



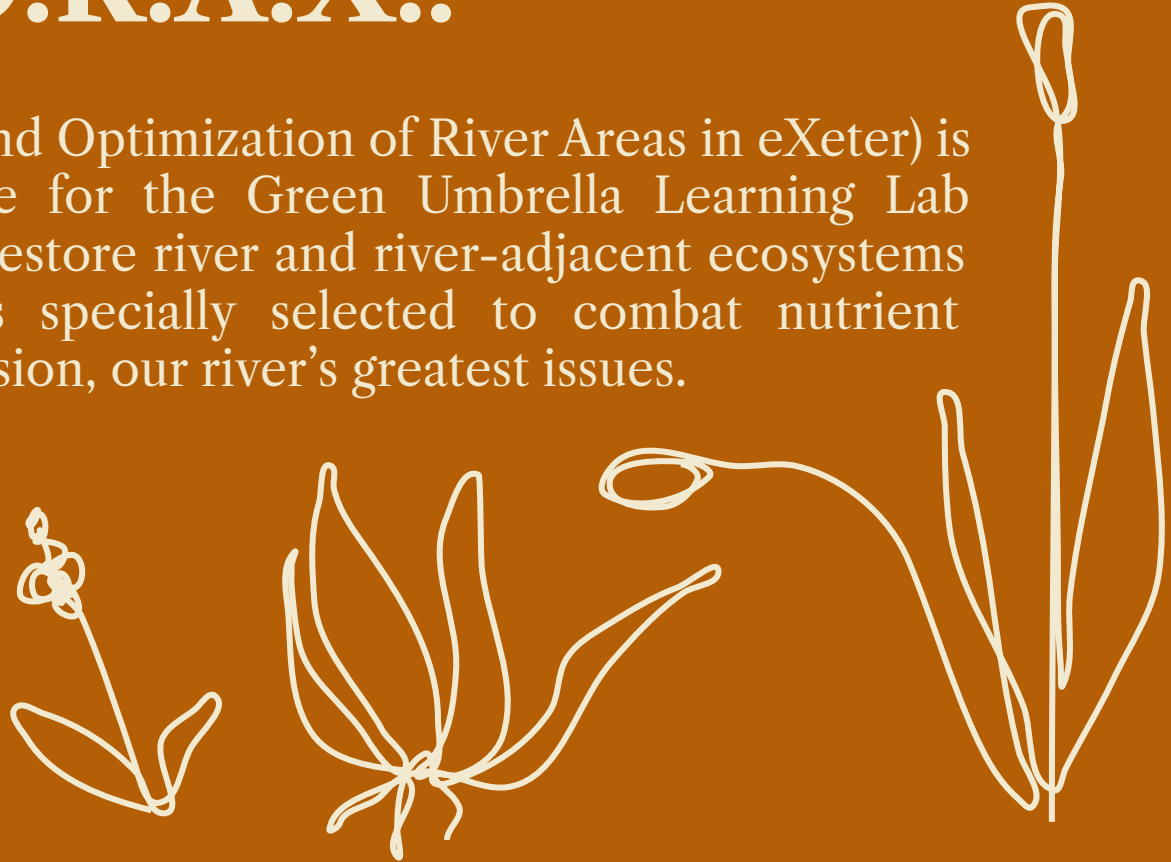
**Lucia Rosen, Erin Chen, Amelia Post,
and Lionel Hearon**


“We speak for the creek”

What is

Project L.O.R.A.X.?

Project L.O.R.A.X. (Land Optimization of River Areas in eXeter) is a student-led project made for the Green Umbrella Learning Lab course. Our goal is to help restore river and river-adjacent ecosystems by planting **native plants** specially selected to combat nutrient pollution and river bank erosion, our river's greatest issues.



A photograph of a concrete arch bridge spanning a river. The bridge has a decorative railing on top. The water is dark and reflects the bridge and surrounding greenery. The sky is clear and blue. The text "The problems our river faces" is overlaid in a large, white, serif font across the center of the image.

The problems
our river faces



“
Human Waste contributes
95,432 pounds
of nitrogen per year
to the Exeter-Squamscott River Watershed...”

(2015 Piscataqua Region Environmental Planning Assessment)

Because of the amount of waste that enters the Exeter River upstream, it is already rich in nutrients.

Runoff from our fields just worsens the problem, and we need to do our part to help.

Our work will by no means **fix** the problem, as we aren't stopping any source of nutrients, but it will **help**.

In small amounts, nutrients are necessary and beneficial, but **too much** from human waste and fertilizer runoff can cause **eutrophication** downstream.

What is

eutrophication?

When a body of water is overly enriched with nutrients, the nutrients cause a boom in algal growth, which can be harmful to us.

When the algae dies, decomposers use oxygen to break it down. When too much oxygen is removed from the water, **marine life can't survive.**

Erosion.

Additionally, parts of our riverbank are eroding away.

This photo isn't of our river, but it may look familiar.

This is another way too many nutrients can get into the river.



Multiflora rose



Invasives.

In order to keep our river bank strong, we need the right plants. We need native plants! Invasives don't help.

This is multiflora rose. It may look beautiful, but it needs to go. Other common invasives, like phragmites and Japanese knotweed, are way harder to remove.

A photograph of a concrete arch bridge spanning a river. The bridge has a decorative railing with square balusters. The water is calm, reflecting the bridge and the surrounding greenery. In the background, there are lush green trees and utility poles with power lines under a clear sky.

**What's one way
we can help?**

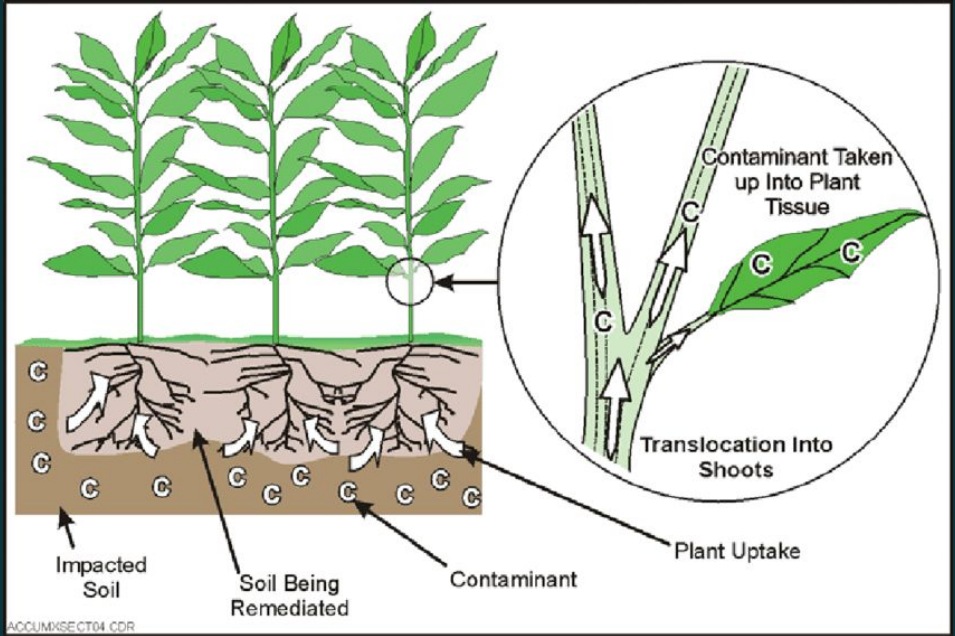
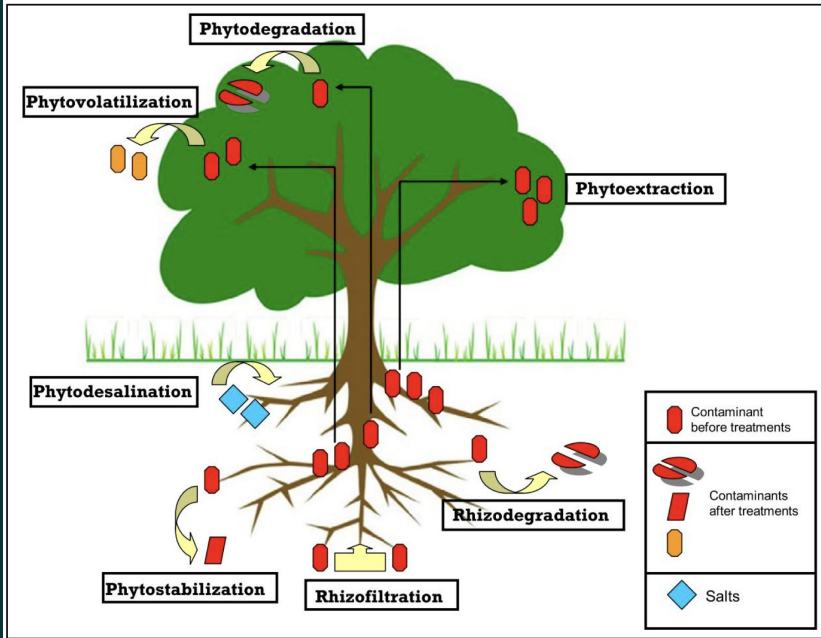
We can help nutrient pollution from entering the river by blocking run-off points with helpful native plants. This is called phytoremediation.



The strong roots of these plants will prevent erosion by the river!

What is Phytoremediation?

- The process of filtering contaminants from water or land through the use of plants.
- Phytoextraction vs rhizofiltration:
 - Phytoextraction: absorbs contaminants from soil near the roots and transfers them into their own biomass.
 - Rhizofiltration: absorbs contaminants from water under the plant.
 - Contaminants are accumulated on the surface of the roots and in plant tissue.



**CLIMATE
ACTION DAY
WORKSHOP!**

The Plants

Black Willows:

- Stabilizes erosion with roots
- improves the soil quality
- Planted far from the riverbank



Joe Pye Weed:

- attracts pollinators
- extremely robust and will last the winter
- Reduces soil nitrogen



Pussy Willows:

- fibrous roots that help prevent erosion
- filter phosphorus and nitrogen
- grow quickly and are adaptable to their ecosystems



Cattails:

- Remove nitrogen and phosphorus from the river
- help prevent algae blooms
- erosion control
- support biodiversity



Planting Locations



Site A:

Due to its proximity to four heavily fertilized playing fields, a high amount of nutrients runs into the Exeter River at this spot. The stream enters the river just upstream from the area recently re-planted near the Hill Bridge.

- Planting group: ~12 people

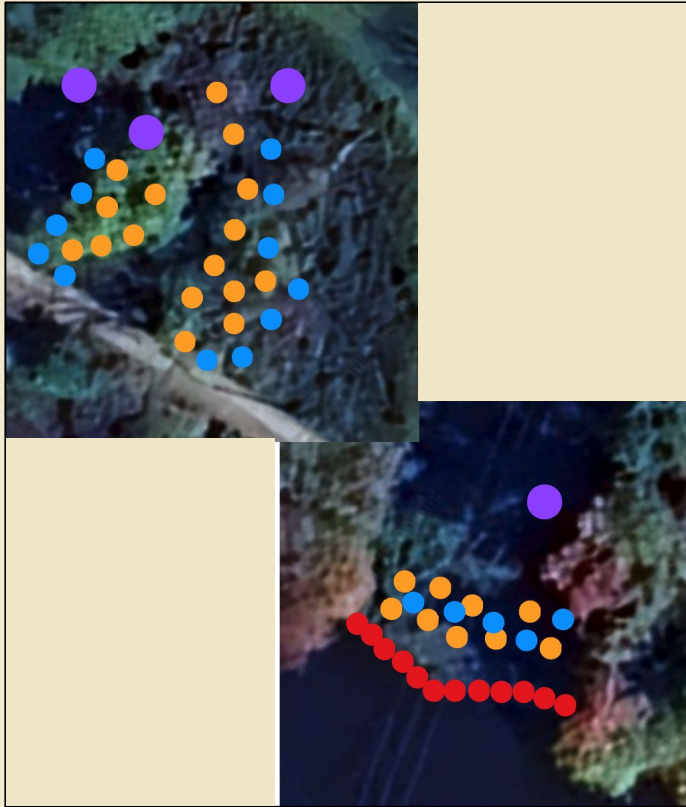


Site B:

This section of the riverbank is void of trees and shrubs. Because of this, any runoff runs unfiltered into the river here. The ecosystem (if it can even be called that) is not healthy.

- Planting group: ~10 people

Planting Location Specifics



 = Black Willows (4)

 = Joe Pye Weed (17)

 = Cattails (12)

 = Pussy Willows (12)

2025 C.A.D. Schedule

- 10:00AM:** Present information about our project.
- 10:20AM :** Begin walking out to Site A as a group.
- 10:30AM :** Begin planting/removal demonstration at Site A.
- 10:45AM :** Split off into groups.
12 and Lionel and Amelia stay at Site A.
10 and Lucia go to Site B.
- 10:50AM :** Groups get settled. First thing to do will be to break up soil with rakes. Multiflora rose removal and hole digging.
- 12:00PM :** BREAK (w/snacks)
- 12:15PM :** Split into groups of two to plant each type of plant.
- 1:45PM :** Call it a day for planting. Everyone returns to Site A to circle up and recap.
- 2:00PM :** Head back to campus together.

Bibliography

“Best Practices for Submitting Your Soil Sample.” *University of New Hampshire Extension*, 29 Apr. 2024, extension.unh.edu/resource/best-practices-submitting-your-soil-sample.

- We submitted soil samples to UNH and this resource was helpful for preparing them. Because of the recommendations from this website, we went back to the sites to collect a larger volume of soil (1 cup) to send for soil testing.

Biggins, Warren. 10 Dec. 2024. & 14 Jan. 2024.

- Mr. Warren Biggins has been a great resource for learning what permissions we have for working on the Exeter River. He forwarded us to the Exeter River Advisory Committee meeting for more information.

Exeter-Squamscott River Watershed Management Plan, exeterriver.org/wp-content/uploads/2023/04/ESRLAC_ManagementPlan_Update-2022_4.4.23-_.pdf. Accessed 15 Dec. 2024.

- This plan details how the river interacts with the watershed and surrounding environment, as well as local plans in the area that we are keeping in mind for how we interact with the river’s communities.

Murphy, Kristen. “Google Meet Meeting on River Landscaping.” 14 Jan. 2025.

- Ms. Kristen Murphy is the town Natural Resource Officer and we made sure to confirm with her that we have permissions to landscape on the river. Ms. Murphy recommended a lot of specific plants and forwarded us to the Hammy’s Way site.

“Plant Native Plants.” *Plant Native Plants | Town of Exeter New Hampshire Official Website*, www.exeternh.gov/cc/plant-native-plants. Accessed 18 Dec. 2024.

- This website hosts many plant lists we are utilising to pin down which plants we hope to cultivate and further researching individually.

Bibliography

Papakonstantis, Niko, et al. “Exeter River Advisory Committee Meeting” 19 Dec. 2024.

- We sat in on a River Advisory Committee meeting to scope out the landscape and timeline for recent and future projects on the river that we may need to consider (ie. change in water level due to the destruction or construction of dams). We learned about DES requirements and grant funding.

Neal, Catherine. *Landscaping at the Water’s Edge: An Ecological Approach: A Manual for New Hampshire Landowners and Landscapers*. University of New Hampshire, Cooperative Extension, 2007, *UNH Extension*, https://www.exeternh.gov/sites/default/files/fileattachments/conservation_commission/page/62696/landscaping_at_waters_edge.pdf.

- Professor Catherine Neal’s book has been recommended by multiple sources that we have reached out to, and is an overwhelmingly comprehensive guide to every step of the plant landscaping process from identifying which plants are right for your site to techniques and proper considerations for how the plants will affect the local environment in the

“Think Blue Exeter.” Think Blue Exeter | Town of Exeter New Hampshire Official Website, www.exeternh.gov/cc/think-blue-exeter#:~:text=As%20a%20result%20of%20water,either%20direct%20or%20indirect%20contact. Accessed 10 Dec. 2024.

- This website helped us identify the severity of the issue we are tackling by providing information on water quality and large pollution events such as recent stormwater overflows.

“How willow absorbs and traps mercury on the Yuba.” <https://yubariver.org/posts/how-willow-absorb-and-trap-mercury-on-the-yuba/>. Accessed 14 Jan. 2025.

- Gave us an overview of how phytoremediation works and the mechanisms around planting for the site.

“Phytoremediation: In situ alternative...” <https://biointerfaceresearch.com/wp-content/uploads/2021/10/20695837124.49454960.pdf>.