

DK3: Endelave – Future scarcity of fresh and clean groundwater on the island of Endelave

Pilot Lead: VIA University College

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Pilot summary

Endelave is an island of 1320 ha located in the Kattegat sea holding 150 inhabitants. The island has mainly been used for agriculture and large parts of the island is being cultivated. But in the recent years, the beautiful nature and landscape on the island have attracted more tourists and currently 15.000 tourists visit Endelave each year.

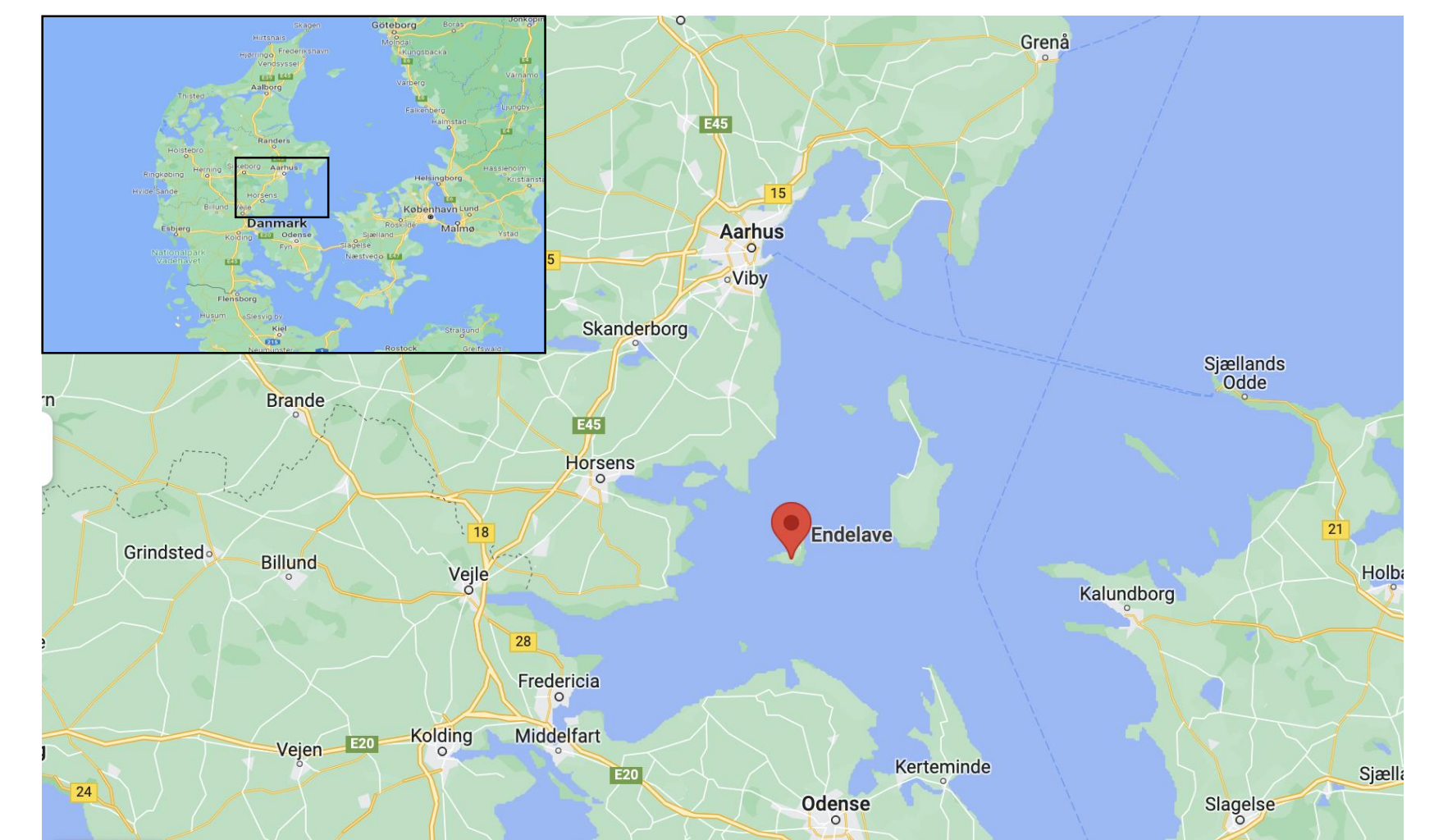
This puts a huge pressure the islands limited groundwater resources.

Furthermore, climate change will lead to sea level rise, increased risk for storm floods and increase the risk of droughts in the summer which also will exhaust the groundwater resources and lead to saltwater intrusion. There is however, a potential to find synergies for a community transition while managing the impacts of climate change and the ecosystem services (ESS) of the island's groundwater reserve. A societal transition moving away from a traditional arable island community will free up valuable land for nature restoration and groundwater protection benefitting the transition to a community based on tourism, ecotourism and experience economy.



Activities

The objective of the pilot will be to gain a better understanding of the hydrogeological conditions on the island and the interaction between the fresh water and the sea water. This is achieved through a series of steps.



The first step will be to conduct hydrogeological modelling of Endelave. This involves setting up a geological model based on geophysical data (T-TEM, NMR logging etc.) in combination with boreholes. The geological model will serve the basis for a groundwater model that takes both freshwater resources and saltwater into account. The groundwater model will improve the understanding of the present and future interactions between surface water, groundwater and sea water. It will also be used to investigate different climate change scenarios on the groundwater resources as well as the effect of preventive measures such as establishment of dikes or change in land use.

The next step is to investigate the interrelation between the precipitation, sea level and groundwater using machine learning. This will be based on data from groundwater loggers, sea level loggers and data from a weather station. At the same time, a MonitorTEM will be tested and installed to examine the saltwater interface and changes in the inland groundwater. We will also be mapping the shoreline of Endelave with Floa-TEM to investigate any freshwater-saltwater interaction in the coastline.

Finally it will also be investigated how Nature Based Solutions (NBS) can contribute to an enhanced infiltration thereby adding more freshwater into the groundwater system and forcing the saltwater intrusion closer to the shoreline.

Governance

The groundwater resources on Endelave is important and affecting many different stakeholders and different activities involving different stakeholdergroups have thus been planned.

To get a better understanding of how it has affected the island and it's inhabitants that more of the economy on the island is driven by tourism and less on agriculture we will conduct a socioeconomic analyse of the island. This will include involvement of different stakeholders through interviews citizens, meetings with the municipality and utility and other activities. This analysis will among others be used as input to develop a catalouge and a business case, together with local utility company about possible solutions on how to ensure high quality and quantity of the drinking water.

To support decision making for the local politicians an augmented reality (AR) solution will be developed wich will visualize the impact of sea level rise and flooding and the future shoreline of the island.

A workshop will also be planned for the partnership meeting in Denmark where partners will be invited to share knowledge and experiences about similiar challenges to gain inspiration for the pilot.

Besides these planned activities, a continous dialogue will be made with municiplity, utility and the citizens on the island where we will update on the project proces, planned activities and basic communication through newsletters, citizens meetings and workshops.

