AN INVESTIGATION ON WHETHER THE SHALLOW SEA BOTTOM OR THE DEEP-SEA BOTTOM SUPPORTS MORE BIODIVERSITY IN THE TVÄRMINNE REGION OF THE BALTIC SEA.

Microphotograph of typical benthic animals. Microphotograph taken by G. Carter, April 2000. Photo via Wikimedia Commons

Research Question

Is there more biodiversity of the benthic organisms at the shallow bottom (1-1.5 m) or the deep bottom (30 m) in the Baltic Sea at Tvärminne, Finland?

Introduction

Benthos refers to organisms that inhabit the seafloor. These organisms are called Benthic Organisms. The experiment for this research was conducted at a research station in Tvärminne, Finland. The samples were collected from a shallow bottom and a deep bottom.

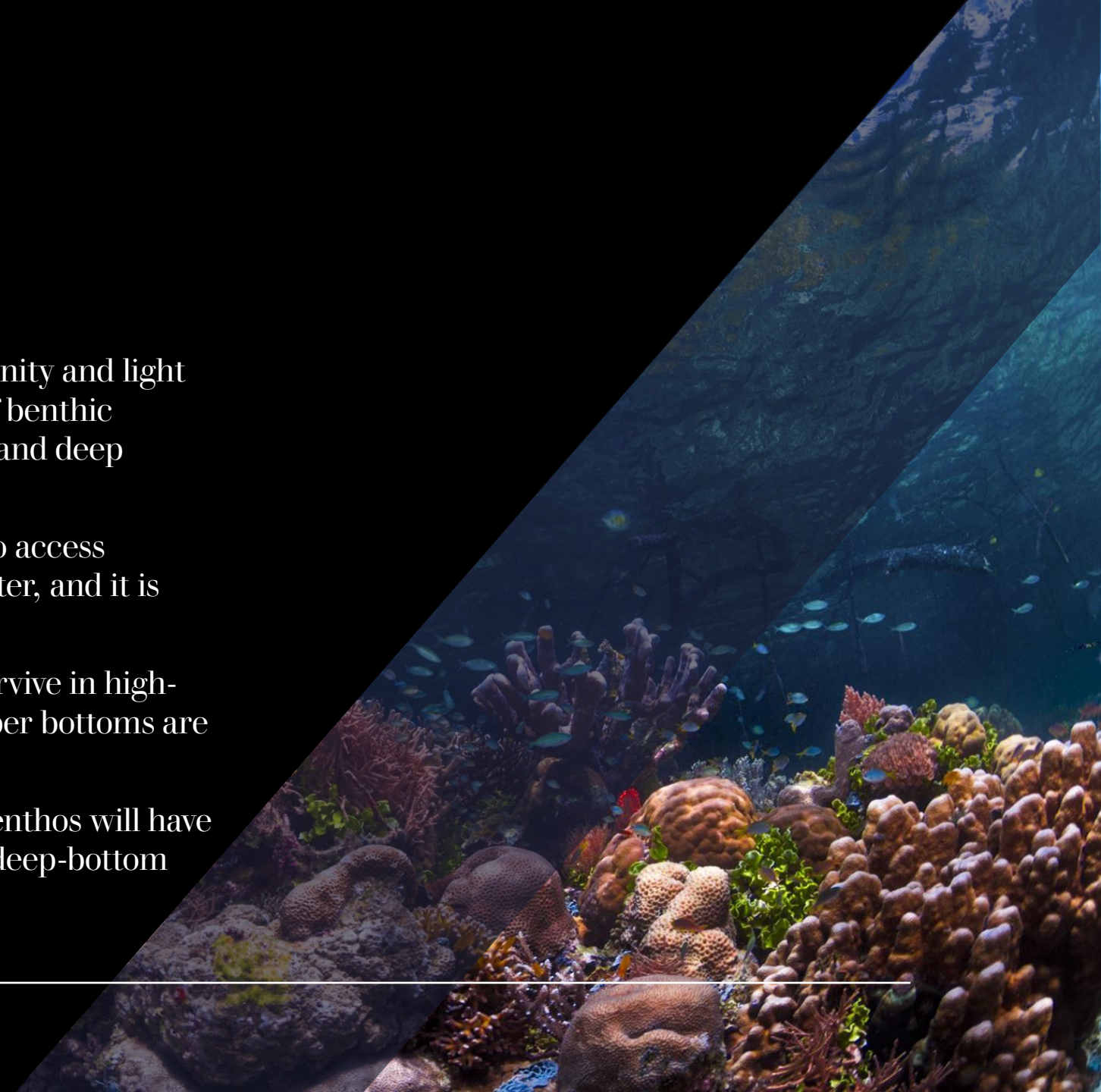
Sand from the shallow bottom(1-1.5m) and silt from the deep bottom(30m) were taken and cleansed with water to find the samples for the research.

The species and the number of individuals found are used to calculate the biodiversity

Hypothesis

- Different abiotic factors like temperature, salinity and light penetration/visibility affect the biodiversity of benthic organisms in the Baltic Sea's shallow bottom and deep bottom waters. (These were measured)
- At shallow bottom, it is easier for organisms to access sunlight as it is closer to the surface of the water, and it is warmer than the deep bottom.
- Many species of benthic organisms cannot survive in high-saline environment, and it is known that deeper bottoms are more saline.

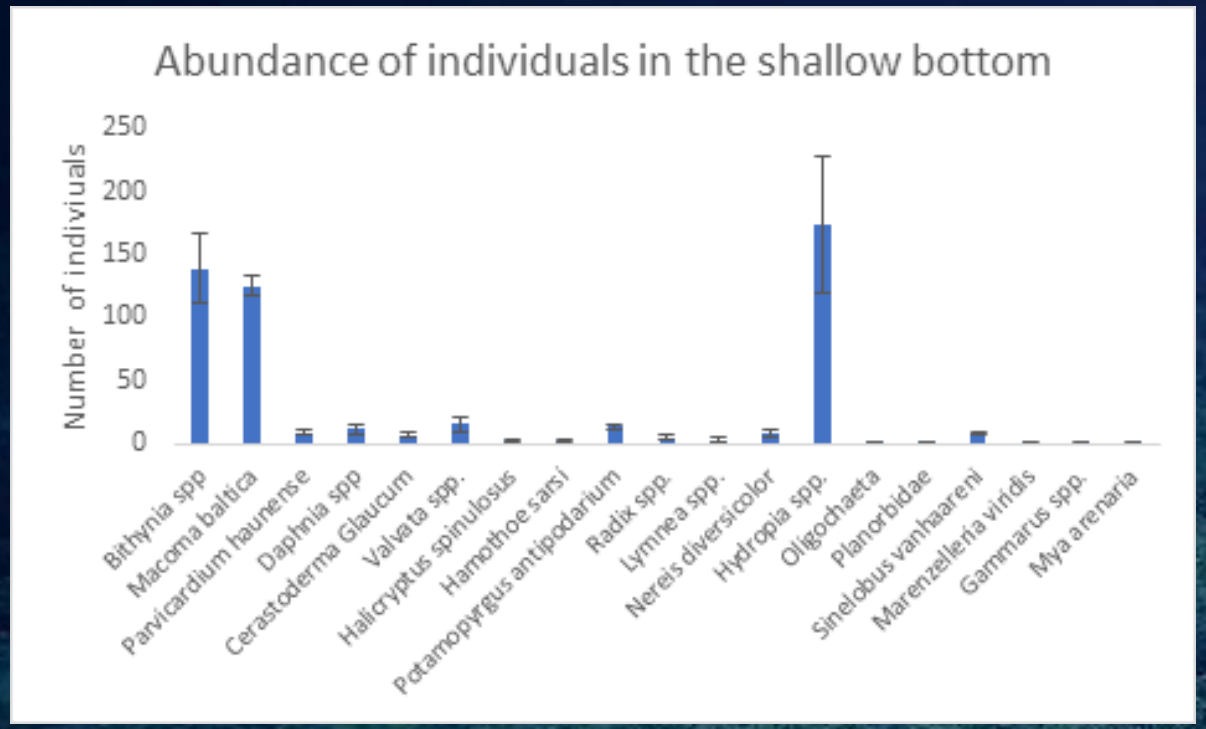
➢ Hence, I hypothesized that shallow-bottom benthos will have more biodiversity of benthic organisms than deep-bottom benthos

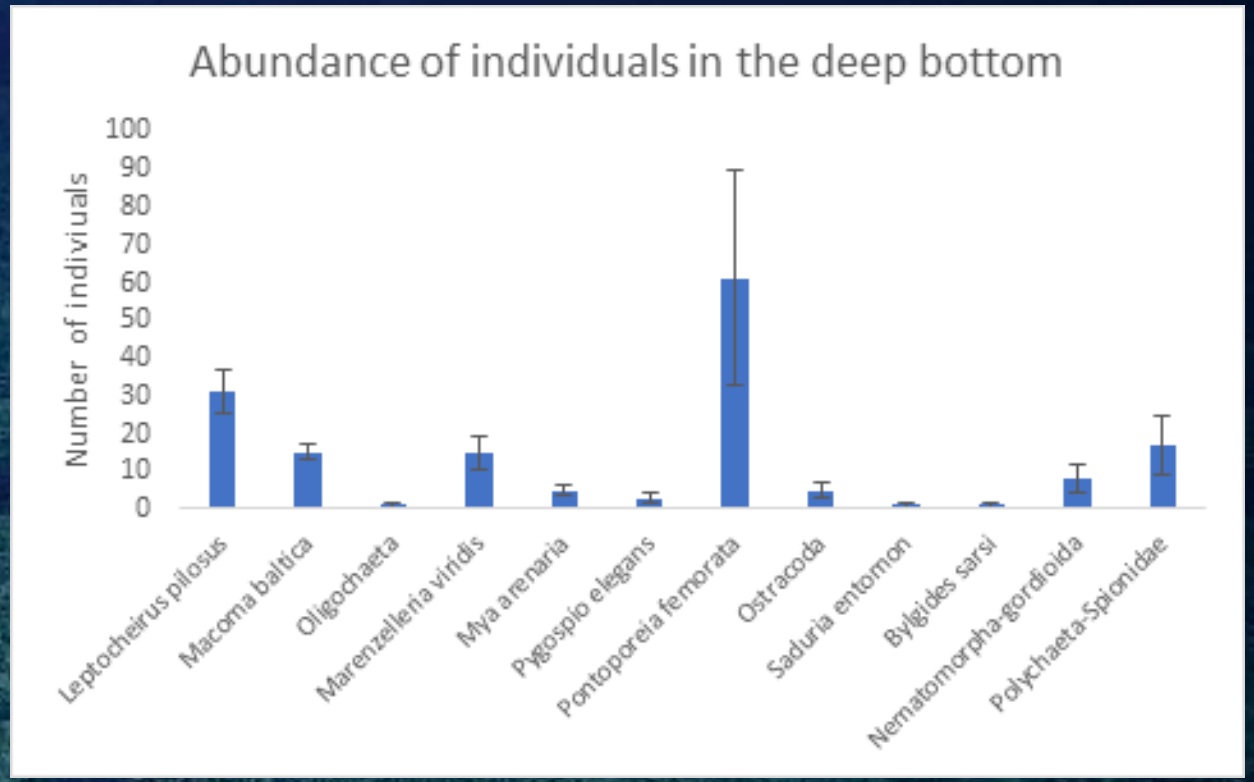


Methodology (in short)

- Shallow bottom : on the bay of the research station, half a bucketful of the sea bottom was collected, along with its benthos, using a bottom sweep with a petite ponar. This was poured then into a 0.5 mm sieve and washed thoroughly, the fauna was preserved and stored in a container.
- Deep bottom : to obtain the deep bottom sample, the same method as the shallow bottom sample is used, but this time a Boxcorer is used on the research vessel Augusta
- Abiotic factors : light penetration/visibility was measured by using a Secci plate and Salinity and temperature (carried out by the station's personnel) was done using a Sondi
- All the data found was recorded and 5 trials were done for each.
- It is crucial to minimize any disturbance to the ecosystem and habitat of the benthic organisms during the experiment and hence all the samples were returned back to the sea after the experiment. Also, none of them were harmed during the experiment!

Results


Abundance of individuals in the shallow bottom
Number of indiviuals
250
200
150
100
50
0
Bithynia spp
Macoma baltica
Parvicardium haunense
Daphnia spp
Cerastoderma Glaucum
Valvata spp.
Halicryptus spinulosus
Hamothoe sarsi
Potamopyrgus antipodarium
Radix spp.
Lymnea spp.
Nereis diversicolor
Hydropia spp.
Oligochaeta
Planorbidae
Sinelobus vanhaareni
Marenzelleria viridis
Gammarus spp.
Mya arenaria


Abundance of individuals in the deep bottom
Number of indiviuals
100
90
80
70
60
50
40
30
20
10
0
Leptocheirus pilosus
Macoma baltica
Oligochaeta
Marenzelleria viridis
Mya arenaria
Pygospio elegans
Pontoporeia femorata
Ostracoda
Saduria entomon
Bylgides sarsi
Nematomorpha-gordioida
Polychaeta-Spionidae

Results

Table 8: Biodiversity index for shallow bottom sample

Shallow bottom	Biodiversity index
Trial 1	4.46
Trial 2	3.18
Trial 3	2.92
Trial 4	1.65
Trial 5	2.11
Average	**2.86**

Table 9: Biodiversity index for deep bottom sample

Deep Bottom	Biodiversity index
Trial 1	1.67
Trial 2	1.79
Trial 3	1.67
Trial 4	1.77
Trial 5	3.53
Average	**2.03**

Strengths and Limitations

The samples were taken in large size and 5 trials were done. This ensured that there was enough data to analyze, and it was more reliable.

Identification guides were carefully analyzed and used to identify different organisms which made the data more reliable than just identifying them by memory.

The sample size was large, and this increased the chances of getting human errors. The samples were separated by hand using forceps and tweezers. Some samples might have been left out as they were not seen at that moment.

Abiotic factors like soil type, moisture, wind and water currents, and nutrient availability were not considered. Different soil types support habitats for different organisms.

Conclusion

- ❑ The objective of this analysis was to prove that shallow bottom has more diversity of organisms than the deep bottom. The hypothesis was proven true as seen in data analysis. The results from abiotic factors also supported the hypothesis
- ❑ Calculating biodiversity can give valuable insights on the benthic population especially to monitor the biodiversity loss.
- ❑ Marine benthic communities have faced biodiversity loss due to different human activities like dredging, pollution inputs, overfishing etc.[1]

1: Source : Barret, Katherine. “If the Benthos Could Talk: The Value of Long-Term Biodiversity Monitoring.” Oceanbites.org, 7 Nov. 2018, oceanbites.org/if-the-benthos-could-talk-the-value-of-longterm-biodiversity-monitoring/. Accessed 10 Apr. 2024