

Kennebunk River Trees and Bank Erosion

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An aerial photograph of a wide river valley, likely the Kennebunk River. The river flows through the center, surrounded by lush green trees and some residential areas on the left. The sky is blue with scattered white clouds. A semi-transparent white rectangular box is overlaid on the center of the image, containing the text.

Project Goals

Initiate a project to mitigate the erosion occurring along the banks of the Kennebunk River between Durrell's Bridge and Rt 9 within the towns of Kennebunk, Kennebunkport, and Arundel.

Primary Concerns

- The Kennebunk River Committee is concerned with the ever present erosion along the banks of the Kennebunk River
- The Committee is looking for both short and long-term solutions to this problem
 - Additionally, a “snapshot” of current biodiversity along the banks



Additional concerns from the community

- River bank erosion is taking trees out
- Trees are blocking the river for recreational activities
 - Boating, kayaking, etc.
- Fallen trees are floating down river
 - Scraping against more of the bank, expediting erosion process



Background Research

- Erosion along the river
 - Sources of erosion
- Existing shoreland zoning laws
 - What obstacles do they present?
 - How to amend them?
 - How to work with them?
- Potential living shoreline solutions
 - Similar sites suffering from erosion
 - Types of living shoreline structures
 - (Maine Geological Survey 2021)

Examples of living shoreline designs from other sites in Maine



Example of Kennebunk River erosion



HOW GREEN OR GRAY SHOULD YOUR SHORELINE SOLUTION BE?

GREEN - SOFTER TECHNIQUES

GRAY - HARDER TECHNIQUES

Living Shorelines



VEGETATION ONLY - Provides a buffer to upland areas and breaks small waves. Suitable only for low wave energy environments.



EDGING - Added structure holds the toe of existing or vegetated slope in place.



SILLS - Parallel to existing or vegetated shoreline, reduces wave energy, and prevents erosion. Suitable for most areas except high wave energy environments.

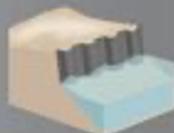
Coastal Structures



BREAKWATER - (vegetation optional) - Offshore structures intended to break waves, reducing the force of wave action, and encourage sediment accretion. Suitable for most areas.



REVETMENT - Lays over the slope of the shoreline and protects it from erosion and waves. Suitable for sites with pre-existing hardened shoreline structures.



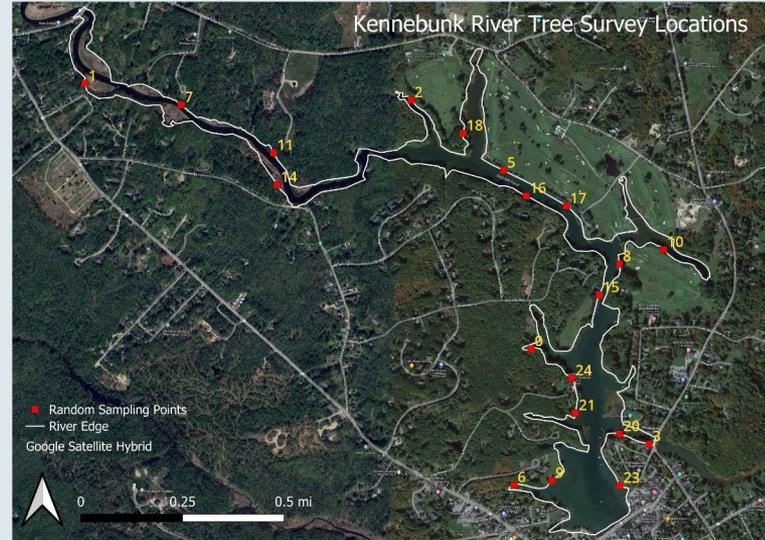
BULKHEAD - Vertical wall parallel to the shoreline intended to hold soil in place. Suitable for areas highly vulnerable to storm surge and wave forces.

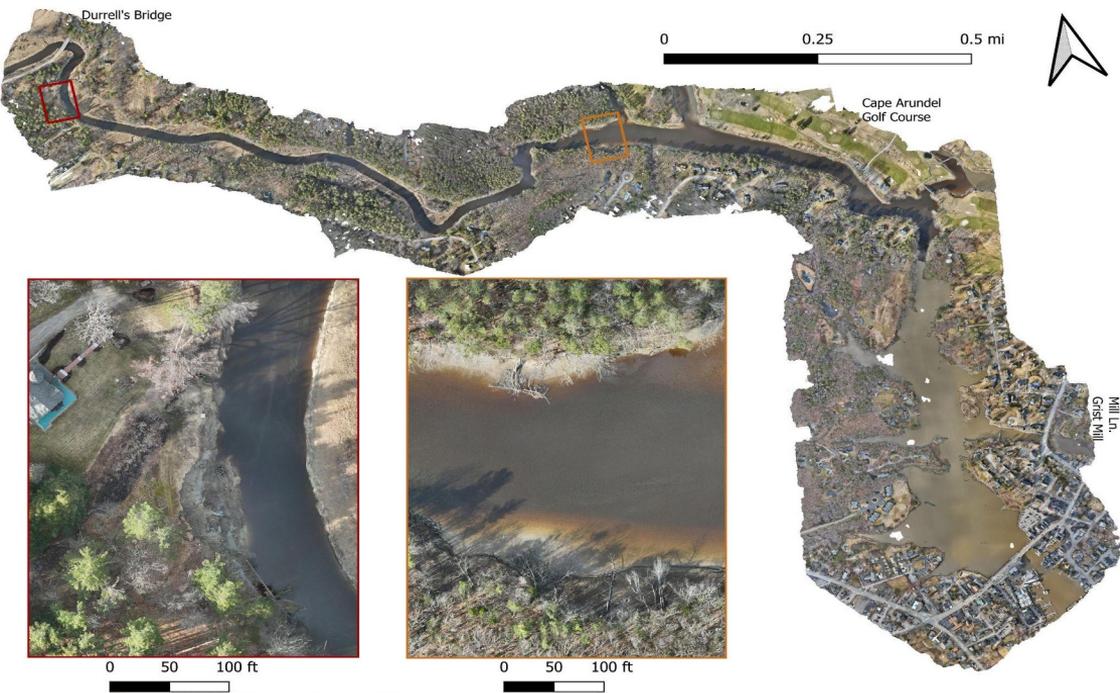
Shoreland zoning and why it matters

- Mandatory Shoreland Zoning Act (MsZA)
 - 250 ft horizontal distance from a body of water
- What can be built
 - Permitting is required in many situations
- Specifics of what trees can be cut/removed, when, and how
 - tree stand specifics
 - tree dbh
 - location in relation to the body of water
 - vegetation in the surrounding area
 - Removal of trees from storm damage
- These laws limit what we can do in terms of proposed solutions, however, they are also important to protect the State's bodies of water.

Collection of Baseline Data

- Drone Flights:
 - Orthoimagery, Aerial Photography, DEMs
- Vegetation Surveys:
 - 10x10m plots with one edge along rivers edge
 - Trees dbh, species, shrub and herb species
- Soils:
 - Examined soils at each plot from river bank using soil texture charts and Munsell color charts





Baseline Data

Dominant Tree Species:

- *Quercus rubra*:
 - avg dbh: 15.4 in
 - Abundance: 0.39
- *Pinus strobus*:
 - avg dbh: 15.3 in
 - Abundance: 0.29
- *Prunus serotina*:
 - Avg dbh: 8.3 in
 - Abundance: 0.08
- Overall Average: 13.4 in
 - Standard dev.: 6.8 in

Soil Observations:

- Majority of the river banks had very soft soil with a lot of give
- Mostly made up of Presumpscot clay
- Some areas with thick layers of organic matter build up



Proposed Solutions

- Solutions will vary site to site
- Avoid impacts on the eroding banks
 - Relocate existing infrastructure if possible
- Plant erosion-resistant vegetation
 - Maine Coastal Planting Guide
- Divert upland water runoff
 - Plant native shrubs/herbs in buffer zone
- Living Shoreline Solution
 - Maintain or add to the fringe marsh vegetation
 - Repurpose fallen trees



Native vegetation planted to stabilize an eroding bank in Freeport, ME



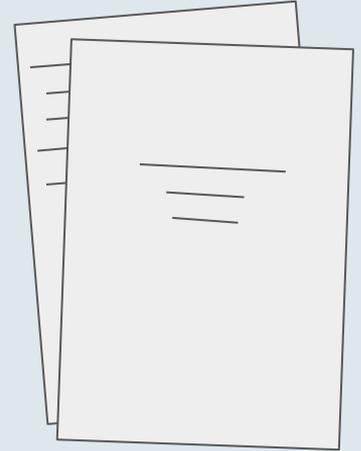
Example of a living shoreline using biodegradable bags, oyster-filled baskets, and logs in Brunswick, ME.

(Slovinsky 2021)

Final Products

Project Proposal for committee

- Explains objects and goals
- Summary of background research
 - Zoning laws, living shoreline examples
- Methods and results of baseline data collection
- Proposed Solutions:
 - Continued monitoring; (installing tide gauge, game cameras, etc.)
 - Continued collaboration with GIS and Env students at UNE
 - Shoreline stabilization and living shorelines



Conclusions

- The banks of the Kennebunk river are experiencing erosion
- Trees growing along the river's edge are at risk of falling in
 - As trees fall and roots dislodge, greater bank erosion will occur
- Presumpscot clay deposits slough off in larger chunks
 - The entire river area is composed of this clay

The combination of the extreme weather events, fallen trees, and soil composition have caused serious concern for the banks and developments along the Kennebunk River.

Reflections

- Mother Nature was not on our side for much of this field work
 - Many days had to be cancelled due to rain or other unsafe conditions
- More people are concerned about the environment than expected
 - Maybe due to this happening in their backyards, but many people were more than willing to let us onto their properties to conduct these surveys
 - After attending the river committee meeting, we found out a lot of people were also very interested in learning more about the issue and educating themselves
- Field work may be slow to start, but can go very quickly once you get in a groove

References

- Clearing Vegetation in the Shoreland Zone (Issue Profile), Land & Water Quality, Maine Department of Environmental Protection. [wwwmainegov. https://www.maine.gov/dep/land/slz/ip-szveg.html](https://www.maine.gov/dep/land/slz/ip-szveg.html).
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Questions?



Thank you.