Application Details

Research and Development Minigrants for 2017-2018: Application Review

Application Title: Beach Sustainability Project: Establishing an economic value for California's Sandy Beach Ecosystem

Application ID: #000070

Review Deadline: Jan 27, 2017 11:59:00 PM

Primary Appointment Title: Assistant Professor

Proposal Summary:

In January 2017, Dr. Philip King, from SFU, and I will be holding a two-day workshop to kick off our Beach Sustainability Project (BSP). With funding through a COAST grant, the overarching goal of the BSP is to construct what we are calling a Beach Sustainability Index (BSI), an objectively derived quantitative score based on available data or standardized observations by citizen scientists as well as CSU faculty and undergraduates. The workshop will focus on facilitating discourse among CSU campuses and other stakeholders on public policy issues related to coastal ecosystem function goods and services (EFGS). The BSI will be informed by monitoring standardized assessments, satellite imagery, and photographs. The assessments will be conducted through the development of a citizen-science, mobile-based decision-support application, which may serve as a critical data source to inform California’s coastal resilience planning. An online application documenting coastal BSI results in consistent mapped formats will readily disseminate results and track improvements over time.
With assistance from this mini-grant, I hope to assimilate the information gleaned from our workshop to write a technical report developing the underlying algorithms as well as a peer reviewed journal article fleshing out the science behind the BSI. In addition, I would like to present this research at the American Shore and Beach Preservation Association’s 2017 Meeting. I see this report, peer-reviewed paper, and conference presentation as seeds needed to facilitate the writing of a larger grant to fund this state-wide, and perhaps nationwide, undergraduate student-based research endeavor.

Comments to the Administrator(s):

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DR. KIKI (RUNYAN) PATSCH
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  - Short-term and long-term beach erosion
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Runyan, K. B., & Griggs, G. B. (2002). Chapter 8: Contributions from Coastal Cliff Erosion to the Littoral Budget. In M. Coyne & K. Sterrett (Eds.), *California Beach Restoration Study* (pp. 8.1-8.5). Sacramento, California: California Department of Boating and Waterways and the State Coastal Conservancy.

Runyan, K. B., & Dolan, R. (2001). Origin of Jockey's Ridge, North Carolina: End of the Highest Sand Dune on the Atlantic Coast? *Shore and Beach, 69*(3).

Runyan, K. B. (2000). *A Dune Called Jockey's Ridge*. Unpublished Undergraduate Honor's Thesis, University of Virginia, Charlottesville, Virginia.

ABSTRACTS/TALKS/POSTERS

Patsch, K.B. *Establishing Sea Cliff Erosion Rates and Identifying Erosional Hotspots for Bechers Bay, Santa Rosa Island.* 9th California Islands Symposium. Ventura, California, October 2016. (Poster)

Summers, R., Horn, D., Apperson-Chavez, C., Rudolph, R., Hanna, C., **Patsch, K.** Georectification of Historical Aerial Imagery of Channel Islands National Park. 9th California Islands Symposium. Ventura, California, October 2016. (Poster)

Domingo, M., Arborgast, M., Ceja, A., Greenfield, C., Palasik, S., Swann, F., **Patsch, K**., Hanna, C. Historic Photo-point Analysis of Vegetation Cover on Santa Rosa Island. 9th California Islands Symposium. Ventura, California, October 2016. (Poster)

Griggs, G.B., **Runyan, K.B.**, Willis, C. *Challenges to Understanding Littoral Sand Budgets along Active Margin, High Energy Coastlines.* GSA Conference 2003-Session: Coastal Processes and Hazards along Active Margin and Low Latitude Coasts. Seattle, Washington, November 2003. (Speaker)

Griggs, G.B. and **Runyan, K.B**. *Cliff Erosion and Bluff Retreat along the California Coast.* Oceans 2003 Marine Science and Ocean Technology Conference. San Diego, California, September 2003. (Speaker)

Runyan, K.B. *Implications of Harbor Dredging for the Santa Barbara Littoral Cell*. California and the World Ocean '02. Santa Barbara, California, October 2002. (Speaker)

Runyan, K.B. *Harbor Dredging, Littoral Cells, and Littoral Drift: Comprehensive Sediment Budgets for California*. Coastal Inlet Research Program (CIRP) Conference, Vicksburg, Mississippi, June 2002. (Speaker)

Runyan, K. B. (2001). *Contributions of Coastal Cliff Erosion to the Beach Sand Budget in California and the Effects of Armoring*. Restoring the Beach: Science, Policy, and Funding- CSBPA and SoCalCoast 2001 Annual Conference, La Jolla, CA, Scripps Institute of Oceanography. (Speakerr)

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CSUCI RFP: MINIGRANT 2016-2017

Beach Sustainability Project:
Establishing an economic value for sandy beach ecosystems in California

Dr. Kiki Patsch, ESRM

PROPOSAL SUMMARY (250 WORDS)

In January 2017, Dr. Philip King, from SFU, and I will be holding a two-day workshop to kick off our **Beach Sustainability Project (BSP).** With funding through a COAST grant, the overarching goal of the **BSP** is to construct what we are calling a **Beach Sustainability Index (BSI),** an objectively derived quantitative score based on available data or standardized observations by citizen scientists as well as CSU faculty and undergraduates. The workshop will focus on facilitating discourse among CSU campuses and other stakeholders on public policy issues related to coastal ecosystem function goods and services (EFGS). The **BSI** will be informed by monitoring standardized assessments, satellite imagery, and photographs. The assessments will be conducted through the development of a citizen-science, mobile-based decision-support application, which may serve as a critical data source to inform California's coastal resilience planning. An online application documenting coastal **BSI** results in consistent mapped formats will readily disseminate results and track improvements over time.

With assistance from this mini-grant, I hope to assimilate the information gleaned from our workshop to write a technical report developing the underlying algorithms as well as a peer reviewed journal article fleshing out the science behind the **BSI**. In addition, I would like to present this research at the American Shore and Beach Preservation Association's 2017 Meeting. I see this report, peer-reviewed paper, and conference presentation as seeds needed to facilitate the writing of a larger grant to fund this state-wide, and perhaps nationwide, undergraduate student-based research endeavor.

Proposal Narrative (2-4 Pages)

Project Summary: Over 80% of California's coast is actively eroding and climate change/sea level rise will exacerbate the erosion of coastal areas, in particular California's beaches (Melius et al., 2015). Currently, many federal, state and local government agencies, as well as NGOs and academic institutions, are engaged in a debate over how best to adapt California's coast to the increasing threat of sea level rise. Much of this debate involves "green versus grey" options (i.e., allowing the coast to retreat or nourishing beaches versus coastal armoring such as revetments and seawalls). What is missing in these analyses is an evaluation of the critical value of California's beaches.

California's beaches generate over $5 billion in direct revenue to California annually (King and Symes, 2004). In addition, wide beaches and dune complexes are natural buffers to storm surge protecting back beach and low-lying development and infrastructure. Beaches play an important role in terrestrial and marine nutrient cycling and are natural biological filters, detoxifying coastal waters. Beaches provide habitat for many of California's imperiled and endemic plant and animal species including the Western Snowy Plover and the California Least Tern, and are important for the breeding, migrating, and wintering of many other animals. Recreational and commercial fishing also depend on beaches either directly as habitat or indirectly as an essential component of the food web. And as most visiting the shore know, beaches encourage outdoor recreation and are shown to benefit human mental health and well-being.

Services provided by the beach are of value to humans; assigning an economic value to natural ecosystem functions allows beaches to be evaluated as ecosystem services (Kaufman and Pilkey, 1983, Pilkey and Cooper, 2014, Barbier, 2011). Given the interdisciplinary nature of beach ecosystem services, it is surprising that, to date, there is not a standardized protocol for beach assessment, evaluation, and quantification of value. If beach ecosystems are not giving an evaluation, their value is essentially zero.

California's beach ecosystems are diminishing or threatened by human-induced erosion caused by coastal armoring and reductions to sediment supply, sea-level rise, changes in land use and development, invasive species, and heavy recreational use (Defeo et al., 2009, Schlacher et al., 2007, Dugan et al., 2004, Melius et al. 2015). It is imperative that scientists, NGOs, and policy makers come together to develop a standard way to evaluate the importance of specific beaches in their various roles, a challenging feat given the dynamic nature of this ecosystem. Using a spatially-based approach to BSI development, we will integrate expert knowledge of beach function to identify where opportunities exist to better manage our coastlines for the range of ecosystem services we know they provide.

Using a grant from COAST, Dr. Philip King from SFU and I will facilitate a 2-day focused workshop to unify coastal researchers (primarily from CSUs) with expertise in each of these ecosystem service areas with applied scientists and coastal NGOs to lay out a framework for

the development of a Beach Sustainability Index (BSI) that will be used to evaluate, quantify and track the condition of the CA coastline in relation to the potential ecosystem services we expect them to provide. Our hope is that the BSI will operationalize and standardize the assessment, taxonomy, and value of beach ecosystems in California, and possibly elsewhere. Coastal NGOs will assist with the development of an approach and supporting data management and reporting system that would inform beach management decisions into the future and provide a means to communicate the value of decisions implemented over time.

During the workshop, we will discuss and evaluate beach ecosystem services from each attendee's specific disciplinary point of view with attention to: identifying gaps in the knowledgebase; acknowledging differences in opinion and available data; evaluating data sources to utilize in assessments; and determining which data can be collected by citizen scientists and where training is needed for data acquisition.

I am seeking additional funding through this mini grant to develop the concept and ultimately a paper to establish the concept of a Beach Sustainability Index (BSI) and taxonomy of beach ecosystems based on their geographic context (we call these site types with differing data collection and scoring based on each type) to standardize rapid assessments of beaches to generate a 0-5 BSI value. The 0-5 scale may end up looking more like a license plate number including a taxonomy type, and rating for ecology, geomorphology, recreational, and cultural values. This value will directly relate to the current observable/measurable condition of the subject beach length and to beach function and its relative value in providing the critical ecosystem services. This paper will also discuss methods to evaluate the economic value of ecosystem services; ecosystem services identify the natural benefits to humans from healthy ecosystems and discuss how to assign an economic value to those services. The BSI also plays a key role here, since it provides a potential index of ecological value, which can be used in mitigation. I plan to submit the paper to a journal such as *Ocean and Coastal Management, Journal of Coastal Research*, or *Marine Policy.*

In addition to the peer-reviewed journal article, I am seeking funding to attend and present this research at the American Shore and Beach Preservation Association's October, 2017 meeting in Fort Lauderdale, Florida or similar conference to bring national attention to the Beach Sustainability Project. Ideally, the workshop, peer-reviewed journal article, and conference presentation will help secure larger funding for CSU faculty and undergraduate, NGO, and agency collaborations to develop a successful Beach Sustainability Project which will incorporate the BSI in an online decision support application that will include a citizen-science, mobile-based application to focus data collection and assessments of beach environments in useful formats to inform California's coastal resilience planning into the future. Further funding will allow this timely project to be replicated nationwide to give us up-to-date information on the health of our beaches. By placing an economic value on these ecosystems, we can help preserve and protect these important environments from the threat of sea level rise and the pinch of coastal development.

Project Goals and Outcomes:

1. Facilitate discourse among CSU campuses and other stakeholders on public policy issues related to beach ecosystem function and goods (EFGs);
2. Document the direct and indirect cause and effect linkages between BSI results and the EFGS;
3. Assist in the development of a mobile app which can be used by citizen scientists on beach visits;
4. Discuss how a BSI can help with efforts to mitigate the damages from coastal erosion;
5. Write a technical report describing the algorithm for development of the Beach Sustainability Index
6. Submit a peer-reviewed journal article describing the science behind the beach sustainability index with collaboration from workshop attendees
7. Develop logo and marketing material for the Beach Sustainability Project to network at the ASBPA conference
8. Present research at the ASBPA 2017 conference
9. Apply for larger grants and/or private funding for the development of an online application documenting and tracking coastal BSI results in consistent mapped formats to disseminate results and track improvements over time.

Research Plan and Methodology:

Post-workshop, multiple meetings with collaborators will be necessary to develop the components of the Beach Sustainability Index and write manuscripts. Input from NGOs and state and federal agencies will be considered to ensure we have a product that can be readily used to inform policy decisions. With the support and collaboration from multiple CSU campuses and SCRIPPS Institute of Oceanography, we are likely to develop a robust and readily usable database.

Professional Development:

This project will serve as an excellent networking tool to increase collaborations across CSU campuses, NGOs, and state and federal agencies. It will also kick start my research agenda and result in, hopefully, multiple publications and a long-term, student-based, collaborative research endeavor that will be utilized to inform policy as we deal with sea level rise and the pinch of coastal development. Our beaches are threated, and it's about time that researchers and agencies pooled their incredible knowledge base to create a useful decision-support tool. I would like to be the facilitator of that collaborative effort.

Project Timeline:

- Prepare for Beach Sustainability Workshop: **January 2016**
- Assimilate information gleaned from workshop to develop a technical report detailing the development of a beach sustainability index and a peer-reviewed journal article discussing the economic value associated with the BSI. **February-June, 2017**
- Seek funding to further operationalize the Beach Sustainability Project and Beach Sustainability Index with the development of a citizen-science, mobile-based, decision-

support application which may serve as a key component to California's coastal resilience planning. **March 2017-December 2017**

- Prepare an abstract to submit to the American Shore and Beach Preservation Association's (ASBPA) annual meeting. **June 2017**
- Present research and network at the ASBPA conference **October 2017**
- If additional funding is obtained, database and citizen science-based mobile application will then be developed by building on the BSI technical report developed with input from workshop attendees. California will serve as the pilot Beach Sustainability Project with the goal of expanding to the project across additional regions. It is the goal of this project to create a long term monitoring database of beach EFG's accessible to policy makers and researchers throughout California. **2018**

Dissemination Plan:

Workshop attendees will receive updates throughout this project and provide reviews of written material. After the workshop, we plan to develop a webinar for invited participants that could not make the workshop due to schedule conflicts as well as other CSU faculty that are interested in collaborating on this project. Ultimately, the database will be openly available and serve as a decision support tool to assess the economic value of the beach with respect to its ecological, geomorphological, recreational, and cultural value.

Project Assessment:

The purpose of this project is to bring together leading scientists in the CSU system as well as Scripps Institute of Oceanography in the fields of economics, geomorphology, ecology, psychology, cultural anthropology, and environmental policy related to the sandy beach environment (all currently scheduled to attend the Beach Sustainability Project Workshop in January 2017) to brainstorm how to place an economic value on the ecosystem function and goods (EFG's) of the beach each system. Throughout this project, workshop attendees will serve as collaborators in the development of the Beach Sustainability Project and subsequently the Beach Sustainability Index. The idea is to bring together the impressive, applied research of CSU faculty to create a database to gather relevant information and ultimately use this information to create a real-time decision support tool. Relevant information will be gathered by researchers, students, and citizen scientists and will feed into the database and display on a spatial user-friendly map of Coastal California. This project will prove successful with acceptance of the peer-reviewed journal article and the agreed collaboration on how to assess beach EFGs. Sources of funding for the implementation of the database, decision-support tool, and mobile data-collection app would then follow.

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Budget Justification

- **Reassign Time**: I am requesting reassign time for 3 WTUs in the fall of 2017 to allow time to write a technical report, journal article, and research and apply for grants to fund the state-wide Beach Sustainability Project. In addition, the time will be spent on developing the functionality of the online mapping database. $1800 per unit * 3 units = **$5,400**
- **Travel**: The American Shore and Beach Preservation Association's (ASBPA) National Coastal Conference October 24th, 2017- October 27, 2017 in Fort Lauderdale, Florida would be the ideal venue to present this research. The theme of the 2017 conference, "Beaches, Bays, and Beyond," continues to broaden ASBPA's focus across the entire coastal and estuarine system. This national coastal conference would allow networking with other colleges and universities, NGO's, agencies, and coastal stakeholders to promote the applicability and need for the development of our citizen-science-based **Beach Sustainability Project** and the development of the **Beach Sustainability Index** for beaches around the country. Airfare, Lodging, Mileage, Travel to Convention Center, Food, Incidentals associated with attending the ASBPA conference at the Broward County Convention Center in Fort Lauderdale, Florida. Estimated at **$1,900** after an internet search for flights and accommodations.
    - Conference registration, workshop, and field trip are **$675**
- Funds totaling $1,000 are requested to print posters, pay for the necessary color printing in academic journals, and develop a logo and marketing material to promote the **Beach Sustainability Project** while at the conference as well as cover unanticipated supplies and expenses associated with this project. As this will be a long-term, large-scale, citizen-science based monitoring project with associated faculty from around California and possibly nationwide, a strong web-presence and branding are necessary.

BUDGET

Item	Price
Personnel	
Reassign Time for Kiki Patsch: Fall 2017 (3 WTUs)- ($1800 * 3)	5,400
Travel ASBPA: 2017 National Conference Oct 24th – Oct 27th 2017: Ft. Lauderdale, FL	
Conference Registration/Workshop	$675
Travel Costs for conference: Airfare, Lodging, Food, Transportation, and Incidentals	$1900
Other	
Printing, Copying, Supplies, Logo design	$1000
Total	**$8,975**

Research and Development Minigrants for 2017-2018: Review Form

Routing Step: Initial Committee Review

Application Title: Beach Sustainability Project: Establishing an economic value for California's Sandy Beach Ecosystem

Application ID: #000070

Review Deadline: Jan 27, 2017 11:59:00 PM

***Project Goals and Outcomes:**

The proposal sets clear goals and outcomes for the project, and it explains the steps that will be taken to realize project goals.

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Rating Scale 1 (1 weakest to 11 strongest):

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***Research Plan and Methodology:**

The proposal conveys a complete and well thought-out plan for the project that describes the activities of all individuals involved in the project. If support is requested for student research assistance, the proposal must also include a description of their role in the project and how the faculty

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Rating Scale 2 (1 weakest to 11 strongest):

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***Professional Development Benefits for the Faculty:**

The proposed makes clear how the project will advance each individual applicant's or research, scholarship, creative activity, or innovation in teaching. The proposal discusses whether the applicant(s) intend to pursue external funding and identifies those external funding opportunities.

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Rating Scale 3 (1 weakest to 11 strongest):

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***Project Benefits:**

To what extent does the proposed qualify for special consideration (e.g., applicant is probationary, applicant has not had minigrant funding in the past, applicant has been especially successful in the use of past minigrant funding, project scope is particularly ambitious but realizable).

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Rating Scale 4 (1 weakest to 11 strongest):

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***Dissemination Plans:**

The level and type of dissemination is appropriate for the project, its goals, and its outcomes.

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Rating Scale 5 (1 weakest to 11 strongest):

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***Project Timeline:**

The project goals and objectives are attainable within the timeline of the proposal.

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Rating Scale 6 (1 weakest to 11 strongest):

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***Project Assessment:**

The proposal describes how the product(s) of the project will be assessed and evaluated to determine the degree of success achieved.

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Rating Scale 7 (1 weakest to 11 strongest):

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***Project Budget:**

The proposed budget is reasonable in the context of the project description, and the project costs are necessary to achieve project goals and outcomes.

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Rating Scale 8 (1 weakest to 11 strongest):

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***Other considerations:**

To what extent does the proposed qualify for special consideration (e.g., applicant is probationary, applicant has not had minigrant funding in the past, applicant has been especially successful in the use of past minigrant funding, project scope is particularly ambitious but realizable).

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Rating Scale 9 (1 weakest to 11 strongest):

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