



How many jars of mud is enough to make a researcher happy?

Six sites and several sampling occasions during all seasons is hard work! In her PhD research at Tvärminne Zoological Station, Margaret Williamson collects sediment samples and reed biomass samples. These samples are analyzed for carbon content, to get a picture of what carbon sequestration looks like in our coastal reed beds.

– My field work is physically intense but a lot of fun! Every season holds its own challenges, but figuring out how to adapt to new conditions every 3 months is part of the fun. We've jokingly nicknamed our soil box corer "Excalibur" and it is carried through sinking mud and ice in the reed beds to help us obtain soil samples down to 1 m, says Margaret.

Distribution of reeds has increased in coastal ecosystems of Finland and worldwide but there are gaps in the understanding of the role of reed beds in carbon cycling.



Ground-breaking research:

What is the actual carbon sequestration potential of bladderwrack?

A team of CoastClim researchers at Tvärminne are conducting a novel in-situ experiment with the aim to obtain a more holistic understanding of the carbon cycle of bladderwrack (*Fucus vesiculosus*). This novel approach considers its entire life-cycle, across seasons, different depths, and also its effects on other ecosystem components. This has not been done to this extent before.

We are exploring how the degradation of this macroalgae varies along a depth gradient (5 m to 40 m) around Tvärminne. Every few months our skilled scientific divers collect bags of degrading bladderwrack that were deployed in June 2023. We measure the remaining carbon in the algal tissue and within the underlying sediment, we collect the animals associated with the degrading algae. Furthermore, we will explore the diversity of the microbial communities that have colonised the bladderwrack, and the underlying sediment, during the degradation process.

Why is this important?

Bladderwrack absorbs and fixes carbon dioxide when it grows, forming dense beds in the shallow coastal areas, like a forest of the sea. When it gets detached from rocky substrates during disturbances or at the end of its life cycle, individuals (or fragments) get washed ashore, are consumed, or transported to deeper waters. Ultimately, they decay which means that carbon is mineralized and re-released back into the environment. If this degradation process is taking place in very deep waters or if the algae are buried in deep sediments the carbon is unlikely to be recycled to the atmosphere over very long time-scales, which means that the bladderwrack would contribute to carbon sequestration. However, we currently lack a mechanistic understanding of how degradation rates of algae vary with depth, and thus how quickly they are mineralized during their migration to deeper waters.



Project leader Lydia White (left) and Anna Vesanen (right) are going out SCUBA-diving for one of the sampling occasions. The team consists of several researchers from different disciplines, including support from The Finnish Scientific Diving Academy at Tvärminne.



Application open: Polar Diving Course

The Finnish Scientific Diving Academy (FSDA) is offering a Polar Diving Course in northern Finland at Kilpisjärvi 9-17 of March 2024.

This course is aimed for divers working with research programs in polar environments to develop knowledge in skills related to surface and underwater

operations over a seven day intensive program. Applications are open until February 14th.

FDSA is a leading cold water based scientific diving training facility at Tvärminne Zoological Station. For applications and more information please contact coordinator Edd Stockdale, edward.stockdale@helsinki.fi.

Tvärminne is a new official ICOS Ecosystem Station!

Tvärminne work at Tvärminne Zoological Station for its work providing continuous data on atmospheric greenhouse gas concentrations (carbon dioxide and methane) as well as gas fluxes between seawater and the atmosphere. ICOS stands for Integrated Carbon Observation System and it is a European network of infrastructure that aims to provide high precision and long-term observations of greenhouse gases in Europe, both on land and over the sea.



CoastClim work at Tvärminne Zoological Station regarding the importance of coastal habitats is also featured in an article in the ICOS journal Fluxes – The European Greenhouse Gas Bulletin

CoastClim keeps growing!

All CoastClim members gathered in Stockholm for two days in November, to dive into coastal and climate issues, sharing results and planning new transdisciplinary fieldwork. Members of our newly established and prominent advisory board also attended the meeting to get insight into the research projects, outreach activities and the functioning of the CoastClim centre.



November 2023

Opinion Piece

Input to the COP28 meeting, held in Dubai 30 November–12 December 2023.

Time to highlight the ocean's role for climate mitigation

The ocean has a major impact on the development of the climate, and the upcoming climate summit is the time to highlight this until now undervalued resource. By reducing acidification and protecting important ecosystems, greenhouse gas emissions from the oceans can be reduced and the ocean's function as a carbon sink can be strengthened.

During the COP 28 it will again be discussed who will do what to limit greenhouse gas emissions. This is a time to stress the link between the ocean and the climate, and to show how the ocean can help us reach our climate goals. In recent years, more than 100 million people have been displaced by climate change, and the climate debate and COP meetings now have dedicated 'ocean panels'. However, the ocean is still not fully valued in climate work.

About a quarter of human carbon dioxide emissions are absorbed by the world's oceans. Some of this is captured and stored in coastal ecosystems. When organic matter dies and sinks to the bottom, some will be buried and can be used for a very long time, even as fuel. Other, faster cycling components are particularly effective at absorbing and transporting carbon, such as marine organisms and organic matter, but this is not fully accounted for in current climate assessments.

Unfortunately, coastal ecosystems, both in the Baltic Sea and globally, have been drastically mismanaged for several decades. This includes, for example, changing bottom trawling, dredging and sedimentation of estuaries. In the Baltic Sea in particular, pollution is one of the major threats to important ecosystems. It is a serious problem. Reducing pressure and restoring ecosystems that support the carbon sink by supporting nature-based solutions to mitigate climate change.

Depending on ocean conditions, some of the organic material decomposing in the sea can be released into the atmosphere in the form of carbon dioxide, methane or even dimethyl sulphide. In some parts, greenhouse gas fluxes can be high.

The ocean has a major impact on the development of the climate, and the upcoming climate summit is the time to highlight this until now undervalued resource. By reducing acidification and protecting important ecosystems, greenhouse gas emissions from the oceans can be reduced and the ocean's function as a carbon sink can be strengthened.

According to preliminary calculations by researchers at Stockholm University's Baltic Sea Centre, methane emissions from Swedish brackish waters could amount to as much as 20 000 tonnes of methane annually. This corresponds to 2.1 million tonnes of carbon dioxide equivalent or a 0.01% contribution to the total methane emissions from Sweden. This is because methane emissions are more intense from oxygen-poor sediments, which are more in brackish water environments.

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To safeguard the ocean's ability to mitigate climate change, coastal ecosystems need to be protected and restored. For the Baltic Sea, however, restoring ecosystems is possible in the near future. For example, reducing bottom trawling and dredging, and sedimentation of estuaries, can help restore the ocean's ability to absorb and store carbon. Healthy ecosystems are a prerequisite not only for natural values such as fishing and recreation, but also for the ocean's ability to absorb and store carbon.

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Researchers to COP28 participants: "Include the role of the oceans in climate work"

The ocean has a major impact on the development of the climate, and the ongoing climate summit is the time to highlight this, until now undervalued resource. Read the Opinion Piece by Christoph Humborg, Alf Norkko and Gustaf Hugelius, Professors at Stockholm University and the University of Helsinki, addressed to the participants of COP28.

A debate article on the topic was also published in Aftonbladet and Hufvudstadsbladet (in Swedish).

Short news at a glance

- **Get the newest knowledge** regarding the state of the Baltic Sea! The newly published [3rd HELCOM Holistic Assessment Report \(HOLAS 3\)](#) is now available online, as well as the [webinar highlighting key results](#).
- **Government's reviewer on the Swedish climate policy:** "[Map greenhouse gas emissions from lakes and seas](#)" (in Swedish).
- **New CoastClim publication by Norman Göbeler et al. (2023)** [HOTFLOOR: A benthic chamber system to simulate warming of the seafloor](#). Limnology and Oceanography Methods.
- **New CoastClim publication by Roel Lammerant et al. (2024)** [A functional perspective on the factors underpinning biomass-bound carbon stocks in coastal macrophyte communities](#). Marine Environmental Research.
- **Baltic Breakfast summary:** [Methane from the seafloor - the unreported emissions](#) (in Swedish).



Who are we?

Meet a CoastClim researcher:

Who are you?

My name is Elias Broman and I am a researcher in marine microbial ecology at Stockholm University. My area of expertise is DNA-techniques and bioinformatics that unravel how bacteria respond to environmental change.

What are you doing in CoastClim and why?

My research focuses on understanding how climate change and other anthropogenic pressures such as eutrophication influence bacterial communities in coastal environments.

Bacteria are typically the main decomposers of organic matter, recyclers of nutrients, and producers of greenhouse gases in coastal environments, it is essential to understand how environmental change impact these communities and metabolic processes.

My recommendation to you...

Is to take work breaks to help recover from stress and increase your well-being and performance.

Meet the [CoastClim team!](#)

CALENDAR:

14/12 [Baltic Breakfast](#) Christmas edition: Status of the iconic animals in the Baltic Sea? (in Swedish)

7/3 SAVE THE DATE for the annual FINMARI Researcher Day in Helsinki

Available positions

Post-doctoral researcher in greenhouse gas exchange in coastal water ecosystems

Professor Ivan Mammarella at INAR, University of Helsinki, is recruiting [a post-doctoral researcher for two years](#).

The post-doctoral researcher will work in the [Micrometeorology group in INAR](#) and will contribute to CoastClim research activities at the new ICOS Station in Tvärminne. The work will focus on sea-atmosphere interaction relevant to the coastal water ecosystem carbon cycle and methane emission. More specifically she/he will contribute to 1) address the spatial variability of CO₂ and CH₄ fluxes and their drivers; 2) develop new parameterizations of gas transfer velocity appropriate for coastal water systems; 3) advance methodological aspects related to air-water gas exchange.

For further information, please contact Professor Ivan Mammarella, ivan.mammarella@helsinki.fi.

Two researchers in fish and fisheries in the Baltic Sea

The Baltic Sea Centre at Stockholm University is recruiting two researchers specializing in fish and fisheries issues in the Baltic Sea for five years.

The project aims to promote and support the development of current fisheries management in a more sustainable direction, with increased focus on rebuilding and long-term sustainable management of Baltic Sea fish stocks. The positions involve conducting research with a specific focus on the ecosystem-based fisheries management of the Baltic Sea. The researchers' role is to gather and assess existing scientific knowledge to support and critically review decision-making processes and to participate in communication.

For further information, please contact Director Tina Elfving, tina.elfwing@su.su, or Professor Christoph Humborg, christoph.humborg@su.se.

Closing date: 14 January 2024

PhD position in coastal food web ecology and carbon cycling

Doctor Susanne Kortsch at Tvärminne Zoological Station, University of Helsinki is recruiting a PhD student in food web ecology.

The overarching aim of this PhD project is to predict the fate of carbon in coastal Baltic Sea ecosystems, using a food web approach. Trophic interactions inter-link the ecosystem from the bottom to the top and are central for the flow of carbon, and therefore food webs are central for understanding the fate of carbon in the ecosystem. This is important because the coastal ecosystems can function as carbon sinks, mitigating climate change effects, but they are faced with multiple threats such as rising temperatures, eutrophication, invasive species, and degradation of foundation species (macrophytes).

For further information and to apply, please contact Dr. Susanne Kortsch, susanne.kortsch@helsinki.fi.

Closing date: 31 January 2024



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