EXPERIMENTAL GARDEN DESIGN AS CONSERVATION

DEVELOPING ROOT-FOCUSED PLANTING DESIGN AS A SHORELINE CONSERVATION STRATEGY IN GASPESIE

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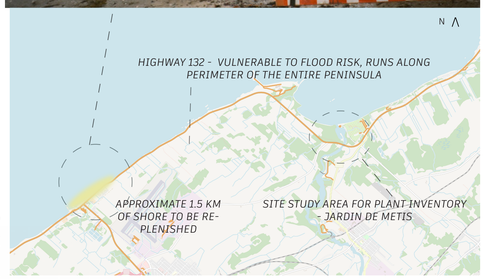
SHORELINE RESTORATION EFFORTS

- PROBLEM: Current conservation strategies are not adequate in scale to address problems caused by erosion and submersion - the detrimental effects of which are harming communities across the entire Gaspesie Peninsula.
- ABOVE/RIGHT: a $26 Million CAD municipally-funded project to 'replenish' a 1.5 KM stretch of coastline with aggregate matter mined from a nearby gravel pit, up to 3 M high on the beach.



CONSERVATION VIA PLANT LIFE

The aim of this research is the creation of a design guide for shoreline rehabilitation gardens. This guide will be created with input from regional conservation authorities and distributed to residents who own property on the coast.

This is inspired by public projects in the area that use experiments in the garden as a method for how landscape architects can address climate change and associated problems, like erosion and flooding, through plant life.

These are notably the '*Jardin du Littoral*' by Nouveaux Voisins and '*Jardin au Bord de la Mer*' by Practice Landscape.

METHODS

1. Sample areas identified for plant inventory at upper, middle and lower banks of the river.
2. Plant inventory of each area done using a grid and a tree survey. A grid was laid over 1 sq M of land. Using the grid as a guide, general character for the vegetation in that area was derived
3. Specific species were identified within each grid.
4. Analysis of species growth on specific bank locations conducted to reveal different species inhabit different areas of the shoreline. A broad schema of root types was developed based on this information.
5. Root morphology of species is currently being more finely examined. The garden design guide will use this information to try to leverage root structures for better planting.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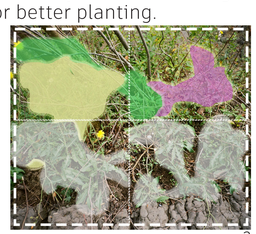
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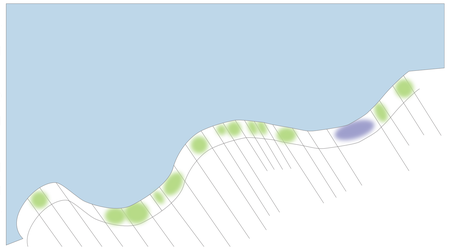
APPROACH: LEVERAGE PRIVATE OWNERSHIP OF COASTLINE TO PLANT SHORELINE GARDENS

BENEFITS:

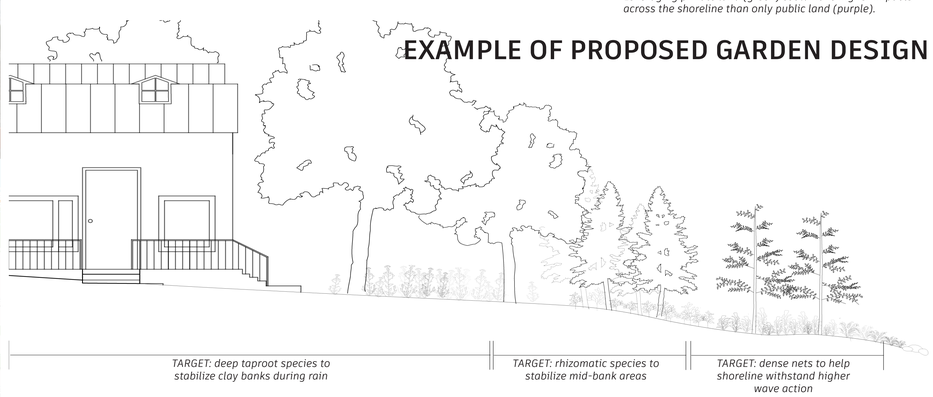
- **Replicable**: gardens can be replicated across site contexts and regional constraints
- **Connected**: a large number of gardens across an area will create a better buffer than any singular project will be able to do
- **Desirable**: gardens are a feature many clients want and can beautify the landscape while providing important functions
- **Accessible**: gardens are easy to implement compared to heavier infrastructural solutions, and can be made available across a range of price points
- **Scalable**: gardens can be scaled to the specific size of the plot they are on - if a client has a large area to work with versus a very small one
- **Co-occuring benefits:** additional benefits from an increased number of gardens can be gleaned from the strategy such as an increase in species richness, pollinator habitat and stormwater retention

Shoreline gardens could take several forms, from a more free naturalistic style to a more formal one.



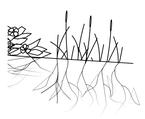
Leveraging private land (green) could have higher impacts across the shoreline than only public land (purple).

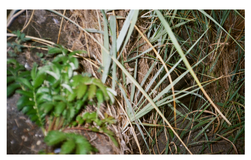
EXAMPLE OF PROPOSED GARDEN DESIGN



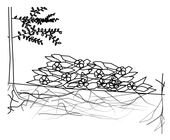
Renders of possible planting schematics - incorporating species that are stabilizing of clay banks on the upper bank area (deep rooted species and clay-tolerant Tamarack), versus those that will root quickly and spread wide to stabilize the middle banks directly next to the shore such as poplars and tall grasses.

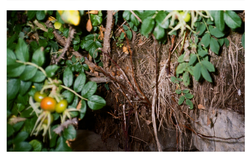
ROOT SYSTEMS TO BE PRIORITIZED IN PLANTING





DEEP TAPROOT
Example species Sea Lyme (*Leymus arenarius)*
This typology has a deep tap root that goes far down into soil layers, creating a depth of stability that provides protection. The roots act as an anchor, holding soil in place from a deep location.





DENSE NET
Example species Wild Rose (*Rosa rugosa)*
This structure creates a dense and web-like root system that can withstand wave activity from below and disturbance on soils from foot traffic above.
The roots act as a net - soil and sediments are stabilized

RHIZOMATIC
Example species Trembling Aspen (*Populus tremuloides)*
This typology grows rhizomatically, meaning that a cluster of trees that looks like separate organisms may all be connected underground. The rhizomatic network stabilizes fine matter and reduces the loss of soil during rain events.

FUTURE DIRECTIONS

ADDITIONAL RESEARCH

- Research is needed into functioning of the existing gardens, any insight on plant viability they can provide will be crucial.
- Additional research is needed on plant species with specific root morphologies, and their compatibility with different conditions on the coast (i.e, clay soil, sandy soil)

COMMUNITY CONSULTATION

- Key community members will be contacted to participate in the development of the guide (leverage existing data and information)
- Mobilization of residents concerned about erosion and willing to plant experimental gardens - identify key community members who can support this

DESIGN DEVELOPMENT

- Development of the guide will be an iterative process, in flux as it responds to the experimental nature of the project
- Designs will incorporate a range of budget options and scales to be accessible to anyone who may want to participate

REFERENCES

"Adaptive planting design and management framework for urban climate change adaptation and mitigation." Urban Forestry & Urban Greening. DOI: https://doi.org/10.1016/j.ufug.2022.127548

"Climate Change and Its Impact on Coastal Ecosystems." *Environmental Research Journal*. DOI: https://doi.org/10.1234/abcd5678

"Planting Coastal Infrastructure." *Climate Change Management*. DOI: https://doi.org/10.1007/978-3-319-53742-9_8

"The role of trees in urban stormwater management." *Landscape and Urban Planning*. DOI: https://doi.org/10.1016/j.landurbplan.2017.02.017

"Vegetation restoration and fine roots promote soil infiltrability in heavy-textured soils." *Soil and Tillage Research*. DOI: https://doi.org/10.1016/j.still.2019.104542