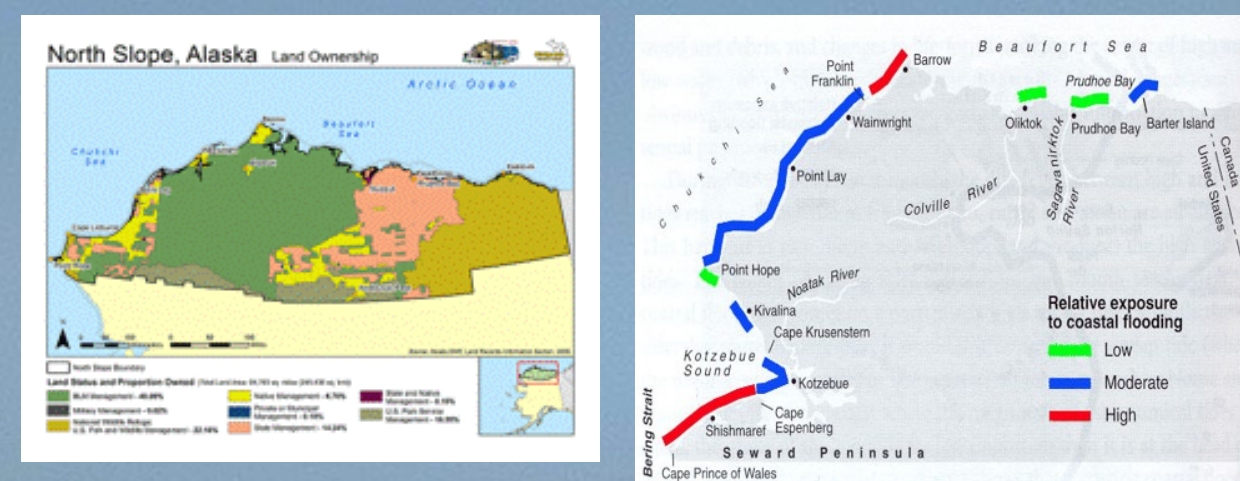




# Coastal Observers of Barrow Community-Based Monitors

## Why

Coastal communities of Arctic Alaska are threatened by coastal hazards. The hazard cycle includes erosion, storm surge, permafrost thaw, sea ice loss and flooding often results. This vulnerability is increasing as the environment changes with rapid warming. The loss of sea ice from warming results in open ocean for longer fetch and intense wave action. The surges and flood threaten infrastructure in Utqiagvik, Alaska.



## Tundra Engineering for Heritage, Health, and Hazard Reduction on Coastal Berms in Utqiagvik, AK.

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## The Story

Many coastal communities on the west and north coast of Alaska are threatened by coastal hazards (erosion, storm surge, permafrost thaw, sea ice loss) and that vulnerability is increasing as the environment changes with rapid warming. In coastal and riverine communities artificial berms are often built from inland pits of alluvial soils as flood barriers. We wanted to test the theory that increased plant growth on the artificial berms would help them resist erosion and thus decrease the costly maintenance and help create greener and more attractive areas along the shorelines. Our study explores and pioneers a tundra introduction project aimed at fortifying coastal berms along the Arctic coast to safeguard Utqiagvik, Ak. from seasonal storms. First we documented the plant growth with summer photos of the entire berm since 2016. With permission from UIC lands department in 2018, we collected species for identification of the plants from natural migration and propagation in the berm soils. In 2023 we documented semi-randomized plots under native conditions and then introduced native seeding (2 extant and relevant species) and erosion control coverage. In 2024 and subsequent seasons, we hope to analysis the results from these interventions and seasonally continue to transplant tundra as well.

## How

Through meticulous monitoring of berm size and slope, our study delves into the impact of surges, comparing pre- and post-event conditions to assess the efficacy of our interventions. Our study consists of several steps: a. phase one involved photographic surveys from 2016 to the present of plant diversity, colonies, botanical samples, and species identifications, b. the second phase in 2023 was the establishment of test plots on the berm in a random block trial and potted plants, where we seed species for roots and coverage, transplant, apply erosion mats, and observe the natural migration of native plants, c. lastly, we are monitoring plant coverage, height, vigor, richness of species diversity, and soil composition for several years.



Data entry form



Slide Presentation of Study

## What and Where

Photographic records of plant growth and disruption from berm maintenance taken since 2015 dictated where along the berm we decided to test the green engineering concepts. We selected a 150 m strip of the berm which undergoes minimal maintenance and has consistent plant growth. We divided the region into one meter wide test plots with 3 native conditions, no plants growing, one species growing or multiple species of plants growing.



## Green Engineering for the Arctic

## Acknowledgement (Who)

The North Slope Borough Office of Emergency Management and Applied Research in Environmental Sciences Nonprofit, Inc., partnered with the following :

- Red Mountain Consulting <https://redmountainalaska.com> Lorene Lynn MS
- Ukpeagvik Iñupiat Corporation. <https://uicalaska.com> Study permit # 2023-151

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## Preliminary Results (When)

Our research seeks to identify key factors influencing optimal plant growth on sacrificial berms for erosion reduction during storm surges and flood . For updates about our next steps and continued results, see our facebook journal you can follow. Please provide feedback and input in our journal. comments. We will answer so we abd discuss. We want to crowd source our results. ere are our queries to consider for results:  
Phase one (3 years)  
• Which plants naturally occur on the berms and what conditions do they like? • What are their root systems like?  
Phase two: (2-3 years)  
• What works best for introducing more plant growth? • What's the best time to seed? transplant? • What native conditions work best for new plants? • How fast will new plants grow? (Measure/mo. plant coverage, height, vigor, richness of diversity, and soil composition)  
Phase Three • What benefits do the greened berms have? less erosion? lower maintenance cost? • Is it worth scaling the project up or not?



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