed as of the day and year first above written. By signing below, each representative indicates the requisite authority to enter into this Agreement on behalf of their respective party.

UNIVERSITY OF HAWAII
SCHOOL OF OCEAN AND EARTH SCIENCE
AND TECHNOLOGY

By _____
Brian Taylor, Dean
School of Ocean and Earth Science
and Technology

Date: _____

Approved by the Board of
Land and Natural Resources
at its meeting on:

DEPARTMENT OF LAND AND NATURAL
RESOURCES

By _____
William J. Aila, Jr., Chairperson
Board of Land and Natural Resources

Date: _____

APPROVED AS TO FORM:

By _____
Deputy Attorney General

Date: _____