

The Science behind Marine Conservation

To enhance prosperity, marine nature is exposed to increasing anthropogenic pressures, such as nutrient over-enrichment, maritime traffic, and effects of aquaculture-, fishing-, and wind energy industries. Together with climate change, these pressures threaten habitats and species (i.e., biodiversity), and the function and resilience of marine ecosystems. This, in turn, weakens the ecosystem services that marine nature provides, and challenges the well-being and survival of societies.

Several binding international agreements and legislations, including the recent goal to protect 30 % of all sea areas and restore marine nature, strive for healthy marine nature and continued sustainable use. To tackle these challenges, our research in the northern Baltic Sea focuses on actions that aid in protecting and restoring the marine environment and contribute to science-based management.

Canopies of bladderwrack (*Fucus vesiculosus*) dominate much of the rocky coastline. Severe declines have occurred; with natural recovery absent in many areas. We examine the potential for restoration under varying environmental conditions in the Archipelago Sea, supporting the future establishment of this key-species



Stoneworts (*Chara* spp.) in shallow, soft bottom bays, provide many important ecosystem functions and services. Being sensitive to anthropogenic and environmental stress, habitats dominated by *Chara* species are threatened. Using aquarium and field experiments, we investigate how different environmental factors, including the sediment, affect the restoration success of *Chara*-species.

Genetic diversity is an integral part of biodiversity. It allows species to adapt to changing environmental conditions, with sufficient genetic diversity providing the foundations to healthy and sustainable populations. We are determining the genetic diversity and population structure of two stonewort species: *Chara tomentosa* and *C. baltica*. This information will be utilised to improve the success of future restoration actions of shallow bays.



Certain communities of organisms can indicate the state of the ecosystem they occupy. By identifying functional marine indicators and developing effective monitoring protocols, we will reveal the state of biodiversity throughout the Finnish coast. This will set the foundations for detecting biodiversity change and assessing ecological effectiveness of marine protected areas.



Much of the biodiversity around the offshore areas of Åland is undocumented. In close collaboration with the Velmu program, we gather baseline information to update species distribution models and highlight valuable marine areas. Results from the work help to expand and diversify marine protected areas and networks.

Biodiversity has an intrinsic value to society. As a university, we educate students in graduate and postgraduate levels. Through education and active participation in scientific and public events, we improve the understanding of the importance of a healthy Baltic Sea. We are part of several projects and networks, including both national and international collaboration.

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