What is a buffer? How do engineered buffers work on the North Slope?

Natural and engineered structures can buffer, or lessen, the effect on an erosional agent like moving water on the landscape or shoreline by reducing the amount of energy available in the collision of waves or currents on soil and coastline sediments. The distance from the edge of offshore sea ice to a beach, for example, can determine much energy can build up in waves being driven by wind over long or short distances, called "the fetch."

In addition to sea ice, islands offshore of the North Slope are shaped by wave and wind action to be long and narrow parallel to the mainland coast. These natural buffers to storm energy are called "barrier islands" because they protect the mainland coast from erosion. Long spits have the same buffering effect for the lagoons they enclose.

People have tried a variety of design solutions to buffer shoreline areas from wind and wave erosion:

- Design and construction of structures made of materials that are more resistant to erosion than natural materials, if available, such as gravel fill, large, angular rocks, called rip-rap, or materials like plastic textiles that hold easily-erodible sands and silt in place.
- Design and maintenance of tall coastal berms to take the brunt of storm waves and provide a barrier to storm surges along the coast.
- Maintain "green spaces" along the shoreline, including riparian buffer zones of natural vegetation along streams.
- Beach nourishment: adding sand or gravel to beaches to replenish what has been eroded.
- Construction of underwater sand barriers.

While coastal berms provide a short-term solution to weathering and erosion, they will also eventually erode. Plantings of native plants, which adds the holding force with roots and buffers the effect of the wind and water on the berm material, are also used to prolong the life of the berms. A variety of manufactured mat materials are also used to hold erodible soils in place. Scientists at UAA are experimenting with tough, but bio-degradable ground covers developed by growing mushrooms.

In the Arctic, permafrost soils are subject to thermal erosion as well as from other weathering and erosional agents. Frost tubes, or thermosyphons, are an engineered solution to the need to release heat from the ground beneath heated structures like houses and schools, as well as supports of the Trans-Alaska Pipeline. They work by transferring the heat in the soil upward to the atmosphere through convection in a closed system within a pipe.

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