



# Society for Risk Analysis New England Chapter

2016-2017 Event Series

## **MEETING ANNOUNCEMENT**

**Thursday, January 19, 2017**

**Refreshments: 5:30 pm – 6:00 pm**

**Presentation: 6:00 pm – 6:30 pm**

**Discussion: 6:30 – 6:50 pm**

## **MINIMIZING THE REGRETS OF LONG-TERM URBAN FLOODPLAIN MANAGEMENT DECISIONS UNDER UNCERTAIN CLIMATE CHANGE**

**JORY S. HECHT, PH.D.**

**TUFTS UNIVERSITY**

**PAUL H. KIRSHEN, PH.D.**

**UNIVERSITY OF MASSACHUSETTS-BOSTON**

### **Location**

Industrial Economics, Inc  
Henderson Carriage Building, Fourth Floor  
2067 Massachusetts Avenue  
Cambridge, MA

**Please RSVP by Friday, January 13<sup>th</sup> to Sonja Sax ([ssax@ramboll.com](mailto:ssax@ramboll.com)) or Jeff Cegan ([Jeffrey.C.Cegan@usace.army.mil](mailto:Jeffrey.C.Cegan@usace.army.mil)).**

Space is limited, so reserve your seat today. For more information on SRA-NE, please go to: [www.sra-ne.org](http://www.sra-ne.org)



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## MINIMIZING THE REGRETS OF LONG-TERM URBAN FLOODPLAIN MANAGEMENT DECISIONS UNDER UNCERTAIN CLIMATE CHANGE

Making long-term floodplain management decisions under uncertain climate change is a major urban planning challenge of the 21<sup>st</sup> century. To support these efforts, we introduce a screening-level optimization model that identifies adaptation portfolios by minimizing the regrets associated with their flood-control and damage costs under different climate change trajectories that are deeply uncertain, i.e. have probabilities that cannot be specified plausibly. This mixed integer program explicitly considers the coupled damage-reduction impacts of different floodwall designs and property-scale investments (first-floor elevation, wet flood proofing of basements, permanent retreat and insurance), recommends implementation schedules and assess impacts to stakeholders residing in three types of homes.

An application to a stylized municipality illuminates many nonlinear system dynamics stemming from large fixed capital costs, infrastructure design thresholds, and discharge-depth-damage relationships. If stakeholders tolerate mild damage, floodwalls that fully protect a community from large design events are less cost-effective than portfolios featuring both smaller floodwalls and property-scale measures. Potential losses of property tax revenue from permanent retreat motivate municipal property-tax initiatives for adaptation financing. Yet, insurance incentives for first-floor elevation may discourage locally financed floodwall investments, in turn making it difficult for lower-income residents to protect themselves from severe flooding. A budget constraint analysis underscores the benefits of flexible floodwall designs with low incremental expansion costs while near-optimal solutions demonstrate the scheduling flexibility of many property-scale measures. Finally, an equity analysis shows the importance of evaluating the overpayment and under-design regrets of recommended adaptation portfolios for each stakeholder and contrasts them to single-scenario model results.



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## ABOUT THE PRESENTERS

Dr. Jory S. Hecht recently defended his dissertation in Environmental and Water Resources Engineering at Tufts University, where he also participated in the interdisciplinary Water Diplomacy program. His dissertation research evaluates methods for making multi-stakeholder water resources decisions when limited streamflow and climate information is available. In addition to climate change adaptation planning, his decision-making research encompasses applications in urban hydrology and environmental flows downstream of hydropower dams. Previously, he has earned master's degrees in both Geography and Civil Engineering, interned with the International Water Management Institute in Lao PDR, worked as a hydrologist with the Illinois State Water Survey, and implemented GIS projects with small non-profit organizations in Guatemala. He will soon be starting a postdoctoral research position with the Lake Champlain Basin Resilience to Extreme Events project at the University of Vermont.

Paul Kirshen has more than 30 years of experience serving as Principal Investigator of complex, interdisciplinary, participatory research related to water resources, coastal zone, and infrastructure management, and climate variability and change. He is presently Professor in the School for the Environment at UMass Boston and Academic Director of the Sustainable Solutions Lab at UMass Boston. Previously he was a faculty member at the University of New Hampshire and Tufts University. He was a Lead Author of the IPCC Fifth Assessment Report and the 2014 US National Climate Assessment. He works at scales ranging from local to international. He received his ScB in Engineering from Brown University and his MS and PhD in Civil Engineering from the Massachusetts Institute of Technology.



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## GETTING TO THE EVENT

Directions to Industrial Economics can be found at: <http://www.indecon.com/iecweb/findus.aspx>

### **From the MBTA Subway (on foot):**

Take the [MBTA Red Line](#) to Porter Square. Exit the T Station to the right and cross the street. Turn left and proceed northwest along Massachusetts Avenue, keeping the Porter Square Shopping Center to the right. Continue northwest approximately 0.2 miles to the Henderson Carriage Building, which is located at the corner of Massachusetts Avenue and Hadley Street. IEC is on the fourth floor.

### **By Bus:**

The [77 and 83](#) bus routes stop in front of the building. Other bus routes that stop nearby include the 88, 87, and 96.

### **Driving Directions:**

From I-95 / Route 128: Take Exit 29 for "Route 2 East - Cambridge." Follow Route 2 East approximately 6.4 miles to the first set of lights, located at the intersection of Route 2 and Routes 3 and 16. Bear left at the intersection onto Route 3 North/Route 16 East, following the signs for Arlington and Medford. Proceed approximately 0.3 miles to the next set of lights. Turn right onto Massachusetts Avenue/Route 2A and proceed southeast approximately 0.9 miles, to the intersection of Rindge Ave. and Massachusetts Ave. Continue on Massachusetts Ave. through the Rindge Ave. intersection, then take the first left onto Russell Street. The entrance to the Henderson Carriage Building parking lot is between the second and third private residences on the right, approximately 50 yards down Russell Street.

From Harvard Square: Follow Massachusetts Ave. north approximately 1.1 miles to the Porter Square T Station. Continue on Massachusetts Ave. another 0.2 miles to the Henderson Carriage Building, which is located at the corner of Massachusetts Avenue and Hadley Street. Turn right onto Hadley. The entrance to the Henderson Carriage Building parking lot is on the left, immediately behind the building.

Parking: Parking is available behind the building. There are special designated IEC parking spaces that we encourage you to use, but you can park in other spaces as well.