SSi maine's sustainability solutions initiative

The Sustainability Solutions Initiative (SSI): Maine as a Sustainability Science Laboratory

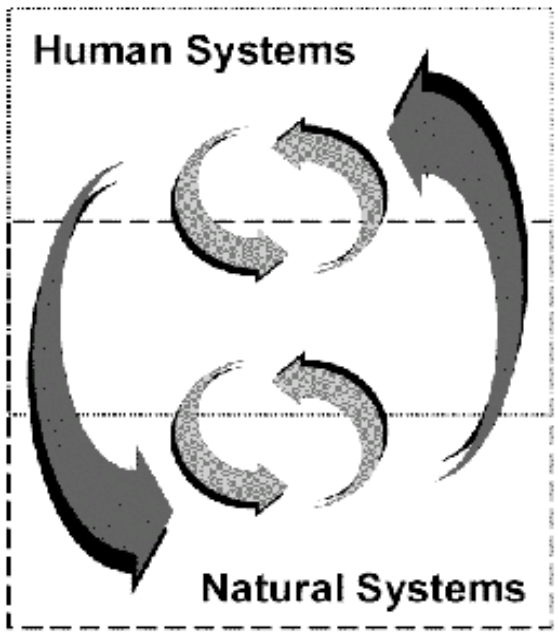
David Hart and Colleagues
Senator George J. Mitchell Center

Supported by National Science Foundation award EPS-0904155 to Maine EPSCoR at the University of Maine.

Advancing sustainability science via three research strategies

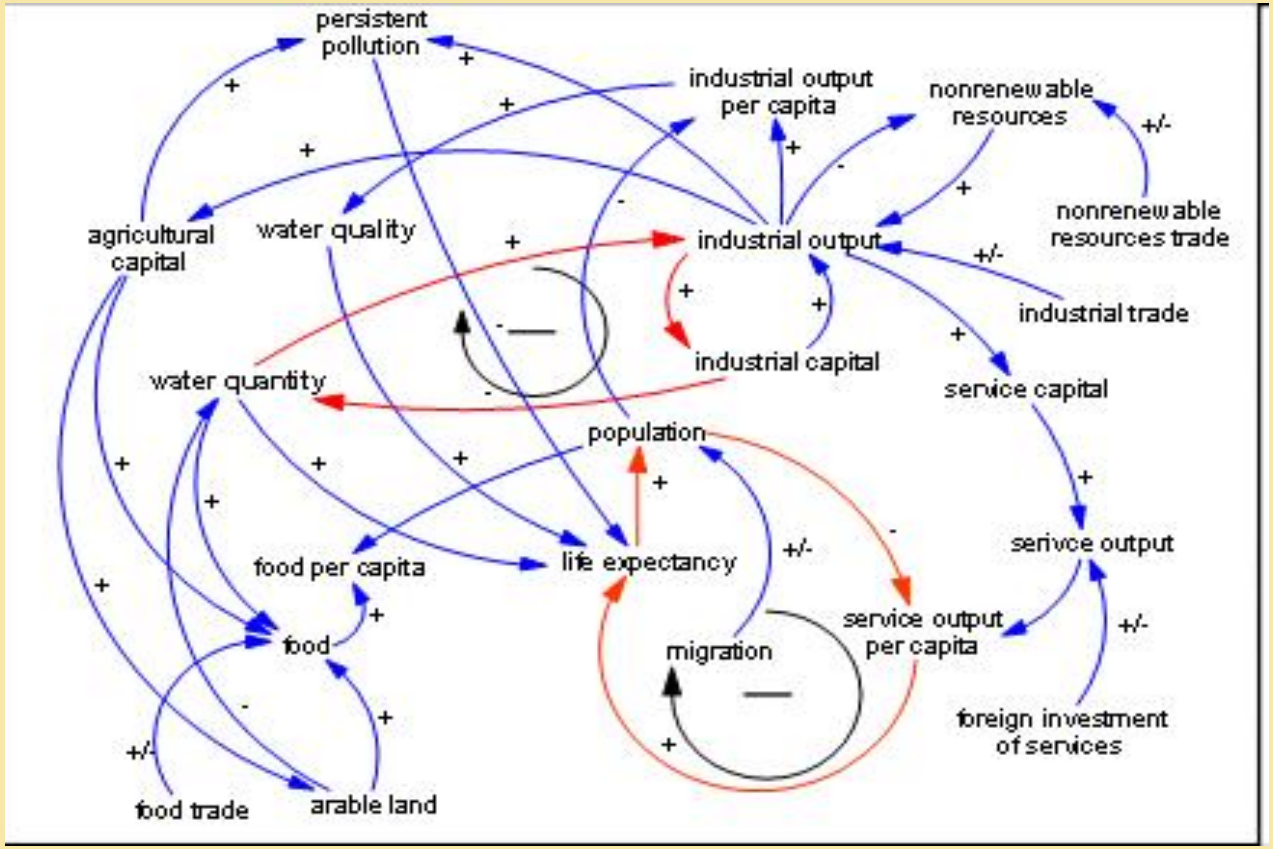
- Understanding the dynamics of coupled social-ecological systems (SES)
- Analyzing and strengthening links between knowledge and action (K↔A)
- Investigating and fostering interdisciplinary integration and organizational innovation (OI)

Dynamics of coupled social-ecological systems (SES)



nsf.gov

- SES thresholds, feedbacks, resilience
- SES as complex adaptive systems

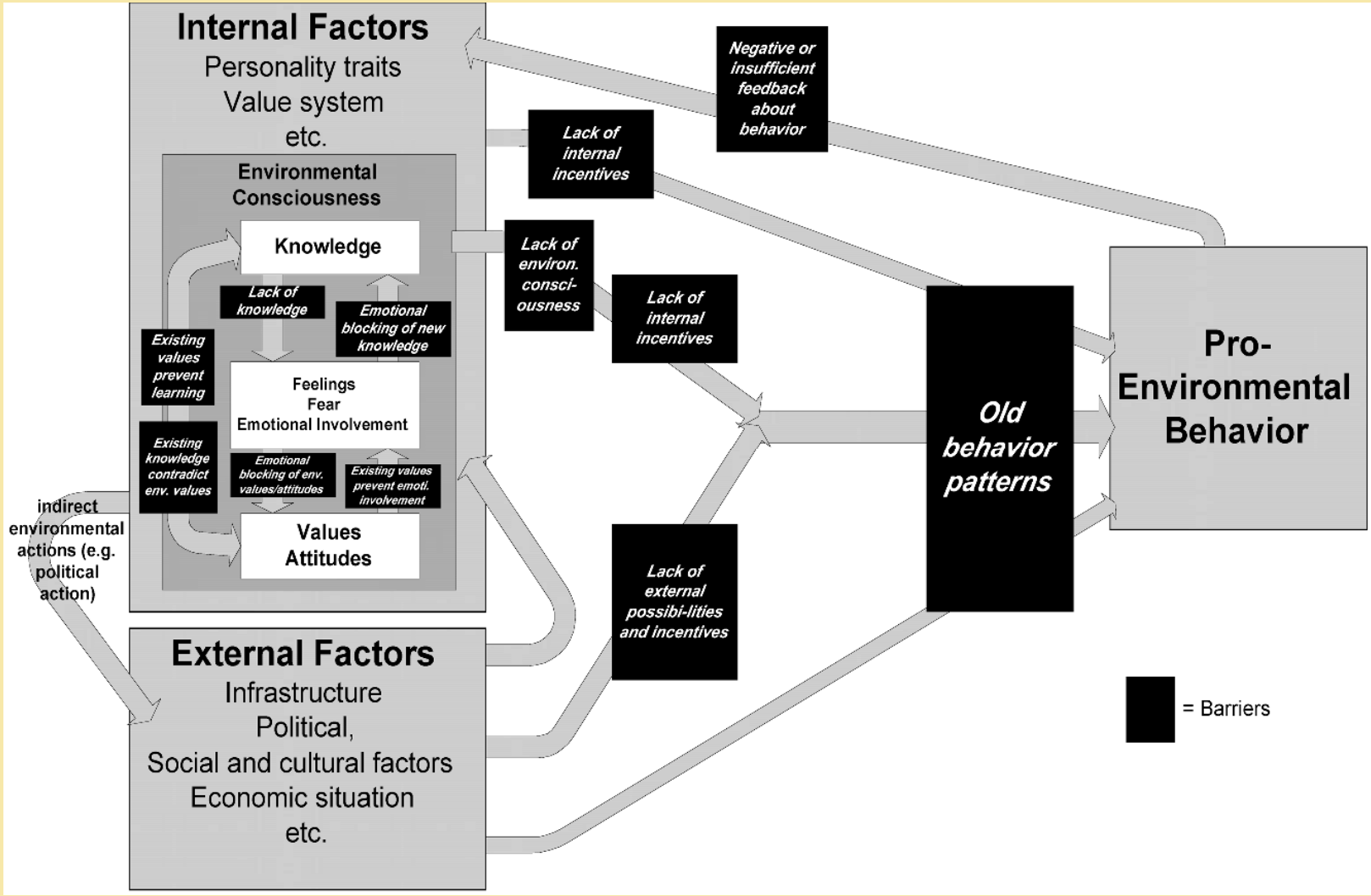


http://gwd.dpri.kyoto-u.ac.jp/english/research/index.html

Links between knowledge and action (K↔A)

Kollmuss and Agyeman, 2002. *Environmental Education Research* 8:239-260.

Linking knowledge and action: A more complex model



Kollmuss and Agyeman, 2002. *Environmental Education Research* 8:239-260.

Key research priorities for linking knowledge with action

- Salience, credibility, legitimacy
  (Cash et al. 2003)
- Participation, integration, learning, negotiation
  (van Kerkhoff and Lebel 2006)

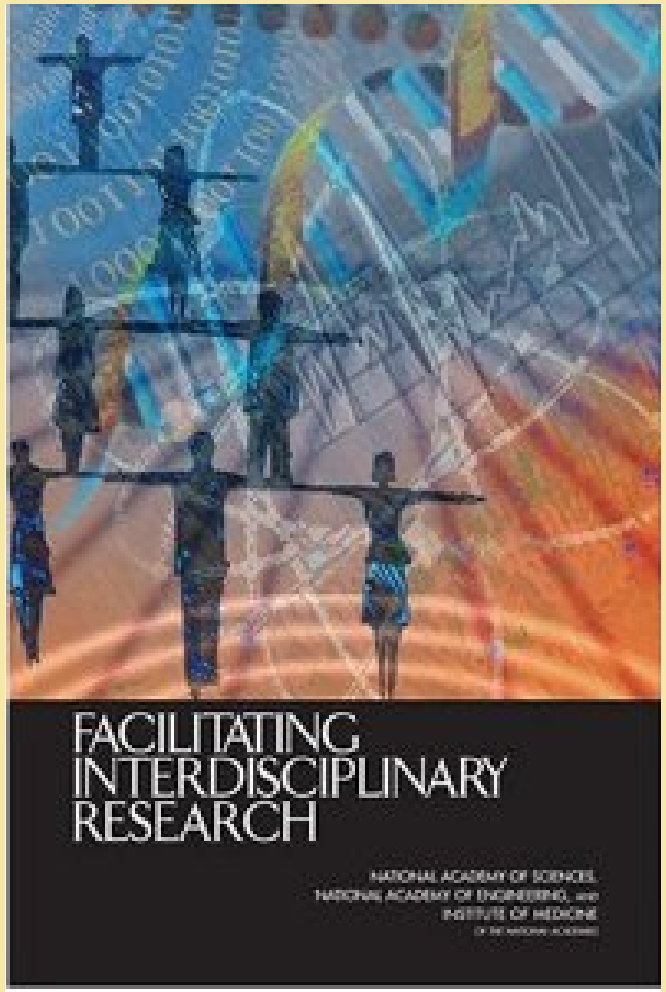
Boundary Work		USE of knowledge to support….		
		Enlightenment (U_0)	Decision (U_1)	Negotiation (U_m)
SOURCE of knowledge…	Single community of expertise (S_1)	$S_1 \leftrightarrow U_o$ *Demarcation*	$S_i \leftrightarrow U_j$ *Expert advice*	$S_i \leftrightarrow \begin{matrix} U_k \\ \updownarrow \\ U_\ell \end{matrix}$ *Assessment*
	Multiple communities of expertise (S_n)	$\begin{matrix} S_i \\ \updownarrow \\ S_j \end{matrix} \leftrightarrow U_o$ *Integrative R&D*	$\begin{matrix} S_i \\ \updownarrow \\ S_j \end{matrix} \leftrightarrow U_j$ *Participatory R&D*	$\begin{matrix} S_i & U_k \\ \updownarrow & \leftrightarrow \updownarrow \\ S_j & U_\ell \end{matrix}$ *Political bargaining*

Fig. 1. Context of boundary work as defined by sources and uses of knowledge.

(Clark et al. 2011)

Interdisciplinary integration and organization innovation

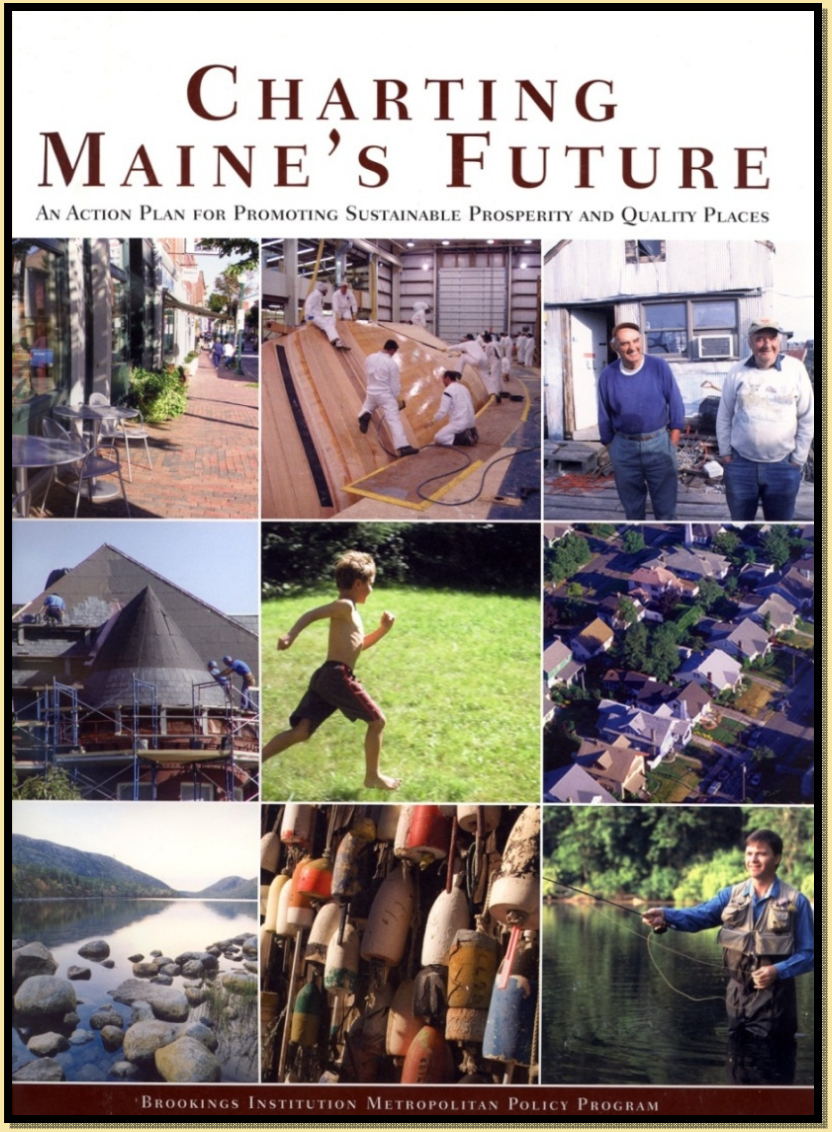
- Individual and institutional factors influencing interdisciplinary collaboration and university-stakeholder partnerships
- Determinants of organizational learning



www.nap.edu

Landscape dynamics in Maine: SSI's model system

Turner, Lambin & Reenberg. 2007. The emergence of land change science for global environmental change and sustainability. PNAS 104: 20666-20671.

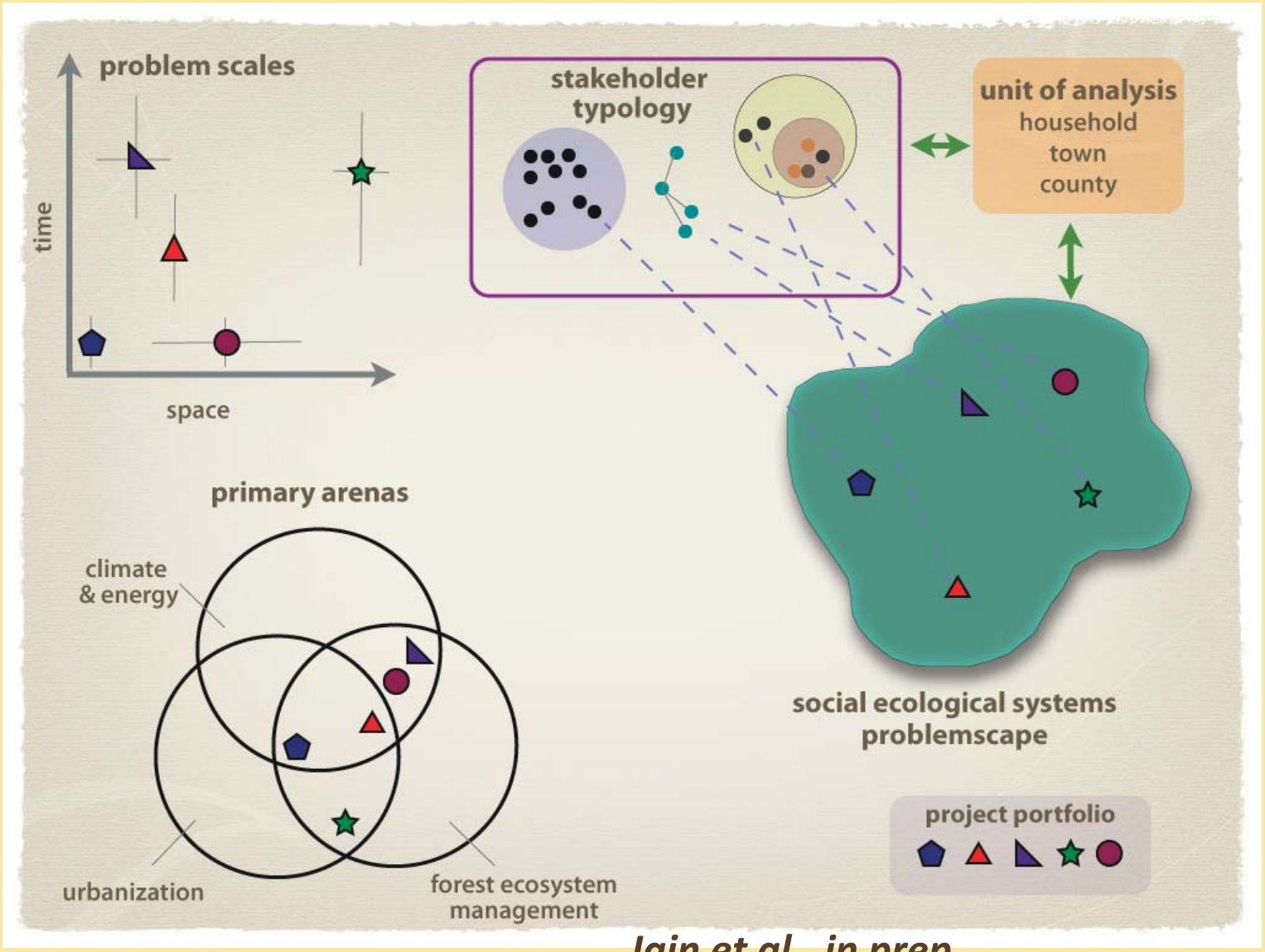


www.brookings.edu

Landscape-related processes influencing SES in Maine

- Urbanization
- Forest ecosystem management
- Climate and energy

The design of SSI's research portfolio

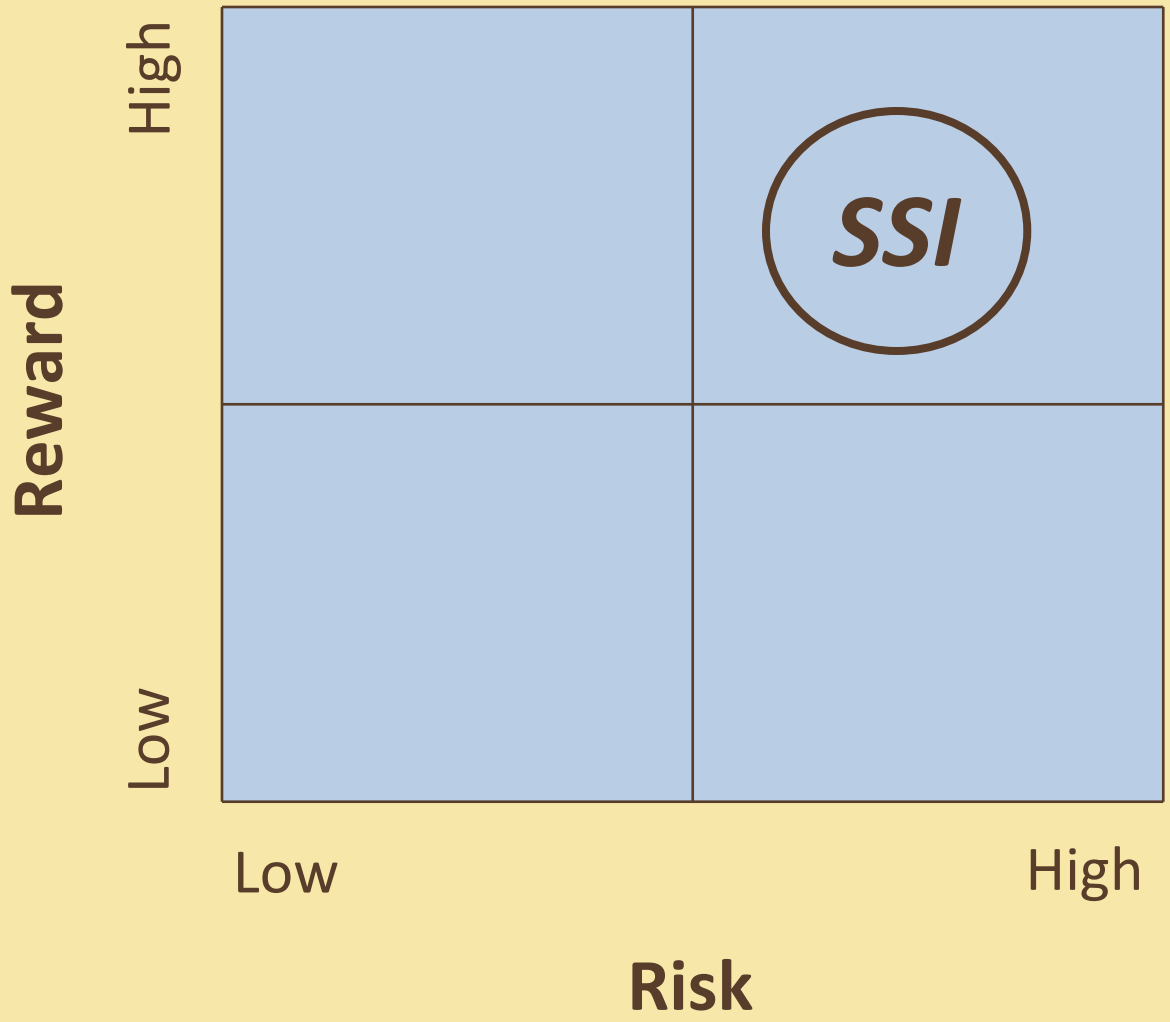


Jain et al., in prep

Implementation of SSI's place-based research projects

- Engage with stakeholders to co-define problems
- Mobilize and support interdisciplinary research teams
- Strive to create durable researcher-stakeholder partnerships
- Develop knowledge co-production strategies
- Emphasize solutions
- Encourage innovation and risk-taking
- Evaluate outcomes and improve effectiveness

SSI emphasizes the ***experimental*** in EPSCoR



SSI Infrastructure

- $20 million, 5-year grant from NSF's Experimental Program to Stimulate Competitive Research (EPSCoR)
- $4 million in matching support from the State of Maine
- > $2.8 million in additional external funding in FY 2012
- > 100 faculty participating in SSI-supported projects
- > 30 disciplines represented
- 5 postdoctoral researchers
- 50+ graduate students
- 100+ undergraduates

Diverse partnerships

A statewide partnership of academic institutions

THE UNIVERSITY OF MAINE

Maine's flagship research & PhD institution – home of Maine EPSCoR & core SSI research faculty teams

UNIVERSITY OF SOUTHERN MAINE

Undergraduate & master's level students - core SSI research faculty

SSP Partners (primarily undergraduate institutions)

UNIVERSITY OF MAINE FORT KENT
UNIVERSITE DU MAINE

University of Maine at PRESQUE ISLE
North of Ordinary

UMF UNIVERSITY OF MAINE FARMINGTON
MAINE'S PUBLIC LIBERAL ARTS COLLEGE

UNITY COLLEGE IN MAINE

THE UNIVERSITY OF MAINE AT MACHIAS
Naturally!

College of the Atlantic
life changing. world changing.

Colby

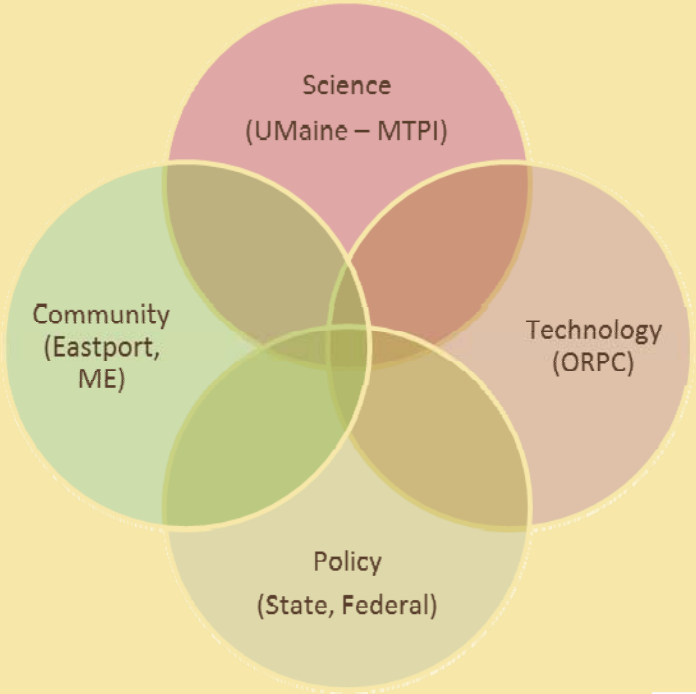
UNIVERSITY OF MAINE AT AUGUSTA
1965

UNE UNIVERSITY OF NEW ENGLAND

Bowdoin

Bates College

Tidal energy development in Cobscook Bay



- Technological feasibility
- Economic viability
- Social acceptability

Teresa R. Johnson, Gayle Zydlewski, Jessica S. Jansujwicz, Jeffrey Vieser, Chris Bartlett, Mick Peterson and Colleagues

SSI maine's sustainability solutions initiative

1865 THE UNIVERSITY OF MAINE School of MARINE SCIENCES

MTPI Resource • Environment • Community • Engineering

Maine Sea Grant Marine Science for Maine People

MAINE EPSCoR

NSF

U.S. DEPARTMENT OF ENERGY

1865 THE UNIVERSITY OF MAINE Cooperative Extension

Who are the stakeholders?

Industry

City Officials

Agencies (Federal/State)

FERC

DEP

DOE

Aquaculture

Passamaquoddy Tribe

Fishermen

2011 Stakeholder Approach

Redefine Problem/
Identify Needs

DY TIDES 22 April, 2011

Public input sought for tidal research

Researchers from the University of Maine are holding an informal public meeting at the Husson University Boat School on Thursday, April 28, from 7 to 9 p.m. to seek input from the community to better understand Cobscook Bay as part of a research project that will gather information on the region's fish population and any impacts that ongoing tidal power projects might have on the fish. Students and staff will present results collected thus far and solicit community input on areas of the bay that should be of interest to researchers. Light snacks and refreshments will be provided.

Gayle Zydlewski emphasizes that she and her group of researchers are invested in the long-term health of the bay, and the role of local citizens is important to the success of this research. "The knowledge of the area from local residents is essential at this stage of the project," emphasizes Zydlewski. "Experience of people who live around the bay would be an invaluable asset and allow researchers to be sure that they are sampling at the most valuable locations. As we collect information we want to provide it back to those interested, and we are seeking comments on the best way to do that."

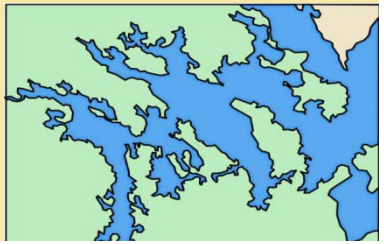
A new phase of research is set to begin in May. While researchers have produced important information on fish presence at sites targeted for tidal power device deployment since 2009, work was focused on limited areas in Cobscook Bay and Western Passage. This new research will broaden the scope to look at the region's fish populations.

Research in Cobscook Bay is being funded by the U.S. Department of Energy and the Maine Sustainability Solutions Initiative. The fish work is intended to be a neutral party assessment. The purpose of the research is to generate information on the fish species that inhabit the bay and assess the possible effects of tidal power installments on those populations. Results of the study will be made publicly available for use by all parties.

Zydlewski and her team are eager to hear any suggestions or concerns from the community. If community members have questions ahead of time or cannot make the meeting, email the team at <umaine.fish@gmail.com>.

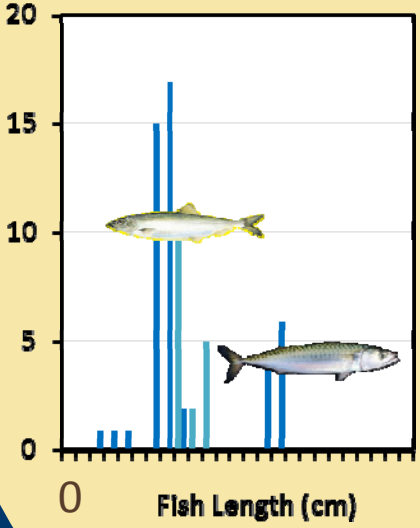
Problem
Identification

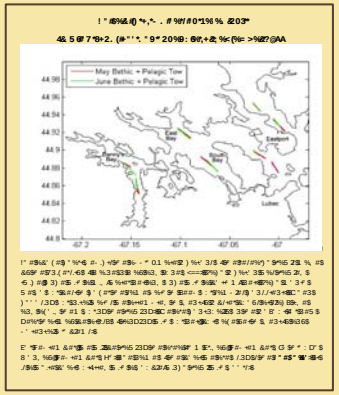
Research
Plan



Data Collection
& Analysis

Present
Results

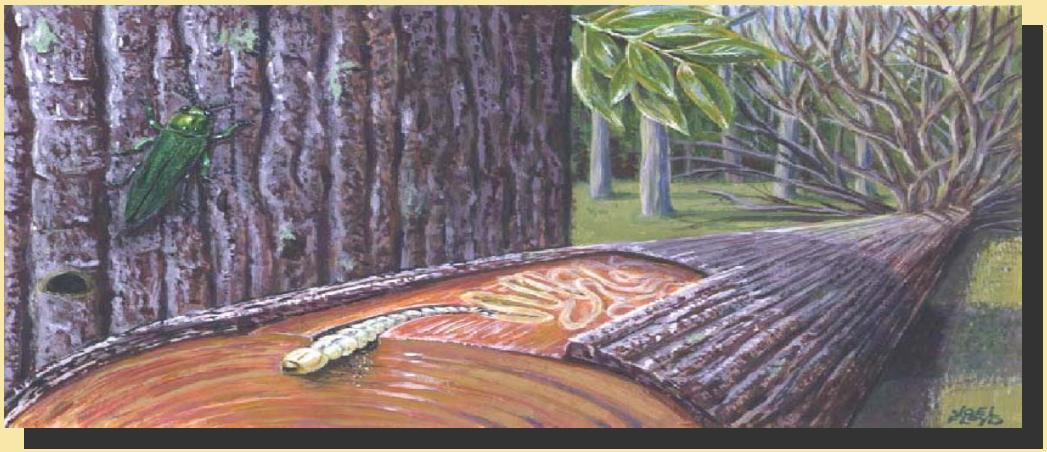




Reducing vulnerability to an invasive forest pest

- Emerald Ash Borer (EAB) has killed 50-100 million ash trees in 14 states, and is spreading east towards Maine

- Goal: Increase capacity to detect and respond to EAB



Protecting the Ash for Future Generations
Kolunkayowan Wikpiyik

Facilitate collaboration among indigenous basketmakers, tribes, state and federal foresters, university researchers, landowners

Linking indigenous knowledge and western science to strengthen resilience

UMaine faculty

- Darren Ranco (Tribal governance and environmental justice)
- John Daigle (Human dimensions of natural resource management)
- Rob Lilieholm (Forest economics and policy
- Bill Livingston (Forest ecology)

Maine Indian Basketmakers Alliance – Theresa Secord and Jennifer Neptune

Theresa Secord

Darren Ranco

Coastal Adaptation in a changing climate

- Focus on Coastal Assets and vulnerability
- Single towns → Maine coast
- Individual Extreme events → Long-term prospects
- Existing network (Maine Sea Grant)
- Initial Survey designed to understand the information needs, critical issues, and knowledge gaps

Shaleen Jain, Civil Engineering and Climate Change Institute
Esperanza Stancioff, Cooperative Extension and Sea Grant

Coastal Adaptation in a changing climate

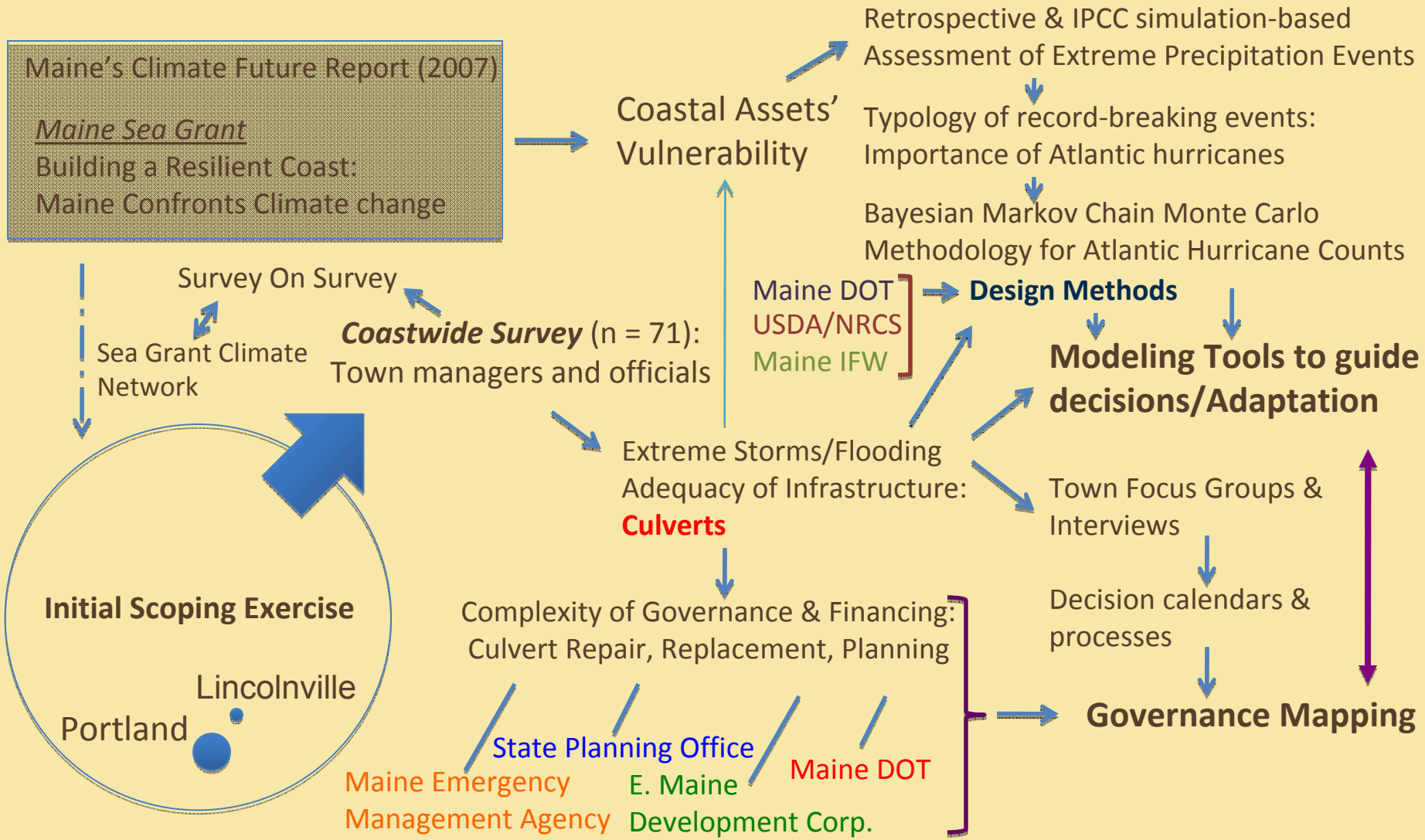
Maine's Climate Future Report (2007)

Maine Sea Grant
Building a Resilient Coast:
Maine Confronts Climate change

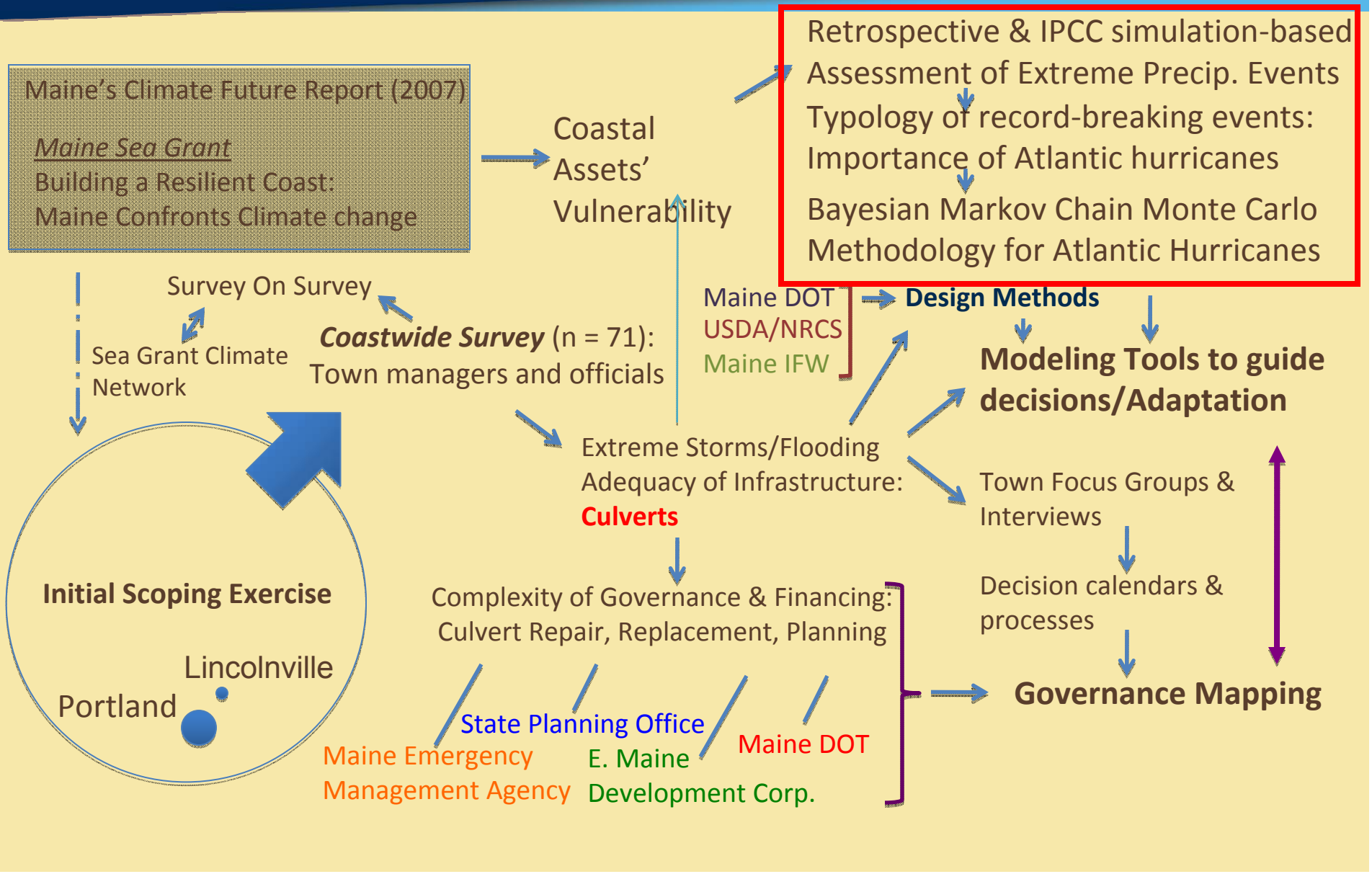
Coastal Assets'
Vulnerability

Modeling Tools to guide decisions/Adaptation

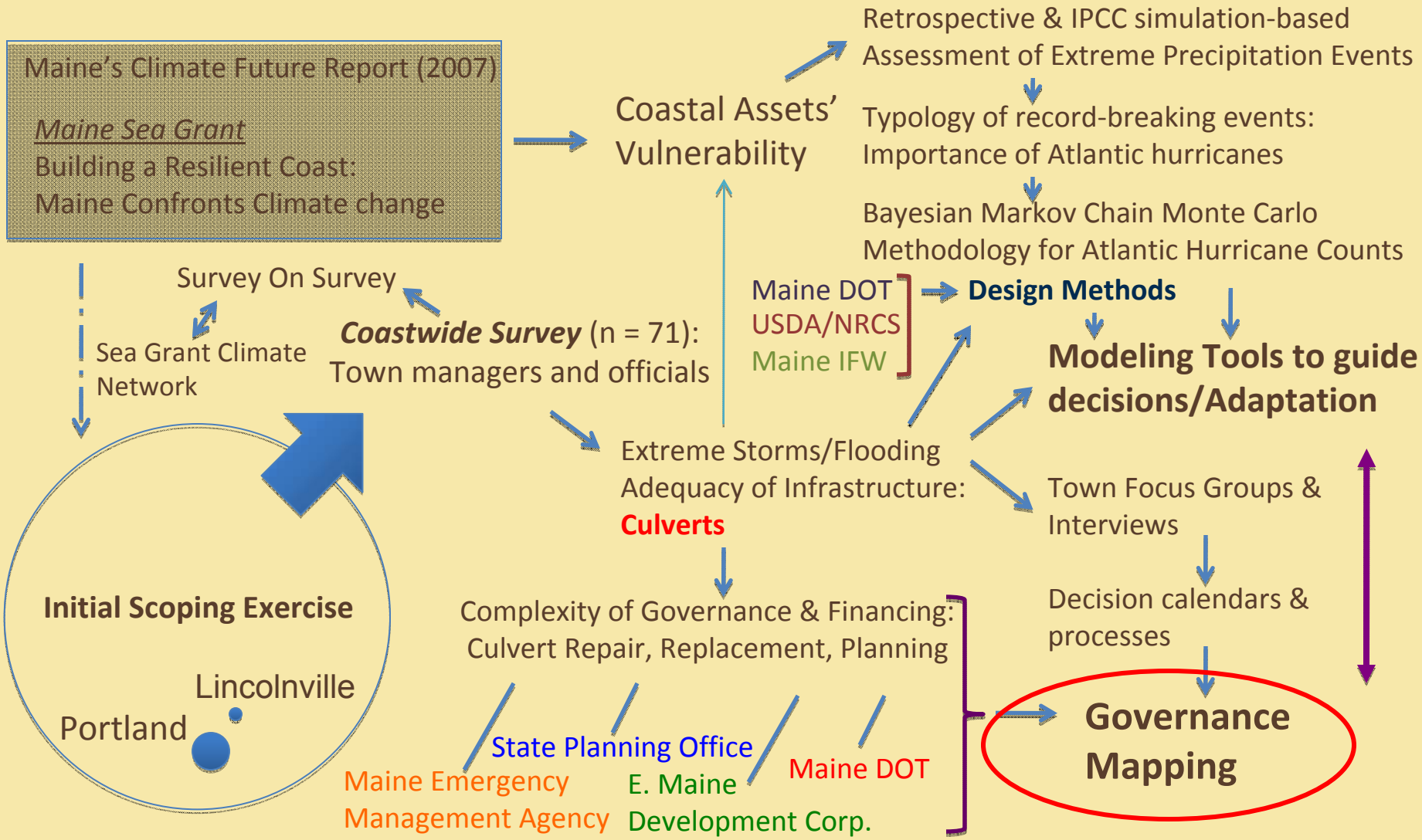
Coastal Adaptation in a changing climate

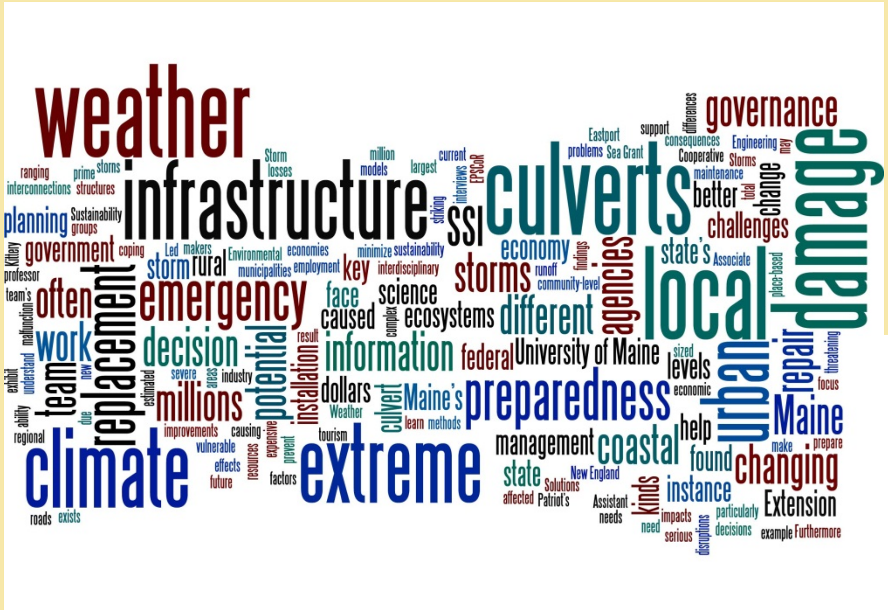


Coastal Adaptation in a changing climate



Coastal Adaptation in a changing climate

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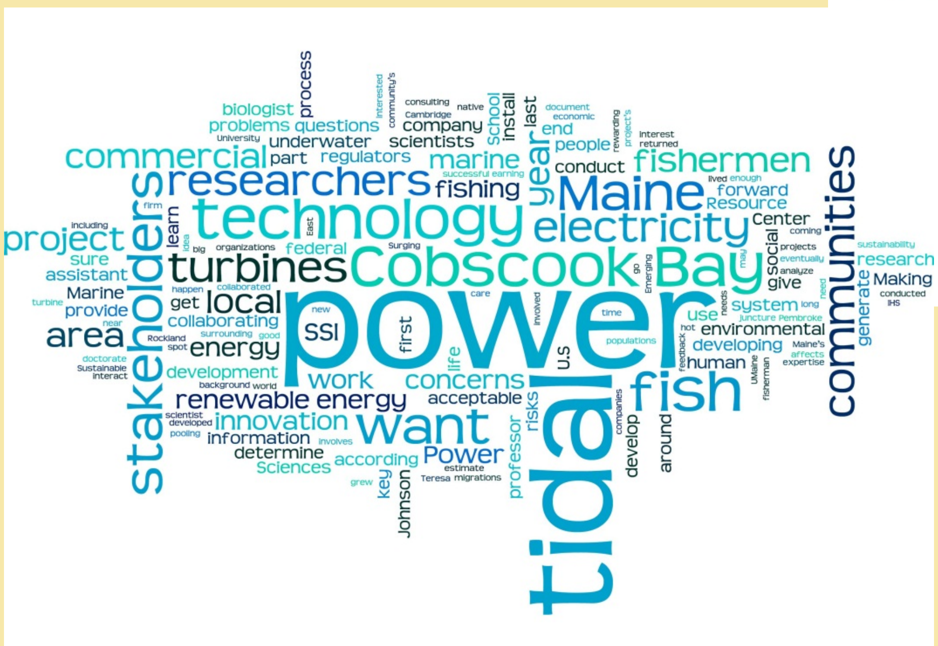
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environmental
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system
research
people
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company
scientists
underwater
problems
questions
biologist
process

Research on interdisciplinary collaboration

Mixed-methods research (qualitative interviews, quantitative surveys, economic experiments) to identify factors influencing collaboration

Researchers low in tolerance for ambiguity fare less well in SSI

Higher discomfort with ambiguity is correlated to:

- Lower the pride in being a member of SSI, r = -.60**
- Less similar their values are to other members of SSI, r = -.50*
- Less they feel they can influence SSI, r = -.50*
- Less they would work on SSI without compensation, r = -.36*

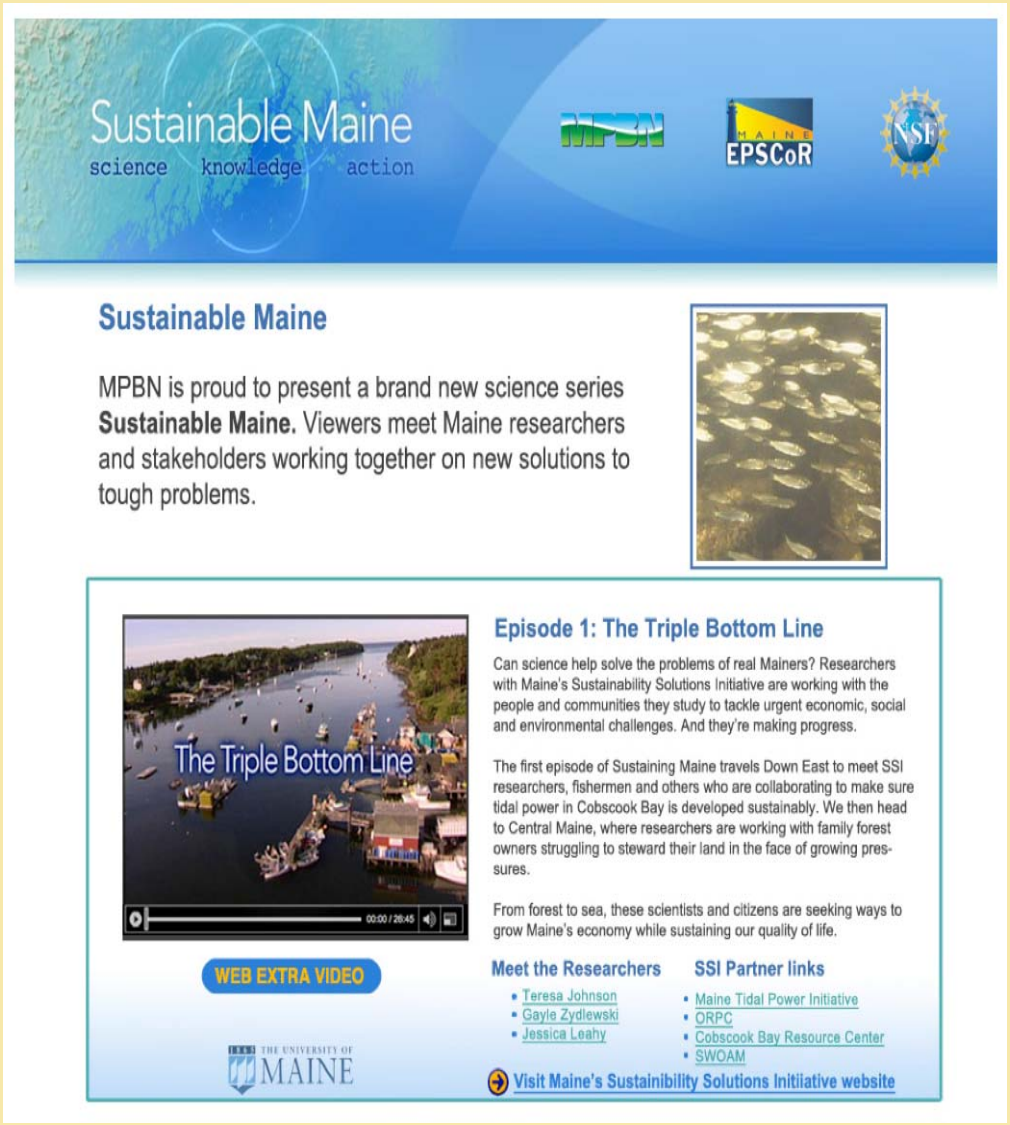
McCoy, Gardner et al., in preparation

Feedback from OI research has strengthened interdisciplinary collaboration

"One of the most impressive things about SSI is that interdisciplinarity is truly central to this initiative; nothing is forced. Indeed, the interdisciplinary nature of the initiative seems to be one of the central elements that draws people to SSI."

— Feedback from AAAS review, May 2011

Maine Public Broadcasting Network has created an entire series about SSI called "*Sustainable Maine*"



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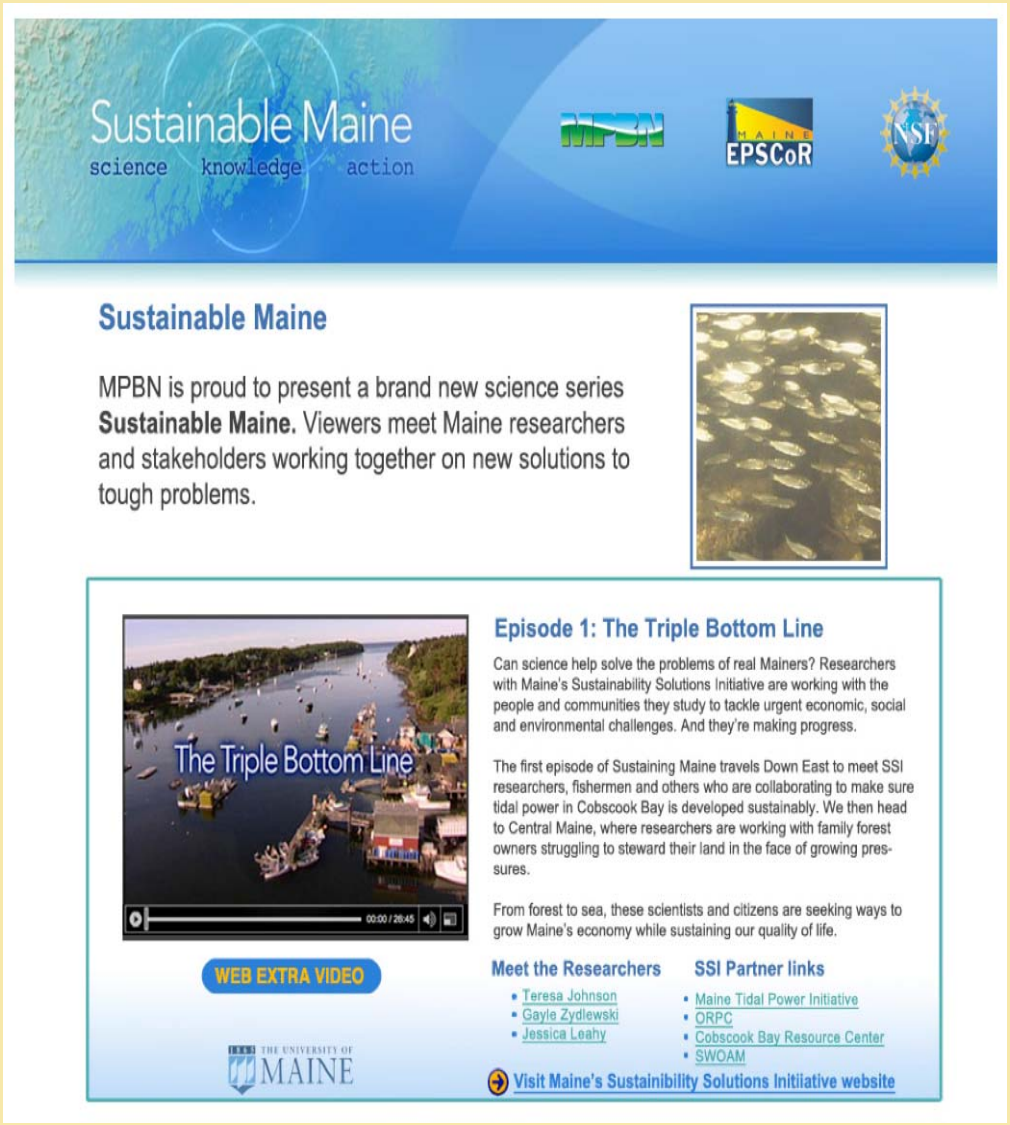

Sustainable Maine just nominated for two Emmys!

SSI maine's sustainability solutions initiative

Connecting knowledge with action to strengthen our economic, social and environmental future

THE UNIVERSITY OF MAINE 1865 | usm UNIVERSITY OF SOUTHERN MAINE | MAINE EPSCoR | NSF

Supported by National Science Foundation award EPS-0904155 to Maine EPSCoR at the University of Maine.

Maine's Sustainability Solutions Initiative - www.umaine.edu/sustainabilitysolutions/

Acknowledgments

- NSF EPSCoR Award EPS-0904155
- Maine Economic Improvement Fund
- Sustainability Solutions Initiative Team
- SSI Advisory Board (especially Bob Kates, Chair)
- Aldo Leopold Leadership Program (especially Jane Lubchenco and Pam Matson)