

MAINE'S SUSTAINABILITY SOLUTIONS INITIATIVE

Coupled Systems Modeling

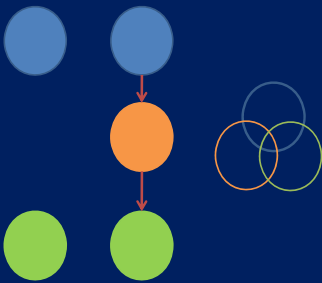


Kathleen P. Bell, Shaleen Jain, and colleagues
School of Economics and Civil and Environmental Engineering
University of Maine

Maine's Landscape



Coupled Natural-Human Systems

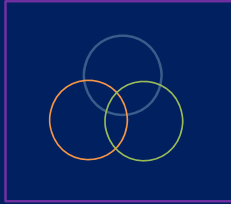


Scientific Advances

- Feedbacks
- Dynamics
- Complexity
- Resilience

Sustainability Science Initiative

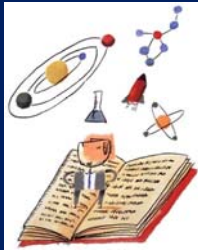
- Scientific core: coupled natural-human systems
 - Capitalize on expertise
 - Clear the market for knowledge
 - Consider alternative futures for Maine



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

Capitalizing on Scientific Expertise

- Recognizes and draws from scientific expertise throughout Maine
- Encourages scientific advances via integration
- Offers novel training to the next generation of scientists



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

Clearing the Market for Scientific Knowledge

- Responds to Scientific Opportunities and Challenges
 - NSF Dynamics of Coupled Natural and Human Systems (CNH)
 - Sustainability Science (NRC 1999; Clark 2007; PNAS)
 - Knowledge to Action (Cash et al. 2003; Kerkhoff and Lebel 2006; Vollmer and Rappoter 2009)



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

Alternative Futures for Maine

- Supports comprehensive and forward-looking assessments
 - Human
 - Economic
 - Social
 - Natural
 - Ecological
 - Biophysical



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

Maine Sustainability Science Experiment

- Landscape Change
 - Urbanization
 - Forest Management
 - Climate Change



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

Project Example

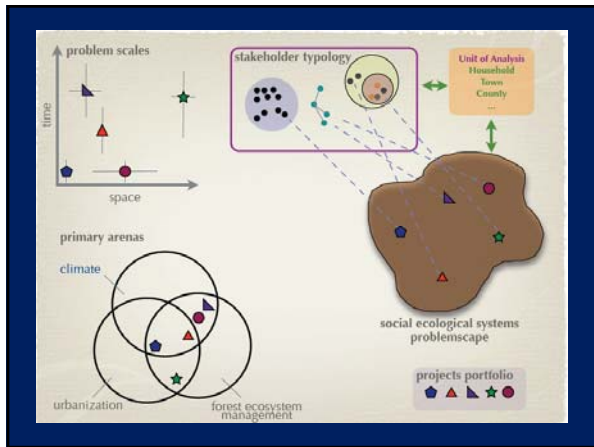
- Study water quantity issues
 - Couple dynamic spatial models of water demand with water supply
 - Study feedback effects between urbanization and water availability and quality
 - Assess sensitivity to climate change
 - Collaborate with SPO, DEP, MEGS, DOT, DECD
 - Support novel student training activities
 - Identify market opportunities



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

Maine Sustainability Science Experiment: Problemscape

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



Guidance Systems for a Complicated Planet

- Confronting Complexity
- Multi-pronged Approaches
- Human-Natural System Models
 - Uncertain scenarios
 - Interplay between subsystems
 - Emergent future
 - Richer expression of complexity
 - Identifying limits, thresholds, and surprises

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

Guidance Systems for a Complicated Planet

- Adapting to an uncertain future

- “Fail-Safe”
- “Safe-Fail”
- Risk across sectors and scales

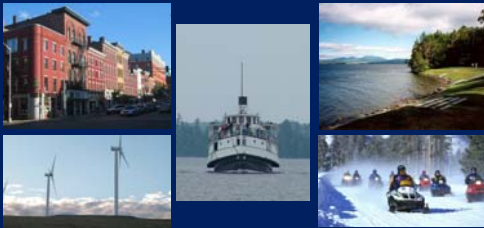


- Envisioning Tools

- Cascading effect of choices/alternatives
- Epicenters of vulnerability
- Telescoping impacts: Individual & Communities
- Policies and Institutions: Nature and Impact of flexibility

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

Maine's Sustainability Solutions Initiative



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

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