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
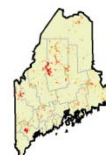
• Scientific approach refined

Improved Conditions through Sustainable Lake Management

State scale
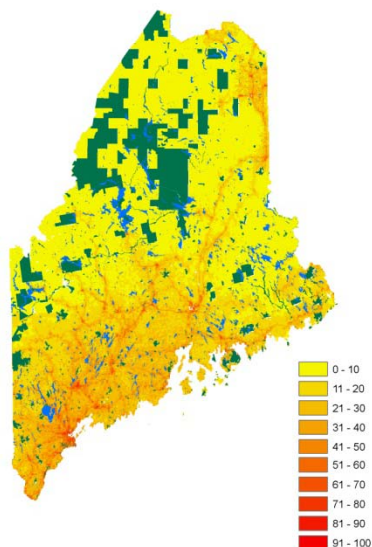
Development pressure

Water Quality
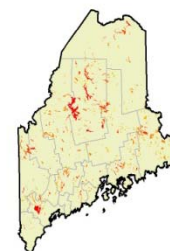Nutrients
Secchi

Invasives
Plants
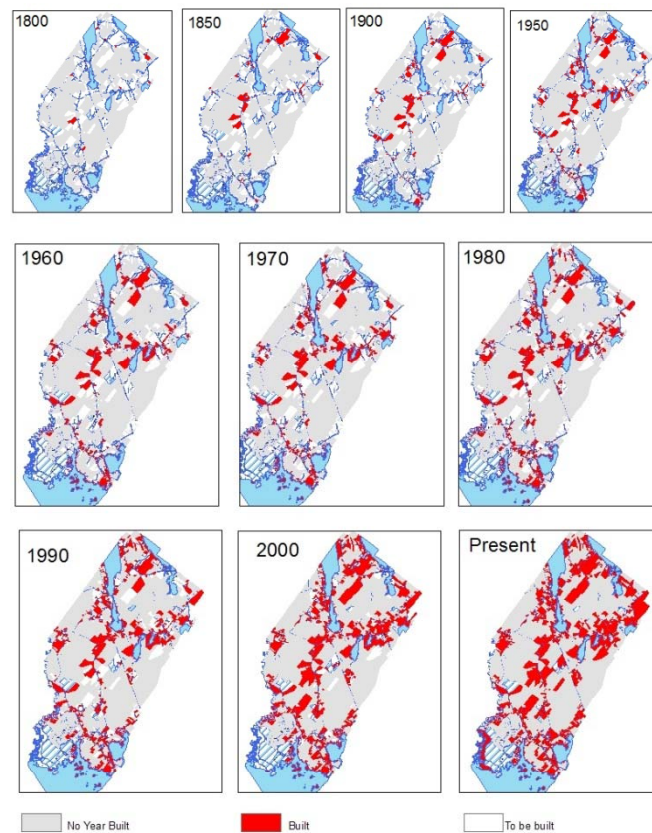Fish

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