

Sustainable Lake Management in Maine's Changing Landscape

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Knowledge to Action: mobilizing science and technology for sustainability (Cash et al. 2003)

- **Applied to Sustainable Lake Management**
 - **managing boundaries between knowledge and action**
 - **fostering meaningful interactions among scientists, policy-makers, communities, NGOs, businesses, and citizens**
 - **changing scientific approach to be inclusive, reflective, and adaptive**
 - **enhancing salience, credibility, and legitimacy of information produced**
 - **generating information on residential development patterns and the interactions among these patterns and lake service flows**
 - **evaluating alternative mechanisms to communicate this information**
 - **assessing impacts of this information on lake management activities and lake conditions**



Context:

- More than 2,000 lakes within a 1 day drive from east coast population centers
- Extensive private land ownership
- Strong local government
- Landownership and land cover changes
- Population and housing growth
- Many unknowns about rural lake-amenity areas

Research Tasks:

- Track and anticipate land use change in lake-amenity areas in Maine
- Delineate impacts of residential development on lake ecosystems and service flows

Research Questions:

- What factors influence the magnitude and spatial distribution of residential development?
- What lake characteristics influence the magnitude and spatial distribution of residential development?
- How can predictions of future residential development advance sustainable lake management?

Interdisciplinary Approach:

- Ecology
- Economics
- Limnology
- Recreation
- Silviculture
- Remote Sensing and GIS

Outputs:

- Spatially explicit & statewide data resources
- Spatially explicit & statewide modeling tools
- Spatial risk assessment tool indicating vulnerability of lakes to various risks (changes in water quality, invasives, recreation, remoteness)

Engagement:

- Use of data, models, and decision tools
- Community-based pilot studies
- Meaningful, interactive discussions with project partners
- Assessment of scientific approach
- Workshops

Knowledge:

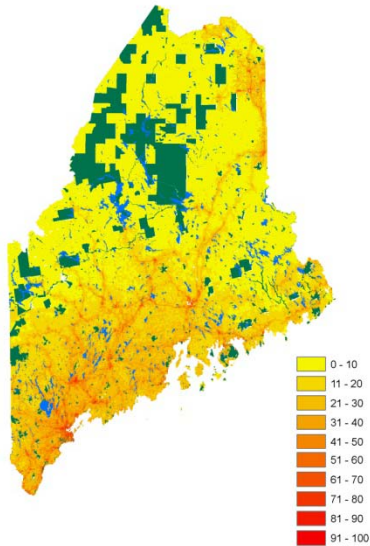
- Increased awareness of Maine's changing landscape
- Increased knowledge of sustainable lake management and land-use planning strategies
- Advanced scientific understanding of sustainable lake management

Action:

- Planners proactively implement sustainable lake management strategies
- Regional and collaborative planning and management efforts undertaken
- Planning tool implemented
- Scientific approach refined

Improved Conditions through Sustainable Lake Management

State scale



Development pressure



**Water Quality
Nutrients
Secchi**



**Invasives
Plants
Fish**

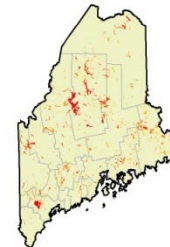


**Recreation
Congestion
Conflicts**

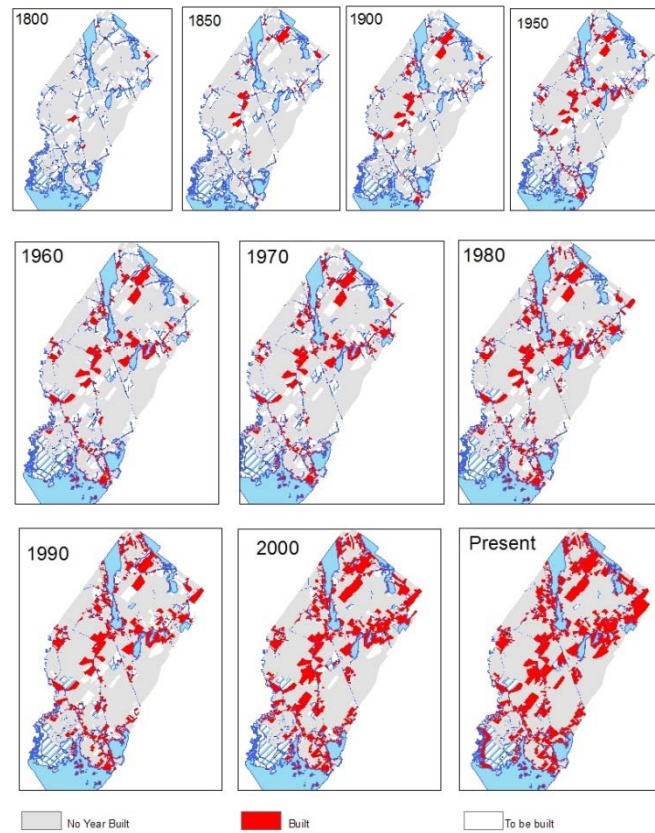


Remoteness

Vulnerability



Community-based pilot studies



Project Partners - collaborators



■ Current

- **State agencies - Maine Department of Environmental Protection; Maine Department of Inland Fisheries and Wildlife; Maine Department of Conservation; Maine State Planning Office; Land Use Regulation Commission; Maine Office of GIS**
- **NGOs - Volunteer Lake Monitoring Program, Congress of Lake Associations**
- **Research and communication organizations - Senator George J. Mitchell Center for Environmental and Watershed Research; Maine Cooperative Extension**

■ Future

- **Mix of partners in 8 pilot communities (local governments, lake associations, citizens, private businesses)**
- **NGOs- TNC, MLTN, SWOAM, CENTRO**
- **US EPA Region 1**
- **Research network (University of Wisconsin Madison, Ohio State University, University of Maine ESI)**

Lessons learned thus far



- **Data on residential development is sparse**
 - successful interaction with other Maine CNS Grantee
 - potential collaboration with VLMP for citizen science collection of data
- **Lake database has an eager audience**
 - integrating data from various agencies and groups
 - adding more social science data to PEARL
- **Interest of partners is strong**
 - widespread support by state agency staff
 - complementing cooperative extension lake education
 - ongoing state-wide debate (Moosehead Lake Proposal)

Workshop Feedback



- **Improving knowledge to action**
 - appropriate balance between complex modeling and effective decision support tools
 - effective collaboration with project partners
 - effective communication with local groups
 - successes and failures of similar projects in other regions
 - sustainability of a dynamic resource

- **Fundamental challenge**
 - "smart" growth in rural, amenity regions