

## **NERRS Science Collaborative Progress Report for the Period 3/1/11 through 8/31/11**

**Project Title:** Sustainable Shorelines along the Hudson River Estuary

**Principal Investigator(s):** Betsy Blair, Hudson River NERR, NYS DEC

**Project start date:** 9/15/10

**Report compiled by:** Betsy Blair

### **Contributing team members and their role in the project:**

- Emilie Hauser, NYS DEC Hudson River NERR -- outreach coordination and project coordinating committee
- Ona Ferguson, Consensus Building Institute (CBI) – project integration lead and project coordinating committee
- Stuart Findlay, Cary Institute of Ecosystem Studies -- ecological studies and project coordinating committee
- Nickitas Georgas, Stevens Institute of Technology -- physical forces assessment
- Kristin Marcell, NYS DEC Hudson River Estuary Program and Cornell University -- project coordinating committee and climate change program liaison
- Dan Miller, NYS DEC Hudson River Estuary Program -- demonstration project development, ecological studies, and project coordinating committee
- Jon Miller, Stevens Institute of Technology -- physical forces assessment, demonstration project, and project coordinating committee
- Dave Strayer, Cary Institute of Ecosystem Studies -- ecological studies and project coordinating committee
- Kathie Weathers, Cary Institute of Ecosystem Studies – project integration and project coordinating committee

### **A. Progress Overview:**

The purpose of the Hudson River Sustainable Shorelines Project is to provide science-based information about the best shoreline management options for preserving important natural functions of the Hudson River Estuary's shore zone, especially as sea level rise accelerates and storms increase in intensity. With the ongoing input of decision-makers and intended users of project results, the project team is generating new information about engineering performance, ecological tradeoffs, economic costs, projected river conditions, legal and regulatory opportunities, and the needs and priorities of key audiences. With NERRS Science Collaborative funding, the shorelines project team will conduct studies to 1) test how shoreline structure affects ecological services, 2) expand knowledge of physical forces impinging on shorelines, 3) construct a demonstration site, and 4) and develop a decision support tool. The project will involve and foster collaboration with shorelines decision-makers, with the ultimate goal of providing useful products, informing decisions, and influencing outcomes.

During this reporting period, we completed the execution of the last subcontracts with project partners, advanced demonstration site development, planned for fall 2011 field research, began our review of decision support tool options, and obtained valuable input from our advisory team and other intended users, as well as from the results of two social science studies.

### **B. Working with Intended Users:**

#### *Progress:*

During this reporting period (although still under separate funding), we:

- Finalized two studies to better understand key decision points and how shoreline decisions are made on the ground. The studies, done by CBI and by Thrive Consulting were reviewed by colleagues, and final reports were completed, as well as summary

one-pagers of key findings. These were shared with the Project Team in April and the Advisory Committee in May.

- Held two large meetings, an all-day meeting with the Project Team on April 11 and a half-day meeting with the Advisory Team on May 6.
- Honed and got feedback on the Overview document that attempts to capture the full scope of the project in one place.
- Began intermediate assessment stakeholder participation, problem definition, and project design by applying the Policy Science Analytic Framework to the project.

*Lessons learned:*

- Project results should be used to help streamline regulatory process for project proponents, and to make things easier, not harder.
- Convening subsets of our advisory teams is an effective way to keep members engaged and gain their advice and insight.
- Stakeholders and users want to see on-the-ground sites constructed and monitored, demonstrating that innovative designs can withstand the rigors of the Hudson.
- A challenge to adoption of softer shorelines is that engineers and developers typically need liability protection, especially when using alternative (innovative) designs. Indemnification language in contracting is one way to handle liability. Good guidelines on best practices can also help reduce liability.
- Collaboration, networking and information sharing among shoreline experts and professionals is somewhat constrained by competition in the development and engineering business arenas.
- There is no common understanding of what we mean by “soft” shoreline. Consider alternative terms such as “ecologically-enhanced,” “bio-engineered,” or “natural”.
- A challenge is to develop an appropriate design level for softer shorelines, so that we can set an appropriate standard while recognizing that any human system can be destroyed by the elements and such catastrophic events.
- Shorelines aren’t necessarily on people’s radars – this project broadly may help raise the profile of shorelines and related issues and concerns.
- The design of all outputs of the all aspects of the project must take into account the target audience.
- Focusing on impacts on shoreline treatments allows us to focus on the shorelines themselves, rather than on upland uses. Including land uses in the analysis could lead to a level of complexity that would make these efforts unfeasible. Also, if we focus on the damage to upland areas, then answer will always be to build more hardened shorelines, which would devalue the natural side of things.

*Next six months:*

- Hold a Project Team meeting in November 2011.
- Hold an Advisory Committee meeting in December 2011.
- Meet with state and non-profit colleagues quarterly to exchange information about activities related to Hudson River shoreline habitat and climate adaptation.
- Meet with potential demonstration site partners.
- Meet with other shoreline advocates along Hudson River Estuary and in New York Harbor to explore interest in creating a network of demonstration sites.
- Convene a group of potential users of the NYHOPS model to provide a facilitated discussion between Stevens’ researchers and Hudson River experts and potential users of project findings and products, so users understand the strengths and constraints of

the model and analytical studies and the researchers obtain feedback from users and experts on the types of products that will be useful.

C. Progress on project objectives for this reporting period:

1) *Shoreline structure effects on ecological services*

During this period, Stuart Findlay, Dan Miller, David Strayer met to refine sampling design and spent a day on the river selecting sampling sites for fish. This field sampling is being done on a range of built shorelines to explore how their physical structure affects ecological function. They chose 20 sites between Rhinecliff and Schodack Island, including five rip-rapped shores, five vertical sheetpile walls, and ten sites containing timber cribbing in various degrees of disrepair. The cribbing sites will serve as analogs for “green walls”, which have not yet been built in this part of the Hudson.

In the next 6 months, the group will begin to collect data at 20 sites on physical structure of the study sites, fish communities, and plant communities; this is projected to occur in September and October 2011. They will sample fish communities over several seasons and measure the physical characteristics (slope, physical complexity, bathymetry) of each of these sites.

2) *Physical forces on shorelines*

During this period, the engineering group (Jon Miller and Nickitas Georgas) analyzed the historical information about ice extent, thickness, and effects along the Hudson River Estuary, and submitted the work to the Journal of Physical Oceanography for publication where it was accepted. During this period, preliminary work on wake measurements was conducting using Stevens-funded summer undergraduate students. A pilot study was done in Pt. Pleasant, NJ and a plan was formulated to assess the advantages and disadvantages of various measurement techniques. The results will be utilized to formulate the data collection plan to be implemented along the Hudson during the summer of 2012.

In the next 6 months, this group will continue to refine the NYHOPS hydrological model participate in the workshop with potential users of the modeling information.

3) *Demonstration site*

Dan Miller attended several on-site meetings and conference calls in an effort to develop a demonstration site at a public park and boat launch in the Village of Coxsackie, in Greene County, NY. He partnered with New York State Office of Parks, Recreation and Historic Preservation (OPRHP, property owner) staff to arrange an on-site meeting with OPRHP natural resource and engineering staff and Jon Miller to examine the site and discuss alternative shoreline solutions. Jon Miller produced a report describing the conditions at the site and proposed solutions that would incorporate a combination of heavy stone, soils and plantings. Based on these recommendations, OPRHP staff produced a preliminary proposal and submitted a permit application to New York State Department of Environmental Conservation, Region 4 Permit staff. A second site visit attended by Dan Miller, NYSDEC permits, United States Army Corp of Engineers and OPRHP staff was arranged to discuss the proposed work and regulatory concerns. As a result of the meeting, the shoreline design and permit application was slightly modified and re-submitted to permitting staff. Issuance of a permit is anticipated. OPRHP hopes to commence construction before December, 2011.

Dan Miller also met with the Waterfront Committee for the Village of Tivoli, in Dutchess County, NY. The village owns a small parcel of property between the Hudson River and the CSX rail road tracks that has been used as an informal access point to the Hudson for many years. The

village is concerned about safety crossing the tracks and the possibility that this issue will result in loss of access to the waterfront. Dan is advising the committee on shoreline habitat, construction and regulatory issues as they develop conceptual plans to preserve access and provide a safe crossing. Shoreline treatment options are an integral part of the overall plan. The village has expressed desire to incorporate habitat friendly solutions.

In the next six months Dan will continue to advise OPRHP in the development and construction of the Cocksackie boat launch site and advise the Village of Tivoli in their shoreline planning efforts. He will also seek additional opportunities to develop demonstration sites in other regions of the estuary.

#### 4) *Decision support tool*

During this reporting period, we gathered decision support tools as possible models for our project from our advisory committees. Zack Steele, TIDES intern, joined the team from June to December, 2011 and began research on decision support tool models. He convened a decision support tool work group twice.

In the next six months, Zack plans to convene additional work group meetings, continue his research, and convene a stakeholder workshop to evaluate decision support tool options and identify the most useful decision support tools.

#### D. Benefit to NERRS and NOAA:

The shoreline case study and expert interviews projects (funded under phase 1 of the Shorelines Project) are being utilized in Phase 2, and efforts are being made in collaboration with NSC staff Dolores Leonard and Cory Riley to extend this work to NERRS and NOAA audiences, especially the Coastal Training sector. This work provides insight into specific audiences and their needs, and is an example of a social methodology. Initially this will focus on the results of the Thrive Consulting interviews of consultants and experts, followed by the CBI case study findings and lessons learned on working with consultants. In the next six months we'll present a poster at the NERRS annual meeting and offer a webinar to the NERRS.

E. Describe any activities, products, accomplishments, or obstacles not addressed in other sections of this report that you feel are important for the Science Collaborative to know.

The spatial database we are developing for Hudson River shorelines (funded under Phase 1) will serve as a tool to develop outreach material and will be an important component of the decision making tool, initially to help team members narrow the extent of the shoreline to consider.

In the next six months, we will build a robust database and use it to answer a suite of questions about shoreline priority areas for revitalization, habitat protection, erosion control, and demonstration projects.