

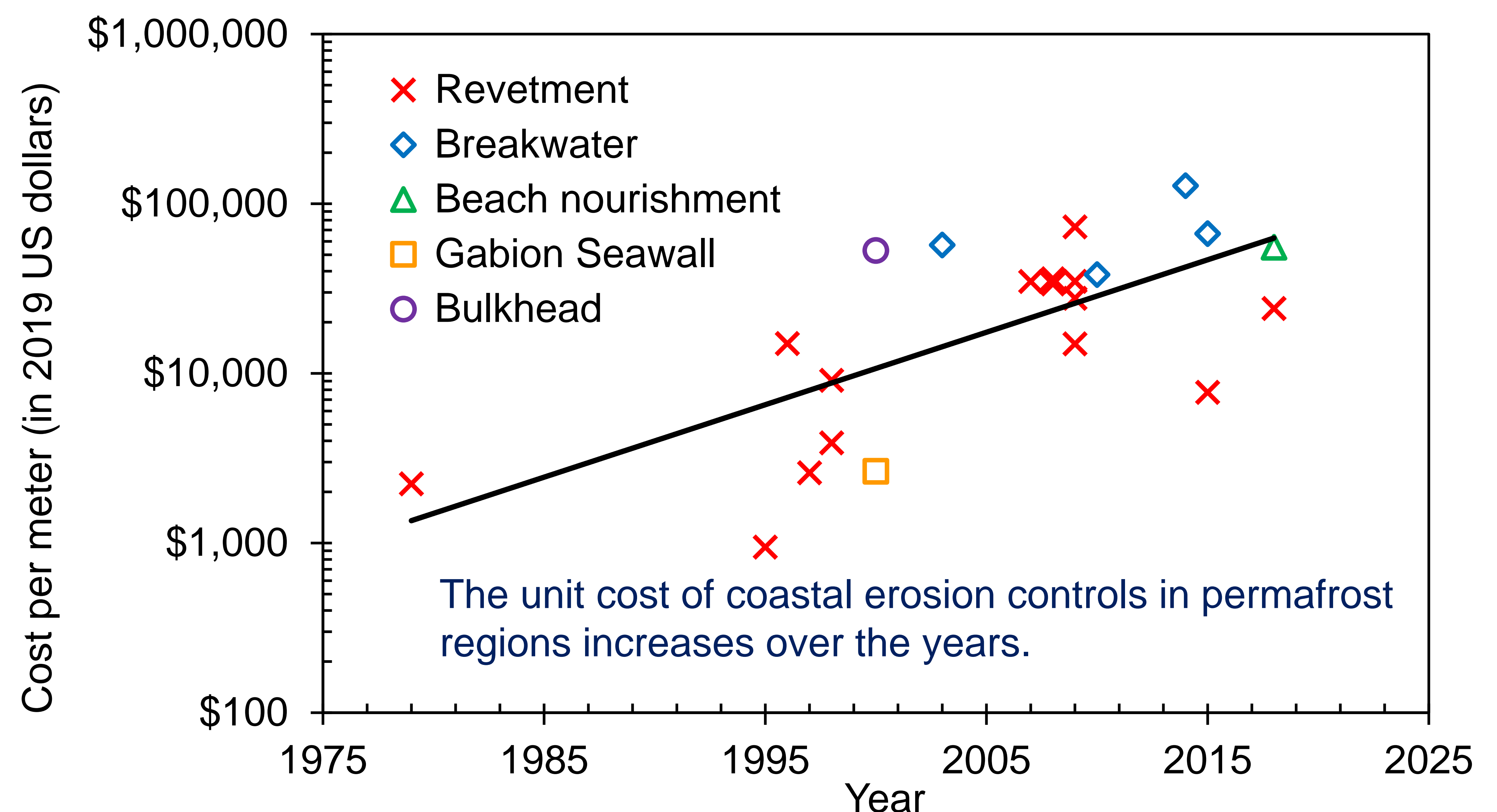
# What are the challenges, current measures, and potential solutions in preventing coastal erosion in the Arctic?

## Current Erosion Controls

- Revetments are the most common measure and those built with rocks have the least reported failures.
- Seawalls, bulkheads, and sand berms have been constructed but are not as common as revetments.
- Softer approaches such as nourished beaches and dynamically stable beaches have also been employed.

## Construction Challenges in the Arctic

| Geographic Challenges   | Engineering Challenges  | Socio-cultural Challenges   |
|---|---|---|
| <ul style="list-style-type: none"> <li>• Site remoteness</li> <li>• Extreme weather</li> <li>• Highly variable site conditions</li> <li>• Short construction periods</li> </ul> | <ul style="list-style-type: none"> <li>• Ineffective equipment and instrumentation</li> <li>• Limited construction materials</li> <li>• Limited database</li> </ul> | <ul style="list-style-type: none"> <li>• Policy inadequacy</li> <li>• Low labor retention</li> <li>• Anthropogenic impacts</li> </ul> |



## Potential Erosion Controls

| Erosion Controls                    | Rationales  | Soil Types      | Coast Types  | Tidal Environments                                    |
|-------------------------------------|---|-----------------|--|---|
| Geosynthetics                       | To withhold soils and resist wave impacts and storm surges  | Sand            | Bluffs (or shores if offshore application)                       | High energy wave impact and strong surge              |
| Vegetation                          | To withhold soils and dissipate wave energy to reduce erosion                                     | Sandy soil      | Shores   | Low energy setting                                    |
| Reef systems or gabions with shells | To resist wave impacts if it is installed onshore and dissipate wave energy if installed offshore | N/A             | Bluffs and shores  | N/A   |
| Static bay-beach concepts           | To reshape beach materials to a dynamically equilibrium state by wave actions                     | Sand and gravel | Shores   | Low energy setting and single constant wave direction |
| Insulation/refrigeration            | To freeze or insulate the thawing permafrost  | Silt and peat   | Bluffs   | N/A   |
| Microbial application               | To produce artificial rocks or to strengthen soils through the binding of soil grains             | Sand            | Bluffs if it is directly treated, or shores if using beach-rocks | N/A   |



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