Challenges and Rewards of Using a Collaborative Science Approach To Sustain Ecosystem Services

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Robert Johnston Ph.D. Clark University

Verna DeLauer Ph.D. Clark University

Peter Wiley, NOAA
Sustaining Coastal Landscapes and Community Benefits
Little River Watershed, Maine
Challenges

1. Responding to a local need to make a stronger *(economic)* case for natural resource protection.

2. Modeling a paradigm of research in the NERRS to integrate ecological and social sciences.

3. Increasing the impact of NERRS science with collaborative research designed to support stakeholders’ work protecting the things people care about.
Ecosystem Services of Riparian Buffers

LAND AND WATER IN SOUTHERN MAINE

What happens on land in Maine affects its rivers and streams. The area where land meets the water is called riparian land. Riparian land within 300 feet of the water is considered most important by scientists.

Natural Riparian Land  Partially Cleared Riparian Land

Natural riparian land in southern Maine is forested, with trees and low level plants. This land provides a number of services. For example, riparian land:

- **Filters out pollutants** before they reach the water
- **Prevents erosion** and collapse of river banks
- **Prevents flooding** of homes and property by absorbing flood waters
- **Improves habitat** for fish, birds and other wildlife
- **Provides natural scenery** for residents and visitors.

When this land is cleared or developed, many of these services decline.

This survey asks for your opinions about how riparian land is managed in areas surrounding the Merriland, Branch Brook, and Little Rivers in your area.

Your answers will help state and local governments decide how to manage this land.
Nobody Said This Would Be Easy

Challenges of Transdisciplinary Research

Value

and Sustain

Ecosystem Services

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June 10, 2013 Burlington, VT
Stewardship Network for the Socio-Ecological System
Protecting Riparian Buffers in the Little River Watershed

- Maine Geological Survey
- Maine Coastal Program
- Maine Nonpoint Education for Municipal Officials (NEMO)
- Maine Sea Grant
- Maine Drinking Water Program/KKW Water District
- Maine Department of Inland Fisheries and Wildlife
- Maine Department of Environmental Protection
- Southern Maine Regional Planning & Development Commission
- Mt A to the Sea Conservation Initiative/Land Trusts/TNC
- Rachel Carson National Wildlife Refuge
- University of New England
- Wells NERR/Laudholm Trust
- Piscataqua Region Estuaries Partnership
- Town of Wells, Planning Department
- Town of Sanford, Planning Department
- Town of Kennebunk Planning Department
Collaborative Learning to engage the *Kaleidoscope of Expertise* working to sustain ecosystem services

(Feurt, 2007)
Conceptual Framework
Evaluating how knowledge of ecosystem service values and tradeoffs can support decision making to sustain what people care about

(Adapted from Feurt, 2007)
Ecological Assessment of Ecosystem Services
Led by ecologists Dr. Michele Dionne and Dr. Kristin Wilson
Understanding How People Value Shoreline Buffers

Communications Audit
Mental Modeling
To inform communication strategies

Qualitative Research
Focus Groups
Interviews
Grounded Theory Coding

Dr. Verna DeLauer
George Perkins Marsh Institute Clark University
Economic valuation of ecosystem services quantifies the human benefit or value provided by these systems.

This provides a means to quantify, aggregate and compare benefits and costs, and to evaluate the tradeoffs or choices people are willing to make.
Broadening preconceived notions of “economics” beyond market values

- An economic benefit or value is something that makes people better off.
- Values are provided by ecosystem services.
- Money transactions are not required for economic values.
- A large proportion of the benefit from environmental policy is in the form of non-market value.
CHOICES FOR OUR LAND AND WATER

A Survey of Kennebunk, Sanford and Wells Residents
Sponsored by the Wells National Estuarine Research Reserve and Clark University
One year of research effort to develop

WHAT RIPARIAN LAND DOES

The figure below illustrates some of the main natural services provided by riparian land, such as absorbing pollution, improving wildlife habitat and providing natural scenery.

Development in Kennebunk, Sanford, and Wells is removing trees and vegetation on more riparian land each year. This is affecting scenery, river ecosystems, fish, and water quality. Because of this, some people have called for additional restrictions on clearing and development of this land. At the same time, other people do not want the development rights of private landowners to be further restricted.
### Example Choice Questions

**YOU WILL BE ASKED TO VOTE**

After considering the current situation and possible protection effects and methods, which do you prefer? You will be given choices and asked to vote for the option you prefer by checking the appropriate box. **Questions will look similar to the sample below.**

**SAMPLE QUESTION:**

<table>
<thead>
<tr>
<th>Method or Effect of Protection</th>
<th>In 5-10 years under the Current Situation</th>
<th>In 5-10 years under Option A</th>
<th>In 5-10 years under Option B</th>
</tr>
</thead>
<tbody>
<tr>
<td>Riparian Land Condition</td>
<td>85%</td>
<td>87%</td>
<td>95%</td>
</tr>
<tr>
<td></td>
<td>4000 out of 4700 riparian acres covered by natural vegetation</td>
<td>4100 out of 4700 riparian acres covered by natural vegetation</td>
<td>4900 out of 4700 riparian acres covered by natural vegetation</td>
</tr>
<tr>
<td>River Ecology</td>
<td>55% of best possible (100%) ecological condition</td>
<td>85% of best possible (100%) ecological condition</td>
<td>85% of best possible (100%) ecological condition</td>
</tr>
<tr>
<td>Recreational Fish</td>
<td>55%</td>
<td>75%</td>
<td>55%</td>
</tr>
<tr>
<td></td>
<td>17 out of 30 possible fish per 1000 sq. feet</td>
<td>25 out of 30 possible fish per 1000 sq. feet</td>
<td>17 out of 30 possible fish per 1000 sq. feet</td>
</tr>
<tr>
<td>Safe Swimming</td>
<td>85% of beach tests meet safe swimming guidelines</td>
<td>95% of beach tests meet safe swimming guidelines</td>
<td>85% of beach tests meet safe swimming guidelines</td>
</tr>
<tr>
<td>Development Setback</td>
<td>100 feet required between development and rivers; 25 feet for streams</td>
<td>150 feet required between development and rivers; 75 feet for streams</td>
<td>100 feet required between development and rivers; 25 feet for streams</td>
</tr>
<tr>
<td>Enforcement</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cost to your Household per Year</td>
<td>$0 Increase in Annual Taxes or Fees</td>
<td>$45 Increase in Annual Taxes or Fees</td>
<td>$5 Increase in Annual Taxes or Fees</td>
</tr>
</tbody>
</table>

**HOW WOULD YOU VOTE?**

(CHOOSE ONLY ONE)

- [ ] I vote for **X** NO NEW PROTECTION
- [ ] I vote for Option A
- [ ] I vote for Option B

**QUESTION 5**

**OPTION A** and **OPTION B** are possible protection options for the area surrounding the Merriland, Branch Brook, and Little River. The current situation is the status quo with **NO NEW PROTECTION**.

Given a choice between the three, how would you vote?

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</tr>
</thead>
<tbody>
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<td>85%</td>
<td>87%</td>
<td>90%</td>
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<td></td>
<td>4000 out of 4700 riparian acres covered by natural vegetation</td>
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</tr>
<tr>
<td>Development Setback</td>
<td>100 feet required between development and rivers; 25 feet for streams</td>
<td>100 feet required between development and rivers; 25 feet for streams</td>
<td>125 feet required between development and rivers; 25 feet for streams</td>
</tr>
<tr>
<td>Enforcement</td>
<td></td>
<td></td>
<td></td>
</tr>
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<td>Cost to your Household per Year</td>
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<td>$45 Increase in Annual Taxes or Fees</td>
<td>$30 Increase in Annual Taxes or Fees</td>
</tr>
</tbody>
</table>

**HOW WOULD YOU VOTE?**

(CHOOSE ONLY ONE)

- [ ] I vote for **X** NO NEW PROTECTION
- [ ] I vote for Option A
- [ ] I vote for Option B
The survey reveals support for policies that protect riparian buffers

- 3816 surveys mailed to randomly selected residents of Kennebunk, Sanford and Wells.
  - Sampled all residents of the Little River Watershed.
  - Incentive membership in Laudholm Trust
- Out of 3472 deliverable surveys, 1126 were returned for a response rate of 32.4%.
Some Choice Experiment Results

Results counter the common wisdom of policymakers and stakeholders.

Kennebunk, Wells and Sanford residents are willing to pay significant amounts to enhance ecological outcomes associated with riparian land.

- Greater restrictions on development are positively valued by residents. This pattern holds for both owners and non-owners of riparian land.
- Residents also support greater inspections and enforcement of development restrictions on private land.

Results can be used to predict the types of programs that residents would support most strongly.
Engagement with Partners, Stewardship Network and Communities

- Stewardship Network Collaborations
- Wells NERR - Coastal Training Program
- “A Watershed Event” Linking Survey to “Membership”
- Restoration Actions: Fish Ladder & Dam Removal
- Applying Communication and Mental Model Findings
- Interdisciplinary Methods Trainings
- Share results and lessons learned with NERRS and NOAA
Interdisciplinary Trainings Developed

Working Together to Get Things Done
9 trainings delivered nationwide to NERRS 2012-2013

Graduate Research Seminars

Qualitative Research Methods Course
Webinar Delivered Winter 2013

Communicating Ecosystem Services
ACES Conference December 2014

Bridging the Gulfs
Two-day training: Maine September 2014
Texas January 2015
“Rewards” of Wells NERR Collaborative Science

1. Research with decision-makers, stakeholders and the general public to develop models, assess Ecosystem Services (ES) and improve communication.

2. Coordination of ecological and economic models and approaches centered around the identified ES.

3. Ecological fieldwork and data gathering to quantify status and forecast potential changes in ES.

4. Development, testing and implementation of economic choice models to quantify preferences and values, linked to ecological project components.

5. Coordination of results to forecast ES value implications of riparian land scenarios.

6. Share knowledge within the NERRS and partners.
Collaborative Learning Projects 2002-2014
Acknowledge: research colleagues, partners, stakeholders

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National Estuarine Research Reserve System
Science Collaborative
Evaluate Your Competency in Collaborative Interdisciplinary Science

**How to be an expert**

- **Expert**, always in flow
- **Kicking Ass Threshold**: “I'll keep pushing myself. There's always some way to do it better...”
- **Suck Threshold**: “Now that I can do it, I'll just keep doing it the same way.”
- **Drop-out**: “I suck at this. I give up.”

**Time**: First time, Years or decades
1. How have you adapted to the challenges of using a collaborative science approach?

2. Are there lessons learned about navigating the uncertainty of collaborative science research?

3. How are the outcomes of using a collaborative science different from traditional disciplinary approaches?

4. How do you evaluate “success”?

5. What advice would you give a colleague about to embark on a collaborative science project?
Collaborative Learning Approach

1. Engage stakeholders & researchers in problem identification to focus research
2. Design events to build shared understanding
3. Identify strategic actions to improve a situation of mutual concern
4. Facilitate co-creation of knowledge among the research team and with stakeholders
5. Evaluate relevance of research findings
6. Adapt research to meet stakeholder expectations
7. Transfer expert knowledge among collaborators