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UNIVERSITY OF APPLIED SCIENCES

RESEARCH & DEVELOPMENT REPORT 2025

FACULTY OF BIOECONOMY

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CONTENT

CITIUS, ALTIUS, FORTIUS

The Olympic motto might seem far fetched for the introductory words of a report about research and development in bioeconomy. However, the Olympic ideals of fair play, community and tolerance in all areas of life are very timely. In 2025 the world is in the midst of a polycrisis and societies are in flux. There are plenty of opportunities to get very anxious and feel depressed about the current state of affairs. I am quite certain that most of you reading this can say you have felt both anxious and down during the past year. Without getting any further into the murky waters of understanding the human psyche, I would say these are very understandable feelings and reactions. The big question however is, what do we do then?

There are many different ways to go, but a good place to start is by ourselves. Recognizing what we can do ourselves in our everyday lives, however small the actions might be, are the start of a revolution. Because in the many small actions lies power that can be iterated in any series of consecutive actions over the time we are each given. Putting into action fair play, creating community and tolerance towards the other are winning strategies because they empower us. This is my personal firm belief, but what does it have to do with writing the intro of a research report?

I think that the idea of competing and competition is very familiar for anyone who ever has applied for funding of any sort. Only the most excelling proposals get funded, and sometimes the competition is so steep that even full points are not enough to earn the award. The competition doesn't stop when the funding is secured either. Then there is competition for getting the stakeholders' attention, of succeeding in the tasks we have set out to do, of gaining visibility in the ever-growing flood of social media and so on. When we have completed one cycle, we start again by competing for new funds. This sounds exhausting just writing about it, and although a certain amount of healthy competition can be a driving force to overcome hurdles, too much of the stuff will burn us out.

In overcoming the polycrisis, solving wicked problems, and supporting our communities it is evident that fair play, creating community around us and tolerating the other are key competences for succeeding. When we only focus on the end result, we forget the path whereas the path is the only thing of value if we are to learn and develop. Results are important, but mostly because they give us an opportunity to create community around us when we celebrate reaching a goal. Results are good prompts to look back and appreciate the work we have done, which is important when we make out the waypoints of the path ahead. If we start seeing results as the end of something, we are throwing away our good work and we will most likely stagnate while busying ourselves building monuments of past achievements.

In this past year we have created community around us by bringing new groups of people together to share their experiences and to discover new knowledge. We have also made every effort to play fair by being transparent in our actions and communicate what it is we are doing. The tolerance towards the other is difficult to evaluate yourself. However, being aware is a first step and looking at the topics and the crowd, we gather in our projects, I hope we are on the right track. Maybe you can be the judge of how we succeed when reading the RDI-report of 2025? I like to think that the fantastic thing with the line of work of research and development is that every day gives a brand new opportunity to try again to be fair, tolerant and build community in a lasting and resilient way.

Sammanfattning på svenska

De olympiska idealen, fair play, gemenskap och tolerans, är relevanta i denna tid präglad av polykris och osäkerhet. Små vardagliga handlingar kan skapa positiv förändring och dessa värden är viktiga även inom forskning och projektarbete, där konkurrensen om finansiering och synlighet ofta är hård och utmattande. I stället för att enbart fokusera på resultat bör man värdesätta vägen dit, eftersom lärande och utveckling sker i processen. Under det gångna året har vi byggt gemenskap, varit transparenta och försökt vara inkluderande i projekten. Jag hoppas detta återspeglas i årets FUI-rapport och vill betona att varje dag ger en ny chans att arbeta mer rättvist, tolerant och gemenskapsstärkande.

MARIANNE FRED
HEAD OF RDI IN BIOECONOMY

THE COMPETENCE CENTER FOR SUSTAINABLE SOLUTIONS

The research and development at the faculty of Bioeconomy at Novia is organized under the umbrella of the competence center for sustainable solutions financed by the City of Raseborg and Utbildningsstiftelsen Sydväst. The competence center has a staff of about 25 people including the teaching staff working on projects. The group is quite diverse with six different foreign nationalities represented but no gender bias. We also have quite a broad set of competencies and educational backgrounds from biologists, agronomists, veterinary medicine, engineers, social sciences, geography, arts, music and more.

During 2025 we have gone through a process of compiling our competencies into three main focal areas from a previous set of seven. This process was done jointly and required some iterations before we could all feel that the areas fitted our competencies and activities, and that the areas could include everything without being so broad as to become meaningless. We all could agree on the focal areas, and our common themes as follows.

Transformative pathways in bioeconomy

1. Resilient agriculture and forestry
2. Ecosystems functioning
3. Socio-ecological transition

The most important part of this process was the actual think-tank and dialogue around our competencies and the direction of our initiatives. You could perhaps expect that a group of people working together already for some time would just write down and agree upon the common themes. However, when thinking a bit deeper about finding common denominators that say something while not excluding anything of what the group sees as their core activities, it was a considerable task. This makes the accomplishment all the more significant and the first half year working in these groups has shown they really describe what we do, and where our competencies lie. The focal areas are in line with several important steering processes from Novias own strategy 2030 to the EU commissions Green Deal and the more recent New European Bauhaus (NEB).

Highlights for 2025

During 2025 the competence center for sustainable solutions has been working with no less than seven team-leaders who will present themselves later in this report. The initiative of team leaders was in its second year in Novia 2025. In January, all the team-leaders in Novia were gathered for a joint meeting in Tampere for the first time.

The meeting was important because it gave the new structure of having team leaders an opportunity to present itself and how the structure has manifested in the different faculties. The foremost feeling when going back home after the meeting was the awe of how many important and interesting things we accomplish together as RDI staff at Novia. Many collaborations have sprung from this one meeting and that alone is a reason to continue the good work.

In April it was time for the bi-annual RDI-seminar at Novia. This time we gathered in Jakobstad where we were hosted by the faculty of Arts and Culture. During the two-day meeting the competence center members were taking part in panel discussions, hosting a session, presenting their work and joining in a futures workshop together.

At the end of the year in December the competence center gathered for a half-day workshop on communication. We were focusing on the personal aspect of communication, branding one's competence as an expert while keeping within the focus of one's work. The task of being visible, creating traction, and speaking from expertise on topical issues is something we would like to learn more about and develop our skills in. We asked Anna Bertills from Bertills & Jung with Friends to share her insights and help us get better at communicating in LinkedIn. She gave us many hands on tips and had us thinking hard on how we profile ourselves, whether we would read our own posts and what we really want to convey about our own expertise.

After this workshop the competence center slowly transitioned to the holiday season and had a well earned rest before starting a new year.

MARIANNE FRED
HEAD OF RDI IN BIOECONOMY

Sammanfattning på svenska

FUI vid institutionen för bioekonomi på Novia samlas inom Kompetenscentret för hållbara lösningar, som finansieras av Raseborgs stad och Utbildningsstiftelsen Sydväst. Centret består av ca 25 medarbetare med breda och mångsidiga kompetenser. Under 2025 genomfördes en gemensam process där man samlade tidigare sju fokusområden till tre tydliga tematiska helheter: resilient jord- och skogsbruk, ekosystemens funktion och socioekologisk omställning. Arbetet stärkte gruppens gemensamma riktning och ligger i linje med både Novias strategi och EU-initiativ som Green Deal och New European Bauhaus.

Årets höjdpunkter inkluderade ett möte för Novias teamledare i Tammerfors, där den nya strukturen presenterades och samarbeten initierades, samt deltagande i Novias RDI-seminarium i Jakobstad. Året avslutades med en workshop om kommunikation och personlig expertprofilering på LinkedIn, ledd av Anna Bertills.

BLUE ECOSYSTEMS

JONNA ENGSTRÖM-ÖST

TEAM LEADER

Blue Ecosystems work with aquatic ecosystems, including wetlands, lakes, rivers and the marine environment, both offshore and coastal areas. We are interested in how the rapidly changing environment will affect the aquatic ecosystems, and our research interests span from ecology and physiology to more applied questions. Can plankton adapt to climate change? Can duck mussels be cultured for human or animal food? During our daily efforts, we work in the field, laboratory or office, using field, experimental or long-term data. Apart from shorter projects, one of our main aims is to educate PhD students for an independent research career. Eutrophication and climate change are main challenges in the Baltic Sea, and it is essential to keep studying the largest brackish basin on Earth. The projects were in 2025 funded by Aktion Österbotten (Havs- och fiskerifonden i EU), Svenska Kulturfonden, Waldemar von Frenckells stiftelse, and the Research Council of Finland.

Projects:

- CARBONATE - Forskningsprojekt om hur kalktillsats i havsvatten påverkar kolsänkan samt plankton och bottenlevande musslor
- ARKTIS - Eco-physiological responses of plankton to spatial differences in warming and salinity in the Arctic
- WarmSea - project studying marine warming and ecosystem effects
- ZETA - Losing weight in marine biota?
- Dammussla - Utredning om akvakultur
- Dammussla - utredning om musslans tillväxt i olika vattenmiljöer

Sammanfattning på svenska

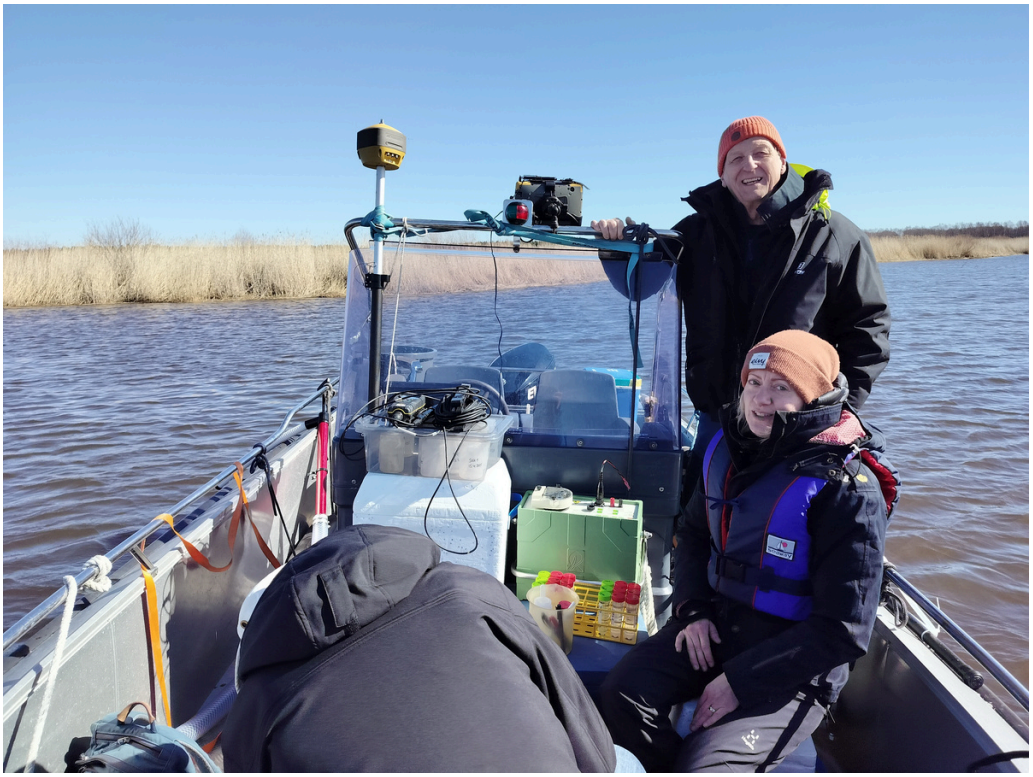
Vi undersöker miljöförändringar, bl.a hur klimatförändring och övergödning påverkar våra vattenekosystem, både i sjö, hav, å samt våtmark. Vi jobbar främst med data insamlat i fält, i experiment, eller under monitoring. Vi undersöker främst djurplankton och deras eko-fysiologi, reproduktionsframgång, anpassning samt överlevnad. Projekten i Blue Ecosystems teamet var år 2025 finansierade av EU, Aktion Österbotten, Svenska kulturfonden, Waldemar von Frenckells stiftelse, samt Finlands akademi.

ACID SULFATE SOILS AND RIVERS: BACTERIA AND PLANKTON DIVERSITY USING DNA METABARCODING

Team: Jonna Engström-Öst, Eva Högfors-Rönnholm, Sten Engblom, Sem Timmerbacka

Acid sulfate soils are found everywhere, but are most frequent in Australia, South-east Asia, West Africa, the Caribbean, and Europe, including Finland, Sweden, and Denmark. The soils become a problem especially in lowland coastal areas during drought, as the oxidation products flush out following rain and lower the pH of the water. We study acid sulfate soil effects on plankton and bacteria diversity, using DNA metabarcoding. Our main research interest is to increase the understanding of acid sulfate soil effects on microbial and plankton diversity, using environmental-DNA, measured by collaborators in Kalmar, Sweden.

Estuaries of rivers Solf å and Toby å in the Vasa region, running through agricultural lands, were sampled in all seasons. As a reference area we sample upstream in River Toby å in Laihela that is unaffected by sulfate soils. We measured water quality, nutrient concentrations, and different metals that dissolve in low-pH waters.



Eva och Sem at Toby river. Photo: Jonna Engström-Öst

In winter, samples were collected using a snowmobile on the ice off Vasa, and during the other seasons we sampled using a motorboat. It was also quite challenging to sample in the cold. The project is funded by Svensk-Österbottniska samfundet, Aktion Österbotten, Gustaf Svanljungs stiftelse, Aktiastiftelsen i Vasa and Waldemar von Frenckells stiftelse in 2025.

Highlights of the year

The main highlight was to receive funds to study biodiversity in river water off acid sulfate soils, a project we have been eager to start for some time.

JONNA ENGSTRÖM-ÖST
SPECIAL RESEARCHER

Humus filtered from river water. Photo: Jonna Engström-Öst

LEADER Aktion Österbotten

SVENSK-ÖSTERBOTTNISKA SAMFUNDET

Waldemar von Frenckells stiftelse

Aktiastiftelsen i Vasa

Gustaf Swanljungs stiftelse

Sammanfattning på svenska

Vi undersöker bakteriers och planktons diversitet i områden som domineras av sura sulfatjordar. Diversitet mäts med DNA analys (eng. metabarcoding) vid Linnéuniversitetet i Sverige. Vidare mäter vi vattenkvalitet, närsalter och metaller som blir lösliga i vatten med lågt pH. Vi jobbar främst med data insamlat under ett år i fält och planerar att skriva en vetenskaplig artikel under 2026.

WARMSEA – DOES THE MARINE FOOD QUALITY SUFFER FROM THE HEAT?

Team: Jonna Engström-Öst, Andriana Koutsandrea

Energy use is increasing when the environment gets warmer. The WARMSEA project had two aims, firstly to measure spring plankton and benthic larval fatty acids of the main Baltic Sea basins, and secondly to collect data also closer to the coastline, from Husö, Själö, and Tvärminne. Our main study question was to relate the fatty acid data to temperature and detect potential effects by warming on the community lipid composition. Andriana Koutsandrea was responsible for the data collection and is preparing a manuscript on the results together with collaborators Ursula Strandberg (University of Eastern Finland), Reijo Käkelä and his team (University of Helsinki), as well as Anna Törnroos-Remes (Åbo Akademi University). Two manuscripts are currently being prepared on the collected data (Koutsandrea et al. a,b).

The results will fill a huge knowledge gap and considerably increase our understanding concerning benthic-pelagic coupling in the Baltic Sea, where few studies have been done about these processes. We expect results to reveal how essential fatty acids, main drivers of food quality, are transferred to the benthic consumers during warming.

Highlights of the year

Andriana Koutsandrea participated in the COMBINE II cruise to the Baltic Sea, studying zooplankton fatty acid composition during spring. She also visited Själö, Husö and Tvärminne field stations to collect additional data closer to the coastline.

Svenska kulturfonden

JONNA ENGSTRÖM-ÖST
SPECIAL RESEARCHER

Sammanfattning på svenska

WARMSEA projektet har jobbat med frågor gällande effekten av temperatur på viktiga fettsyror i plankton, dvs små fiskars viktigaste föda. Data har insamlats ute till havs samt på kustnära stationer i Finska viken, Skärgårdshavet samt i Ålands skärgård.

OCEAN ALKALINITY ENHANCEMENT (OAE)

Ocean acidification is an increasing concern for the Baltic Sea, where warming, eutrophication and overfishing already challenge ecosystem resilience. Ocean Alkalinity Enhancement (OAE) is a potential method to counteract acidification and enhance marine CO_2 uptake by increasing seawater alkalinity. Although liming has been used to mitigate acidification in freshwater systems, its ecological consequences in brackish marine environments remain largely unknown. This project aims to assess how alkalinity enhancement affects the structure and physiological performance of natural plankton communities in the Baltic Sea, and whether such treatment can improve water quality or condition of planktonic organisms in eutrophic coastal environments.

In 2025, we conducted a 6-week indoor mesocosm experiment at Tvärminne Zoological Station (Hanko, Gulf of Finland), using seawater from Krogarviken. Large controlled mesocosms were filled with natural plankton communities and exposed to three treatments: high alkalinity enhancement, low alkalinity enhancement, and an untreated control. Slaked lime ($Ca(OH)_2$) was added to the treatment tanks to increase alkalinity and simulate OAE conditions relevant for the Baltic Sea. The controlled indoor setup allowed regulation of temperature and light while maintaining stable experimental conditions.

Throughout the experiment, we monitored the chemical development of the seawater by measuring alkalinity, pH, pCO_2, dissolved inorganic carbon and nutrient concentrations. These measurements enabled us to quantify the effects of the liming treatments on carbon

Participants in the mesokosmexperiment: Soultana Zervoudaki, Chamika Weerasakara (front row), Josephin Lemke, Andriana Koutsandrea, Henna Yliluikki (middle row), Jonna Engström-Öst, Kristian Spilling, Nicolas-Xavier Geilfus (back row). Photo: Minna Österlund

chemistry and nutrient dynamics. Ecological responses were assessed by analysing phytoplankton and zooplankton species composition and abundance. We also measured physiological variables including zooplankton lipid content, respiration rates, and indicators of cellular stress and reproductive condition.

By combining chemical, ecological and physiological measurements, this study aims to determine whether OAE can influence plankton community functioning or improve the quality of zooplankton in eutrophic brackish waters. The results will provide knowledge for evaluating the feasibility of local OAE applications as a temporary tool to buffer acidification and support ecosystem resilience in the Baltic Sea, while recognizing that largescale solutions must ultimately rely on reducing carbon emissions and mitigating other environmental pressures.

Highlights of the year

An Ocean Alkalinity Enhancement (OAE) experiment at Tvärminne Zoological Station provided new insight into how alkalinity enhancement influences plankton communities and ecosystem functioning in eutrophic brackish waters, offering essential knowledge for evaluating OAE as a temporary tool to buffer acidification and support Baltic Sea ecosystem resilience.

The study is funded by the Research Council of Finland, The Swedish Cultural Foundation (Svenska kulturfonden), and performed in collaboration with Tvärminne Zoological Station, Hellenic Centre for Marine Research, University of Turku, the University of Jyväskylä, and the Finnish Environment Institute.

Project leader: Jonna Engström-Öst
PhD students: Andriana Koutsandrea and Henna Yliluikki
Intern: Chamika Weerasakara
Collaborators: Nicolas-Xavier Geilfus, Soultana Zervoudaki, Elli Koulouvari, Josephin Lemke, Kristian Spilling, Katja Anttila, Minna Hiltunen & team

ANNA-KARIN ALMÈN
PROJECT RESEARCHER

Svenska kulturfonden

Research Council of Finland

Sammanfattning på svenska

Projektets mål är att undersöka hur ökad alkalinitet, genom kalkning av havsvatten, påverkar planktonsamhället i Östersjön. Ett experiment utfördes där släckt kalk tillsattes i bassänger fyllda med havsvatten. Experimentet pågick i 6 veckor under hösten 2025. Vi följde förändringar i vattenkemi och analyserade artsammansättning, respiration, fettsyrainnehåll och indikatorer på fysiologisk stress hos djurplankton. Studien syftar till att klargöra de ekologiska effekterna av ökad alkalinitet (eng. ocean alkalinity enhancement) och dess potential att lokalt motverka havsförsurning.

ECO-PHYSIOLOGICAL RESPONSES OF MARINE BIOTA TO WARMING WATERS AND OCEAN ACIDIFICATION - FOCUS ON BENTHIC-PELAGIC COUPLING

In September–October 2025, I participated in a six-week indoor mesocosm experiment at Tvärminne Zoological Station. The experiment consisted of 12 enclosures of 600 L, which were subjected to 3 treatments: 1) control, 2) low lime addition and 3) high lime addition. My work focused on the analysis of the zooplankton community, sediment trap material, and zooplankton offspring production. I also conducted analyses of microzooplankton and phytoplankton using a Planktoscope, in collaboration with the Hellenic Centre for Marine Research. In addition, I contributed to measurements and analysis of plankton community respiration in collaboration with the Finnish Environment Institute.

Highlights of the year

Alongside my research activities, I worked as a teaching assistant for the course Statistics at the Faculty of Environmental and Marine Biology, Åbo Akademi University, during November and December 2025, where I helped students in statistical analysis using the R programming language.

Acartia spp., This photo is from the Planktoscope analysis at Tvärminne Zoological Station. Photo: Andriana Koutsandrea

During 2025, I also submitted a manuscript from data collected in 2023. I also analysed the fatty acid composition of plankton community from an R/V Aranda cruise and coastal stations. These two manuscripts will be part of my PhD thesis.

ANDRIANA KOUTSANDREA

PHD STUDENT

Collaborators:

Dr. Soultana Zervoudaki, Hellenic Centre for Marine Research

Dr. Kristian Spilling, Finnish Environment Institute

Andriana is collecting the sediment trap at the mesocosm experiment at Tvärminne Zoological Station. Photo: Jonna Engström-Öst

Sammanfattning på svenska

Under september–oktober 2025 deltog jag i ett sex veckor långt mesokosmförsök vid Tvärminne zoologiska station med fokus på hur kalktillsats påverkar planktonsystem. Jag analyserade bland annat zooplanktonsamhällen, sedimentfällor och reproduktion hos zooplankton samt mikro- och fytoplankton i samarbete med internationella och nationella forskningsinstitut. Parallellt arbetade jag som undervisningsassistent i statistik vid Åbo Akademi, där jag stöttade studenter i statistisk analys i R.

ZETA – LOSING WEIGHT? ECO-PHYSIOLOGY AND TRANSCRIPTOMICS REVEAL CLIMATE FORCING ON LIPID PROFILES AND ADAPTATION IN MARINE BIOTA

The ZETA project aims to increase the understanding of how climate change affects marine biota, focusing on ocean warming and acidification and zooplankton eco-physiology. Grazing zooplankton is a key link between primary production and higher trophic levels by providing food rich in polyunsaturated fatty acids to small fish and other planktivores. As a result, eco-physiological changes of zooplankton can be reflected through the whole marine food-web.

We study metabolic changes and zooplankton adaptation to climate change in three sub-projects. The Academy project is funded by the Research Council of Finland. Additional funding is provided by Svenska kulturfonden and Waldemar von Frenckells stiftelse.

- In Study I, long-term adaptation of zooplankton to acidification will be studied by using zooplankton at a site exposed to natural low pH, due to volcanic CO_2 seeping from the seabed.
- Study II is currently under re-planning. However, the research theme will be a comparative study on energy and lipid content of key marine species under conditions of human-induced ocean acidification.
- In Study III, we study a climate change mitigation strategy, ocean alkalinity enhancement (OAE), and its responses on plankton in the Gulf of Finland. We conducted a 6-week large-scale indoor mesocosm experiment at the Tvärminne Zoological Station by using slaked lime as an OAE tool to artificially enhance seawater alkalinity.

Vinodani Weerasekara, Henna Yliluikki, and Andriana Koutsandrea sampling zooplankton at sea near Tvärminne Zoological Station, Hanko, in summer 2025.

Progress of ZETA in 2025

Henna Yliluikki and Andriana Koutsandrea optimized the energy content protocol for zooplankton and crab samples under the supervision of Katja Anttila at University of Turku. In addition, the ZETA blog was launched in spring 2025. In February, the newspaper Västra Nyland published an article about our upcoming mesocosm experiment, titled: *Plankton i fokus när forskare synar havets buffertförmåga.*

Jonna Engström-Öst and Henna Yliluikki visited Greece for two weeks at the end of February to start field and laboratory work of the study I with our collaborators from the Hellenic Centre for Marine Research (HCMR). We received valuable information for designing the main sampling and familiarized ourselves with the specific conditions of the seawater at the venting site. More about the Greece travel can be found in the travel blog of Novialia, titled: *Studying zooplankton from the 'natural laboratory' in Méthana, Greece: setting up a novel project.*

In August, we started a mesocosm experiment. Plankton ecology was studied in collaboration with Soultana Zervoudaki and Elli Koulouvari from the HCMR. Total community respiration was measured together with Kristian Spilling and Josephin Lemke from Finnish Environment Institute. We sampled zooplankton and seston for fatty acid analyses to study possible impacts of OAE on the quality or quantity of fatty acids of zooplankton and seston, reflecting zooplankton food availability. Zooplankton and water were also sampled for ionomics analyses that will be conducted in collaboration with Minna Hiltunen at the University of Jyväskylä. The aim is to finish the laboratory work and gather results from the mesocosm experiment in spring 2026.

Jonna Engström-Öst and Soultana Zervoudaki (with a microscope) working in the "field lab" and sampling at sea in Méthana, Greece, in February 2025

Henna Yliluikki and Jonna Engström-Öst participated in the Baltic University Programme Symposium 2025 in Uppsala in November. There, Henna Yliluikki presented a poster and an oral presentation titled: *Responses of brackish-water plankton communities to Ocean Alkalinity Enhancement using mesocosms*. Henna Yliluikki also gave a presentation about the research plan of ZETA for other doctoral researchers in environmental science.

Highlights of the year

Jonna Engström-Öst and Henna Yliluikki visited an area with natural low pH close to a volcano in Greece, to collect samples for an ocean acidification (OA) study. The work is related to adaptation of zooplankton to OA by comparing plankton from low pH-areas with areas of ambient pH conditions. The area is used to model future ocean conditions caused by climate change.

Collaborators:

Katja Anttila, University of Turku (biomarkers)
Reid Brennan, National Oceanic and Atmospheric Administration and GEOMAR Helmholtz Centre for Ocean Research Kiel (gene expression)
Ursula Strandberg, University of Eastern Finland (fatty acids)
Soultana Zervoudaki, Hellenic Centre for Marine Research (zooplankton ecology)

HENNA YLILUIKKI
PHD STUDENT

Svenska kulturfonden
Research Council of Finland
Waldemar von Frenckells stiftelse

Sammanfattning på svenska

ZETA-projektet undersöker hur klimatförändringar, särskilt uppvärmning och försurning av haven, påverkar den marina biotan genom att förändra zooplanktonets ekofysiologi. Det är viktigt att studera zooplankton eftersom det är en viktig vektor för fleromättade fettsyror (som omega-3-oljor) mellan primärproduktionen och högre konsumenter i marina näringsvävar.

Vi inledde fältarbetet i Méthana i Grekland för att studera zooplanktonets långsiktiga anpassning till försurningen under våren 2025. Under hösten genomförde vi ett storskaligt mesokosmosexperiment inomhus för att studera reaktionerna hos planktonsamhället i bräckt vatten på strategin för att mildra klimatförändringarna, nämligen att öka havets alkalinitet. Henna Yliluikki presenterade en poster och en muntlig presentation om mesokosmosstudien vid Baltic University Programme Symposium 2025 i Uppsala i november.

ADAPTATION OF MARINE COPEPODS TO OCEAN WARMING AND ACIDIFICATION: IMPACTS ON LIPIDS AND METABOLIC CAPACITY

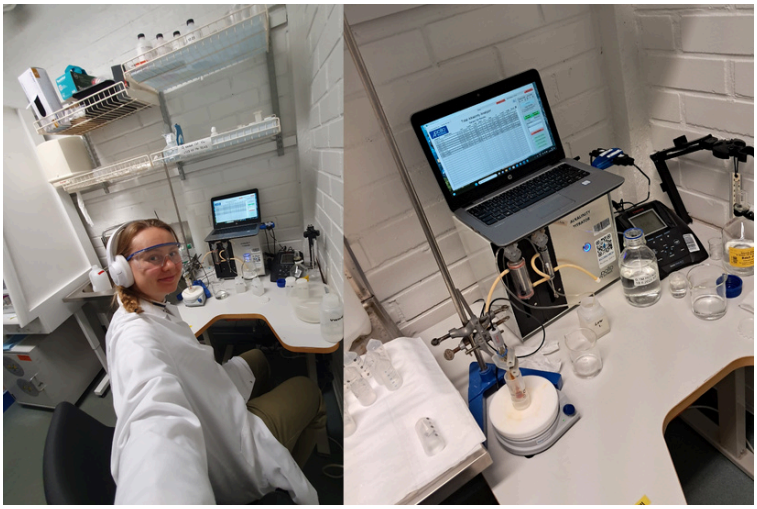
In August 2025, I was accepted to the Doctoral Programme in Biology, Geography and Geology (BGG) of the University of Turku Graduate School. My doctoral research will be conducted as part of the ZETA project. Three publications will be included in my thesis, one from each of three work packages.

The working titles of planned articles are:
I *Fatty acid profiles of zooplankton community under ocean alkalinity enhancement using mesocosms*

II *Interactions of genetic adaptation and plasticity in long-term acclimation of A. clausi inhabiting volcanic shallow areas in Methana*

III *Metabolic capacity of key marine species of north-eastern Pacific Ocean along a gradient of pH and temperature*

Study I has progressed during 2025. The mesocosm experiment on the impact of a climate change mitigation strategy, ocean alkalinity enhancement, on plankton were planned, and preliminary small-scale experiments were run in spring and summer to design the main experiment. The mesocosm experiment was carried out during 6 weeks in autumn 2025. One of the new analyses that I learned was total alkalinity titration. Alkalinity is known as a buffer capacity of water, and it is a key carbon chemistry parameter in the mesocosm experiment, together with dissolved inorganic carbon and pH.



Henna Yliluikki analysing total alkalinity samples from the mesocosm experiment.

I presented study I, the mesocosm experiment, in a poster and gave an oral presentation titled: *Responses of brackish-water plankton communities to Ocean Alkalinity Enhancement using mesocosms* at the Baltic University Programme Symposium 2025 (BUP2025) in Uppsala. I also gave presentation on the research plan of my doctoral research titled: *Adaptation of marine copepods to ocean warming and acidification: focus on lipids and metabolic capacity* to other doctoral researchers at BUP2025.

I participated in the doctoral researcher day of BGG programme and gave presentation titled: *Progress of my dissertation - Adaptation of marine copepods to ocean warming and acidification: focus on lipids and metabolic capacity.* In addition, I participated in the FINMARI Researcher days 2025 in Helsinki and Oikos 2025 Symposium in Jyväskylä.

Highlights of the year

Henna Yliluikki gave a talk about an Ocean Alkalinity Enhancement mesocosm experiment at the Baltic University Programme Symposium in Uppsala.

HENNA YLILUIKKI

PHD STUDENT

Henna Yliluikki enjoying and sampling on the sea.

Sammanfattning på svenska

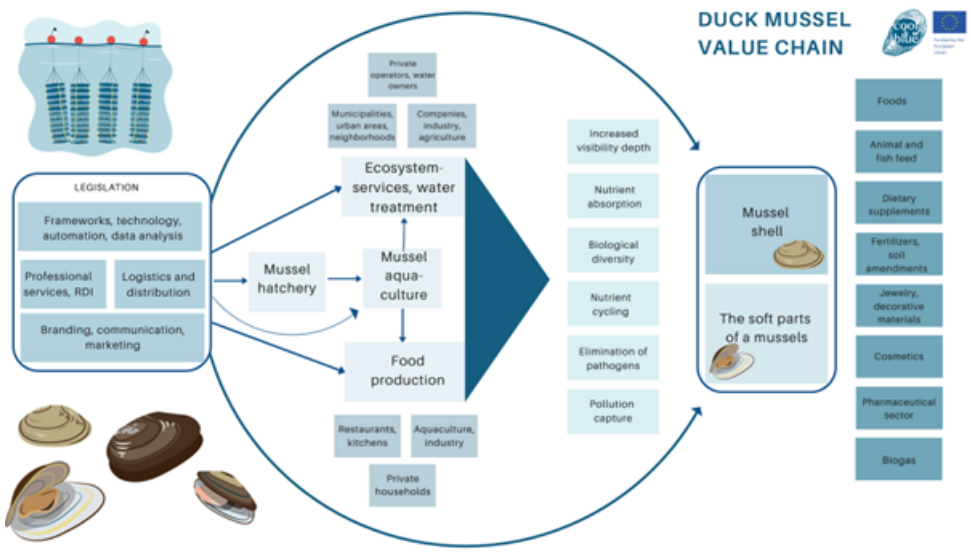
Jag antogs till doktorandprogrammet i biologi, geografi och geologi vid Åbo universitet i augusti 2025. Min doktorsexamen genomförs inom ramen för ZETA-projektet och omfattar tre publikationer som fokuserar på planktonsamhällenas reaktioner på en strategi för att mildra klimatförändringarna, ökad alkalinitet i haven och djurplanktons anpassning till uppvärmning och försurning. Under 2025 genomfördes ett sex veckor långt mesokosmosexperiment, och jag deltog i och presenterade på nationella och internationella vetenskapliga möten.

PROJECT FRESHWATER MUSSEL – AN AQUACULTURE FEASIBILITY STUDY

The project Freshwater Mussel – An Aquaculture Feasibility Study (1.11.2023 - 30.6.2025) has had the overarching goal of investigating the potential of the common freshwater mussel (*Anodonta anatina*) for large-scale aquaculture applications, including animal feed, gourmet food products, and bioremediation. Although the species is widespread in our lakes, surprisingly little consolidated knowledge exists regarding its potential within a circular economy framework. The project has therefore focused on mapping existing research, analyzing available data, and creating a structured foundation for future development.

One of the project's first steps was to establish a digital research library on freshwater mussels. Through extensive literature searches in international databases and scientific archives, reports, articles, and academic papers from around the world were compiled. This material has formed the basis for several articles, a vlog, a podcast, and a value chain analysis describing how freshwater mussels could be integrated into sustainable production systems. The project has also highlighted the major bottleneck at present: the lack of a functional model for artificial reproduction. Contacts have therefore been established with researchers at the University of Jyväskylä who are developing laboratory-based recruitment methods for mussels.

Collaboration with networks such as Cool Blue and Baltic MUPPETS has broadened perspectives on research, technology, and business development. Baltic MUPPETS shared experiences on how small mussels can be used in sustainable animal feed. Discussions have clarified the regulatory steps required for future product development, particularly the issue of Novel Food approval.



Collaboration with networks such as Cool Blue and Baltic MUPPETS has broadened perspectives on research, technology, and business development. Baltic MUPPETS shared experiences on how small mussels can be used in sustainable animal feed. Discussions have clarified the regulatory steps required for future product development, particularly the issue of Novel Food approval.

During the project period, practical activities were also carried out. Mussels were collected by diving in both Maxmo and Lake Larsmo, and samples were analyzed for heavy metals, organic pollutants, and Escherichia coli. Considerable effort was invested in identifying laboratories capable of conducting the analyses, and ultimately a proposal from MetropoliLab was accepted.

The project has had significant public impact. Through participation in fairs, seminars, cultural events, and public gatherings – from the National Rural Parliament to numerous local family events – thousands of people have encountered live freshwater mussels in aquariums and learned about their ecological and economic significance. The project leader has delivered lectures at adult education centers, participated in network meetings, and organized tasting events to highlight the mussel's potential as a food product. Social media, video content, and blogs have further strengthened the project's visibility.

Highlights of the year

- Serving duckmussels at the Archipelago Seminar in Åminne, June
- Laboratory analyses demonstrating that the mussels are sufficiently clean for potential food use
- Development of a value chain model for freshwater mussels

Overall, the project has created a solid foundation for continued work. It has built knowledge repositories, initiated important collaborations, conducted practical trials, and launched analyses essential for future cultivation and commercialization. The work demonstrates that the freshwater mussel holds significant potential – but also that continued research, particularly regarding reproduction and food safety, is necessary to enable sustainable large-scale development.

Finally, the project contributes to long-term societal benefits by laying the groundwork for innovation and business development. By mapping existing knowledge, developing communication strategies, and analyzing nutritional values, the conditions for future commercialization and expanded use are strengthened. This supports local businesses, research actors, and organizations working to develop environmentally responsible industries connected to aquatic ecosystems.

ANITA STORM
PROJECT LEADER

Medfinansieras av Europeiska unionen

KUSTAKTIONSGRUPPEN I ÖSTERBOTTEN

Sammanfattning på svenska

Projektet Dammussla – en utredning om akvakultur har undersökt möjligheterna att använda den allmänna dammusslan inom akvakultur för foder, gourmetprodukter och bioremediering. Ett digitalt forskningsbibliotek har byggts upp och samarbeten etablerats med forskare och nätverk som Cool Blue och Baltic MUPPETS. Praktiska provtagningar och analyser har genomförts, och projektet har fått stort genomslag genom evenemang och kommunikation. Arbetet lägger en viktig grund för framtida odling, men mer forskning krävs kring reproduktion och livsmedelssäkerhet.

FRESHWATER MUSSEL – STUDY OF GROWTH IN DIFFERENT AQUATIC ENVIRONMENTS

The project Freshwater Mussel (1.9.2025 - 31.12.2206) aims to increase knowledge about the common freshwater mussel (*Anodonta anatina*) and how juvenile individuals grow and survive in different aquatic environments in Ostrobothnia. The species plays an important role in freshwater ecosystems due to its ability to filter water and influence nutrient balance. Despite its ecological significance, there is still limited knowledge about how environmental factors such as water quality, temperature, and salinity affect its development.

To investigate this, juvenile mussels were collected from a pond in Maxmo, individually tagged, and deployed in cages at several different sites across the region. A reference population was left in Maxmo for comparison.

During the autumn, the project carried out extensive fieldwork. Collecting sufficient numbers of juvenile mussels required multiple visits and the development of effective techniques for retrieving small individuals. Each mussel was tagged with a small numbered disc attached using epoxy adhesive. The mussels were then placed in round cages made of fine mesh and deployed at depths of 40–50 cm. The sites included both freshwater and coastal locations with slightly brackish water: Finnholmen in Maxmo, Oxkangar in Vörå, Hästöskata in Lake Larsmo, the Malax river mouth, Old Vaasa at YA!, Tjöck River in Kristinestad, and Björkören in Malax.

All sites have been visited at least twice for monitoring and measurement, and some more frequently when cages needed to be moved to deeper water before ice formation.
The project has also maintained a strong communication and outreach profile. Mussels and the project's objectives have been presented at several events, including Environmental Theme Day at YA!, Science Night in Jakobstad, and Fisheries Day at the Kvarken Boat Museum, where children, youth, and parents showed great interest. Presentations were also given to the Övermalax Martha Association and at the Science Carnival in Vaasa. Several blog posts have been published, and additional texts and summaries are planned for winter 2026, including topics such as mussel feeding requirements and the effects of heavy metals on survival.

Preliminary results indicate that growth varies between locations. At some sites, mussels have shown good growth, while at others growth has been weak or absent. At one location, one third of the individuals died, primarily those smaller than 20 mm. Juvenile mussels are more vulnerable due to their thinner shells, and salinity levels at certain coastal sites may approach their tolerance limits. Despite these challenges, the project has already generated valuable knowledge about the species' response to different environmental conditions and established a solid foundation for further analyses and continued monitoring during the next project phase.

Highlights of the year

- Successful recruitment and survival of mussels in cages deployed in natural waters
- Effective collection of juvenile mussels in Maxmo
- Extensive media coverage of the freshwater mussel project in autumn 2026, including features in Yle, Iltalehti, and Ilta-Sanomat

ANITA STORM
PROJECT LEADER

Medfinansieras av Europeiska unionen

KUSTAKTIONSGRUPPEN I ÖSTERBOTTEN

Sammanfattning på svenska

Projektet Dammussla - utredning om musslans tillväxt i olika vattenmiljöer undersöker hur juvenila dammusslor växer och överlever i olika vattenmiljöer i Österbotten. Musslor har samlats in, märkts och placerats i sumpar på flera lokaler i både sötvatten och bräckt vatten. Fältarbetet har omfattat upprepade kontroller och mätningar. Projektet har också haft stark synlighet genom evenemang, presentationer och bloggar. Resultaten visar varierande tillväxt och högre dödlighet hos små individer, men projektet har redan gett värdefull kunskap inför kommande analyser och fortsatta studier.

GEOSPATIAL SYSTEMS

AURÉLIE NOEL

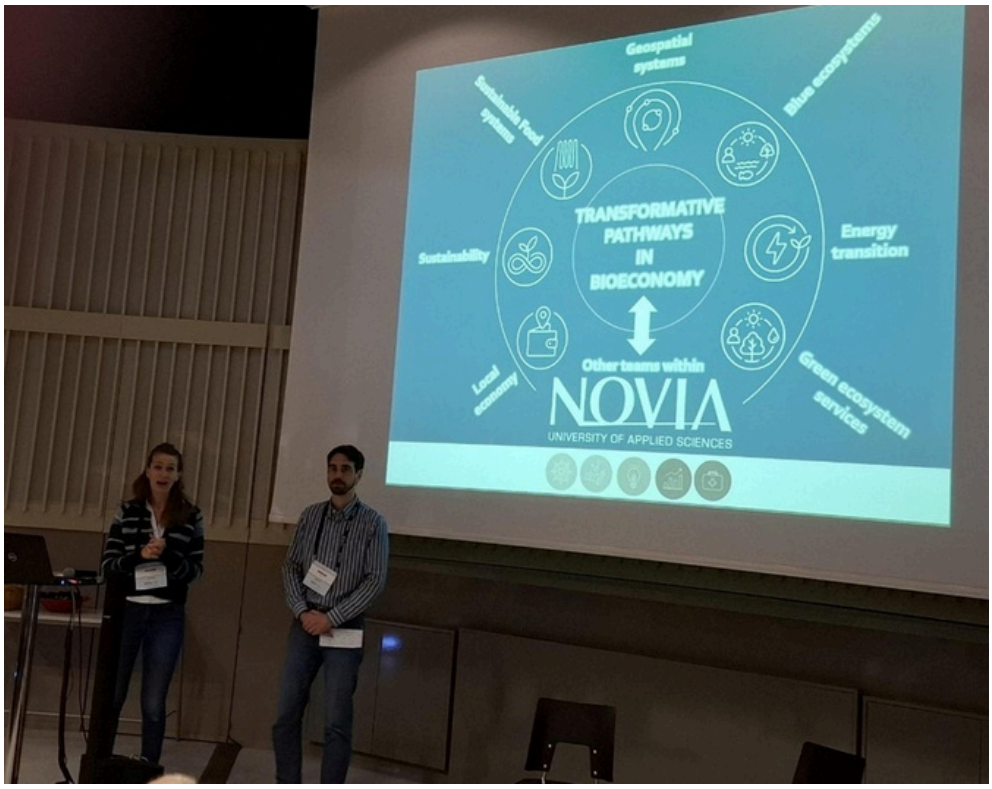
TEAM LEADER

Highlights: Strengthening our (geospatial) ecosystem

Let's celebrate one year in the making and our growth towards resilience and sustainability. We've expanded our Spatial Competence Centre and continued building spatial capacity for key sectors. We also focused on leading responsible geoAI adoption, steering our applied research in making geoAI a useable tool while raising awareness about its drawbacks in geoscientific applications.

Anniversary

In April, we were given the floor to recap one year in the making. We highlighted how this new structure steers our roles and our Research, Development and Innovation activities, and how it strengthens our network, our collaborations and our competences within our faculty and our university



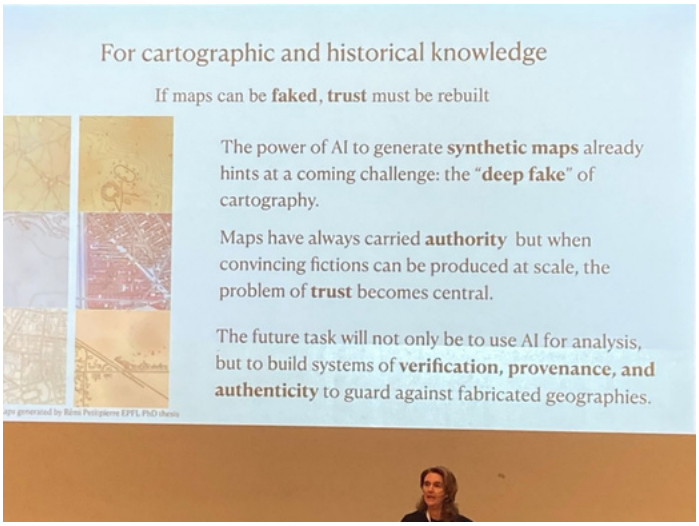
Joshua and Aurelie discussing how our teams have been experiencing their new structure Credit: Marianne Fred

SCC

At the operational level, our team continued its path towards spatial literacy and awareness with the development of the Spatial Competence Centre activities (see specific section?). The focus also remained on supporting precision farming and tech forestry as central interests for our faculty and as one of the three drivers of geospatial systems: data collection, digitalization, and legislation.

GeoAI

Geography and technologies have always evolved hand in hand, identifying early-on bottlenecks and areas of improvement, allowing the discipline to be on the forefront. In the last 10 years, geospatial artificial intelligence (GeoAI) has been in the spotlight and our team onboarded by engaging in international events and training while also addressing critical issues such as trust and misinformation. During our visit to the Geoforum in October, it was obvious that AI feeds most of the research and while the expectations are high in the new technology, there was messages of caution of its limits, notably to stimulate critical thinking. This is a recurring cautionary tale. In April, we participated to the online International Spring School on Visualisation (ISSonVIS 2025) – Seeing through Lies: Mapping Trust in the Age of Misinformation and in September, we attended the symposium organized by the Institute of Cartography and Geoinformation at the Federal Institute of Technology Zurich. During both events, speakers emphasized the importance of GeoAI in geoscientific applications. “In maps, we trust…” Prof. Georg Gartner - President of the International Cartographic Association, reflecting on maps, their significance, and perceptions over time. In a time such as ours, where content can be created easily and with little to no quality control, we, as scientists, raise a fair question about… maps… can they still be trusted (Dr. Isabella di Lenardo)?



Picture to left: ETH Zurich symposium. Photo: Aurelie Noel.

Picture above: Dr. Isabella di Lenardo, EPFL speech during the Zurich event. Photo: Aurelie Noel.

In October 2024, we had then already addressed one of their least known traits: deception – during the International Geographical Union conference and networking event in Jakobstad, while addressing Mediated Geographies (lecture - Maps as media for open representation of perceptions). Since their introduction, the authorship authority mandates the quality and trustfulness of what appears on maps. However, the shift towards general public and AI map production questions that universal foundation. To evolve with this new reality and, as spatial expert, to provide the safety margins for GeoAI, our team follows continuous education. The Location Innovation Academy provided us online courses about Location and AI, and, in December, the Finnish CSC also trained our team – IT Center for Science on GeoML (Practical machine learning with spatial data). Along with training, we will pursue, together with collaborators from Vienna University of Technology, University of Vienne and Swiss Federal Technology Institute of Lausanne, our research on cognitive aspects of maps and trust, harnessing AI capacities instead of foreseeing its worse incomes.

Using spatial technologies, spatial data and GeoAI are today's best tools to move along and to support our path towards resilience and sustainability.

Projects:

- SCC -Spatial Competence Center
- TFK: The FInland -Zanzibar Marine Spatial Planning for a Sustainable Blue Economy
- Seabirds and offshore wind power
- Offshore wind power II

Sammanfattning på svenska

Efter ett år rapporterar teamet om tillväxt, anpassning och konsolidering av sin roll inom yrkeshögskolan och forskningsmiljön. Verksamheten fokuserade på att stärka spatiell kompetens genom Spatial Competence Centre, precisionsjordbruk och tekniskt skogsbruk, drivet av data och digitalisering. I takt med att GeoAI i allt högre grad formar geospatial forskning lyfte internationella evenemang fram både dess potential och begränsningar, särskilt när det gäller förtroende, etik och kritiskt tänkande inom kartläggning. Genom utbildning och samarbete driver teamet forskningen om kartkognition och förtroende framåt och utnyttjar GeoAI för att stödja resiliens och hållbarhet.

SPATIAL COMPETENCE CENTRE

Highlights of the year

"The SCC continues to support multiple RDI projects, demonstrating the practical value of spatial tools in environmental planning and regional development. The SCC also empowers the next generation of spatial experts through courses, thesis, and internships and fosters collaboration among students, researchers, industry and public organization through events and platforms."

"The cherry on the cake remains to witness students climbing the spatial data learning curve, coming from hard and impossible to grasp to achieved with mention, Aurelie, SCC leader".

Central piece of the Geospatial systems team, the Spatial Competence Centre (SCC) continues to evolve and supports spatial awareness and literacy. According to its missions and roles, the SCC supported RDI projects, guided students, developed inter-operational platforms and was presented at and in events.

Support

The SCC supported RDI in very diverse fields. In the agroforestry project NyIAF, the SCC supported the Agroforestry Design Team to produce design briefs for workshops during the Agroforestry exploration Program.

SCC facilitates marine spatial planning in Zanzibar along with local students and stakeholders. Photo Aurelie Noel

In sustainable coastal management project TFK , the SCC facilitated marine spatial planning workshops organized during mobility events (in 2024 and in 2025) around serious games along staff from Breda University of Applied Sciences and State University of Zanzibar. In the sustainable tourism project CNE2.0 and CNE3.0, the SCC activated participants in sustainable tourism. The collaborative map created raised awareness on tourism stakeholders united towards reaching sustainable goals such as STF labels. Finally in the didactic project Slätberget Nature trail, the SCC walked, walked (and walked) the Slätberget area to track the trail, and created the official map.

Mentor

Pursuing its mentoring mission, the SCC guided Sustainable Coastal Management bachelor students through internships (planning bird survey) and thesis supervision and examination. The SCC has also delivered critical course such as GIS applications for land surveying technology students. Leveraging on the team educational purpose and existing content, the SCC should create a new course in 2026 about GeoAI.

SCC with student Senuri and supervisor Stefan Heinänen enjoying bird surveying at 5.02 in the morning with a coffee! Photo: Aurelie Noel

Snapshot of the hands-on crowd. Photo: Aurelie Noel

Broker

To connect stakeholders, the SCC has developed online repositories supported by GitHub (Novia-SCC) including for NylAF project and appeared at public awareness events. In October, the SCC presented its unique structure within Novia UAS to education institutions in the session #8 on geography as a unifying factor through education during Geography days at Helsinki University, campus Kumpula (presentation available). And in November, the SCC organized GeoDAY Raseborg 2025 at Novia UAS, campus Raseborg. It was a full day event with lectures, student seminar, posters and hands-on around spatial data in agriculture, forestry, building and BIM, construction, virtual engineering, consultancy, government, research, environment, and even old maps of Ekenäs from Västra Nyland museum. With a diverse panel of presenters and an attendance of students from Novia Raseborg and Vasa, visiting prospect students from Ostrobothnia, and gymnasiet students from Ekenäs and Hanko, the event was a remarkable success.

Every year brings new students to guide, new challenges to tackle and new possibilities for collaboration, plenty for the SCC to continue pursuing its missions.

AURELIE NOEL
PROJECT LEADER

Sammanfattning på svenska

Spatial Competence Centre (SCC) är en central och växande del av Geospatial Systems-teamet som främjar rumslig medvetenhet och kompetens genom forskning, utbildning, plattformar och evenemang. SCC har stöttat flera FUI-projekt inom agroforestry, marin spatial planering, hållbar turism och miljökartläggning, samtidigt som man har handlett studerande genom praktikplatser, examensarbeten och GIS-kurser. Man har utvecklat gemensamma onlinearkiv och aktivt spridit sitt arbete genom nationella och regionala evenemang, vilket har stärkt det tvärvetenskapliga samarbetet och den tillämpade geospatiala kompetensen.

RASEBORG COLLABORATION

With our unique position within the municipality and through the competence centres (Hållbara lösningar och energiomställning) between Raseborg city and Novia UAS, a valuable collaboration is supported to reach together sustainable goals through sustainability coordinator Miina Rautiainen and head of research Marianne Fred along with the teams from geospatial systems, sustainability, and energy transition. We have a long history of partnership, and this year brings new highlights.

Initiated in 2024, the city, with Anne-May Sundström from planning division, asked some insights from our team to develop the old school area from Lindnäs in Svartå into tiny houses. In 2025, we looked at the opportunities present in the area with local and regional perspectives, and examined the requirements for implementing and designing such a project. In March, we presented the project to the town hall during the Planeringstorget followed by a participatory event. In the spring, a survey was designed to gather the perceptions on the project at the city level and at the community level, and scenario were presented. Those are now in the hands of the city!

Also initiated in 2024, Case Västerby is an internal project aimed at lowering the impact of the logging strategy in the Västerby recreational area, notably with Mats Wikström and Maria Eriksson from the Parks division. In 2025, several actions were proposed. Those were divided into forestry interventions: to favour natural regeneration and water management: to slow down flow and capture nutrients. As mentioned and showcased on the Case Västerby webpage, many technologies were used for this case study such as virtual visit with 360-view, interactive mapping, 3D surface model (Romi Rancken), water flow simulation, citizen survey, and a reporting app to fully comprehend the area.

First official field visit with Raseborgs city and Novia UAS to estimate feasibility of actions and launch information for citizen contribution. Along with students visiting in the framework of the Forest Regeneration course and of the Restoration Ecology Course from HZ University of Applied Sciences , Eesti Maaülikool/Estonian University of Life Sciences. Photo: Aurelie Noel

Students were also involved in the design of the actions. In June, bird surveys were conducted with Sustainable Coastal Management students to draw a baseline and estimate bird population and habitat characteristics in the catchment area with audiomoths and point count surveys. Visitors from Estonia and The Netherlands also participated in the process by doing field visit and then proposed restoration and recreational solutions for the city. In September, some of the actions proposed were put in motion: e.g., the fragmentation and loss of habitat created by the first clear-cuts have been mitigated by leaving spruce seedlings thanks to precise forestry, and allowing a remaining planted range in between the clear cuts. In October, the area was visited again to plan ahead the water flow directions and leverage on the existing wetland. In December, a report was created to deliver a set of comprehensive suggestions to the city. Now the winter has arrived, and we are waiting for spring to continue!

In 2025, the Raseborgs master plan was put in motion in order to harmonize the numerous partial general plans as remains from the old villages structure back in 2009. The master plan follows the development plan prepared for 2050 and also needs to align with the regional plan from Nyland Regional Council.The planning is now active and includes several actors in order to design an integrated and comprehensive version, including Pontus Högström and Johanna Backas from the planning division. As one of the HIRS municipalities (Hangö, Ingå, Raseborg, Sjundeå), the City of Raseborg aims to promote sustainable development and green transition and, as HINKU municipality, the adoption of renewable energy in its region to mitigate climate change. To create a clearer overall picture and further support a proactive planning, a land use study has been conducted since October. Its purpose is to establish a clear understanding of land conditions and suitability for energy systems, enabling the preparation for future investment projects and supporting the green transition.

AURELIE NOEL
PROJECT LEADER

RASEBORG
RAASEPORI

Sammanfattning på svenska

Detta samarbete bygger på ett långvarigt partnerskap mellan Raseborgs stad och Yrkeshögskolan Novia och främjar hållbar utveckling genom forskning, planering och deltagande. Viktiga initiativ är bland annat Lindnäs tiny house-projekt, Case Västerby med fokus på skogsbruk med låg miljöpåverkan och återställande av ekosystem, samt bidrag till Raseborgs översiktsplan och markanvändningsstudie. Med hjälp av avancerade geospatiala verktyg, medborgarengagemang och studerandes deltagande stöder arbetet den gröna omställningen, biologisk mångfald och planering för förnybar energi på lokal och regional nivå.

FINLAND-ZANZIBAR MARINE SPATIAL PLANNING FOR A SUSTAINABLE BLUE ECONOMY

During the two-year project (2023–2025) Novia and the State University of Zanzibar (SUZA) developed and implemented two realizations of a joint Marine Spatial Planning (MSP) course. The project was funded by the Team Finland Knowledge programme (TKF 2023) and got additional travel funds from Svenska Kulturfonden. The aim of the project was to strengthen the capacity in MSP teaching by combining Finnish and Zanzibari expertise as well as applying sophisticated digital and game-based learning tools. Although ecological and societal conditions differ between Finland and Zanzibar, the MSP process is shared, offering an excellent opportunity for mutual learning.

During the final project year, 2025, a team of six Novia students and two teachers, travelled to Zanzibar to conduct an MSP Challenge workshop together with SUZA, facilitated by two experts from Breda University in the Netherlands. During the previous year, 2024, a similar team of students and teachers from SUZA visited Novia and Raseborg campus. These mobilities were central to the project's goals: to enable participants to work in a cross-cultural environment and to deepen collaboration between institutions. During the workshops innovative pedagogical tools, including the MSP Challenge simulation platform and board game were utilized. During the online part of the course we utilized the WIO Symphony tool, hosted by the Nairobi convention and supported by the Swedish Agency for Marine and Water Management (SwAM).

Planning the sea in ZAFIRI's premises. Photo: Stefan Heinänen.

A crucial project outcome was an expansion of the network of contacts and collaborators and in addition to the collaboration with SUZA the project also involved Zanzibar Fisheries and Marine Resources Research Institute (ZAFIRI) where the MSP challenge in Zanzibar was organised. In Finland the Finnish Environment Institute (SYKE), provided expertise on data needs and MSP processes. In addition, we extended and deepened the connection with international partners from Sweden and the Netherlands making the project truly international.

The two implementations of the joint MSP course realizations strengthened global competencies, enhanced understanding of different marine ecosystems, and supported students in developing problem-solving skills relevant for future MSP related work. The project came to an end in December 2025, but it has established a strong foundation for continued cooperation. The project partners are interested in extending the collaboration and are currently working on an Erasmus + application involving also University of Turku. The need for MSP competence remains high, and the networks and pedagogical approaches developed during 2023–2025 form an important platform for future initiatives.

FINANCING FROM FINNISH NATIONAL AGENCY FOR EDUCATION

Svenska kulturfonden

STEFAN HEINÄNEN
SENIOR LECTURER

Enjoying the sea in Zanzibar. Photo: Stefan Heinänen.

Sammanfattning på svenska

I TFK projektet planerade vi två kursgenomföranden i havplanering tillsammans med State University of Zanzibar. Sofistikerade digitala verktyg, nätverkande, mobilitet och tvärkulturellt arbete var i fokus i projektet. Förutom samarbete med våra kolleger i Zanzibar samarbetade vi också med Breda UAS från Nederländerna och Havs- och vattenmyndigheten från Sverige. Projektet var en bra utgångspunkt för fortsatta samarbeten.

SEABIRDS AND WIND POWER & OFFSHORE WIND POWER II

The two projects, funded by the Swedish Cultural Foundation in Finland and Svensk-Österbottniska Samfundet, share the same goal: to study the movement behaviour of seabirds in general, and to examine how their space and habitat use overlaps with areas planned for offshore wind power production. To investigate these questions, we deployed GPS-trackers on 50 lesser black-backed gulls (Larus fuscus) on the Finnish west coast during 2024–2025. The high-precision data obtained are used to address issues related to flight altitudes, roosting sites, foraging areas, and collision exposure. Our primary objective is to provide recommendations for reducing the impacts of wind power on this species and other bird species at risk. The movement behaviour of the species and the risk of collision could, for example, be integrated into environmental impact assessments, monitoring systems and permit procedures in the future. Careful selection of location during the planning phase is also important for wind power developers, as poor planning can delay or even prevent the planned construction. Therefore, the outcome of the project will be a publicly available, fine scale heatmap of collision risk that can be used to mitigate the impact of wind power on marine ecosystems in Finland and beyond. The analyses of the collected material are still in their early stages, and in 2025 we focused on gathering more data from the Jakobstad and Kristinestad areas. However, we have also begun studying the movements of the species on its African wintering grounds—an aspect about which almost nothing is currently known, including the causes of mortality during the boreal winter.

A GPS-tracked lesser black-backed gull found dead close to Rosetta, Egypt, in early December 2025. Photo: Amira Hasann.

This work has already revealed entirely new information about the species: gulls wintering on the large lakes of Eastern Africa show different patterns of space use compared to birds wintering in coastal areas. Given this information is completely new for science it was definitely the highlight of the year 2025 and it will be tremendously interesting to see what new we might learn in 2026!

Collaborators

- Teemu Lehtiniemi, Aki Arkiomaa (BirdLife Finland)
- Ulrik Lötberg (BirdLife Sverige)
- Kimmo Nuotio, Matti Sillanpää (Porin LTY)
- Robert Back, Filip Liljekvist, Ralf Wistbacka (Jakobstadsnejdens Natur r.f.)

PATRIK BYHOLM
SENIOR LECTURER

FABIO BALOTARI CHIEBÀO
LECTURER

Svenska kulturfonden

SVENSK-ÖSTERBOTTNISKA SAMFUNDET 100

Three GPS-loggers loading their batteries in the sun a few days before being deployed on lesser black-backed gulls. Photo: Patrik Byholm.

Sammanfattning på svenska

De två projekten, finansierade av Svenska Kulturfonden i Finland och Svensk-Österbottniska Samfundet, har samma mål: att studera sjöfåglars rörelsebeteende i allmänhet och hur deras utrymmes- och habitatanvändning överlappar med områden som planeras för havsbaserad vindkraftsproduktion. Vårt primära mål är att ge rekommendationer för att minska vindkraftens effekter på denna art och andra fågelarter i riskzonen. Vid sidan om detta har vi även börjat studera artens rörelser på de afrikanska övervintringsområdena – en aspekt som nästan ingenting är känt om för närvarande. År 2025 lärde vi oss redan att silltrutar som övervintrar i de stora sjöarna i Östafrika har olika rörelsemönster än fåglar som övervintrar i kustområden. Med tanke på att denna information är helt ny för vetenskapen var det definitivt årets höjdpunkt och det ska bli oerhört intressant att se vad nytt vi kan lära oss under 2026!

THE IMPACT OF PREDATOR MANAGEMENT ON SEABIRDS IN THE BALTIC SEA

This project examines how Caspian terns move between breeding colonies in the Baltic Sea and how predator management influences these movements. The aim is to understand how local conservation actions affect population connectivity across national borders and shape the Baltic Sea population as a whole.

The project is carried out at Novia University of Applied Sciences by Andreas Otterbeck and Patrik Byholm, in collaboration with partners in Sweden, including Ulrik Lötberg (BirdLife Sweden) and Susanne Åkesson (Lund University). The work is funded by Svenska Kulturfonden.

During the year, work focused on bringing together individual-based data from Finland, Sweden, and Estonia. The project combines ringing data, repeated observations of ringed birds in breeding colonies, and GPS tracking of individual birds. In several colonies, video surveillance has been used to identify individuals without disturbing breeding activity, allowing movements within and between colonies to be followed over time.

A scarecrow placed in an anchored boat next to a breeding colony; a key method used to deter predators and protect the colony. Photo: Ulrik Lötberg

The project has now entered the analysis phase. The primary focus is on assessing how predator management influences dispersal and site fidelity between breeding colonies. This represents the core and most robust analytical component of the project. In addition, the data allow for more detailed individual-based analyses of movement histories, and ongoing work explores whether aspects of these patterns can be incorporated into mark–recapture–based analyses. The extent to which such an additional structure can be resolved will depend on data support and model performance.

Because predator management has been applied in Swedish colonies but not in Finnish ones, the data allow comparisons of dispersal patterns under different management regimes. The main analytical work is expected to be completed during the first half of 2026. In addition, future funding from the Maj and Tor Nessling Foundation enables continuation of the project toward linking Baltic breeding colonies with wintering areas.

ANDREAS OTTERBECK
PROJECT RESEARCHER

Svenska kulturfonden

Webcam-based video footage from a breeding colony.

Sammanfattning på svenska

Projektet undersöker hur skräntärnor sprider sig mellan häckningskolonier i Östersjön och hur predatorhantering påverkar dessa rörelser. Arbetet bygger på ringmärkningsdata, videobevakning och GPS-spårning från Finland, Sverige och Estland. Projektet har nu gått in i analysfasen, med fokus på spridning, platslojalitet och effekter av förvaltning. De huvudsakliga analyserna beräknas vara färdiga under den första delen av 2026.

ENERGY TRANSITION

JORGE GOMEZ-PAREDES
TEAM LEADER

Energy underpins both our ecological and economic systems. At Novia University of Applied Sciences (NUAS), we combine systems thinking (through complex systems modelling) with macroeconomic analytical tools (such as input-output models) to examine the socio-economic metabolism (total energy and material throughput) of human societies embedded within social-ecological systems. From this macro-level perspective, we explore sustainable pathways for transforming our energy systems while critically assessing the risks of pursuing an energy transition without fully accounting for their impacts on water resources, food production, and ecosystems, as well as on people and societies (particularly vulnerable and minority groups). This approach emphasises the need to ensure a just and sustainable energy transition, while also highlighting how current developments may diverge us from such a trajectory. Central to our work is the assessment of whether national policies and strategies contribute to global policy coherence for sustainable development.

Our research focuses on four core thematic areas: 1) spillover effects in terms of the Sustainable Development Goals (SDGs), 2) the water-energy-food-ecosystems (WEFE) nexus, 3) energy and the circular economy, and 4) rebound effects arising from energy efficiency improvements. To date, our work has concentrated primarily on the first two themes, as outlined below:

- SDG-spillover effects

We analyse how actions and policies in one country affect progress toward the SDGs in other countries (e.g., impacts related to SDG7 on affordable and clean energy).

- Energy Transitions and the WEFE Nexus

We assess how sustainability transitions influence water, energy, and food security, as well as the integrity of the biosphere (e.g., via the potential impacts of critical material extraction and renewable energy infrastructure).

Highlights of the year

As the leader of energy transition research, Jorge Gomez-Paredes took part in the following events:

On January 23rd, a virtual talk on “SDG-Nexus and SDG-Spillover Effects” at the Economic Transformation for Development Community of Practice, organised by the German Society for International Cooperation (GIZ); a lecture based on the study examining the impact of international trade published in Nature Sustainability in 2024.

On March 5th, a guest lecture on “Assessing Energy and Sustainability Transitions Through Macroeconomic Modelling” in the Bioeconomy Innovation course of the Graduate Program in Sustainable Coastal Management at NUAS.

On March 13th and 14th, as a participant in the Interreg Aurora project’s Unicollab Workshop, representing NUAS’ Bioeconomy Faculty, held at the University of Vaasa, Finland.

On April 9th, as a panellist in the panel on “Systemic Change for Sustainable Futures”, at NUAS, Jakobstad, Finland.

On May 5th and 6th, as a guest in the live discussions at the Global Solutions Summit, “Bridging Divides: New Pathways for Global Prosperity”, an invitation-only in-person event of the Global Solutions Initiative, held in Berlin, Germany.

On June 6th, as a guest in the preview event of the Helsinki Biennial, "Shelter: Below and Beyond, Becoming and Belonging”.

On October 31st and November 1st, as a guest at the Grater Bay Area (GBA) of China and ASEAN countries’ Conference on Trade, Finance, and Sustainable Development, held in Hong Kong & Shenzen, China.

On November 03rd to 07th, as a participant in the workshop and invitation-only event on global cooperation for Agenda 2030 and as a panellist in the Session “SDGs Looking Forward Beyond 2030”, organised by the United Nations Sustainable Development Solutions Network, held in Kuala Lumpur, Malaysia.

Funding applications sent in 2025 included:
-To the Critical Ecosystem Partnership Fund
-To the Research Council of Finland

New strategic partnerships included:
-University of Turku

Sammanfattning på svenska

Forskningen om energiomställning vid Yrkeshögskolan Novia integrerar komplex systemmodellering med makroekonomisk analys. Detta arbete undersöker samhällens socioekonomiska metabolism och utvärderar hållbara vägar för energiomställning, med särskilt fokus på effekter på vatten, livsmedel och ekosystem samt social rättvisa. Forskningen prioriterar också spridningseffekter mellan länder för att bedöma politikens samstämmighet för hållbar utveckling. Under 2025 omfattade aktiviteterna vårt deltagande i internationella akademiska evenemang och evenemang med flera intressenter, peer-review-granskade publikationer, ansökningar om konkurrenskraftig finansiering och etablering av nya strategiska partnerskap som stöder våra forskningsmål.

GREEN ECOSYSTEMS

JOSHUA FINCH
TEAM LEADER

Last year's activities were focused on revising three high level project applications with partners from around Europe. While much of my efforts were directed towards building these networks and applications, I also kept an eye on projects close to home with a successful grant application for investigating the use of ecological intensification to purify irrigation water at our Lill-Nägels Agroforestry Pilot Project (WP3 of the Agroforestry in Nyland Project). Also, my participation in the European CAP Network's Focus Group on Crop Associations has continued to live on through the drafting of a book chapter on Trap Cropping.

For the first application, we were approached early in the year to revamp a previous application about multi-strata agroforestry by researchers at the Technical University of Munich for a call put out by the Agroecology Partnership, funded by Horizon Europe. Our new application envisioned a three year, European wide project investigating the appropriateness of deliberate understory diversification of woody plant-based farming systems from Nordic conditions through to Mediterranean Portugal. Our role would focus on the creation of testable field trials in southern Finland with current project partners – emphasizing the necessity for projects to maintain working relationships with practical innovation – as well as leading a work package focused on farm economics, while contributing significantly to social science research within the project. This project, Root2Fork, has been recommended for funding to the Finnish Ministry of Agriculture and Forestry by the Agroecology Partnership.

Our second and third applications were born out of 2024's contributions to a Horizon Europe consortium seeking practical support for regenerative agriculture living labs. Our previous application was unsuccessful, but we were encouraged to apply again in 2025. After an invitation from the consortium lead at the University of Oslo, we picked up where we left off and deepened relationships with the other Finnish co-applicants. Although this second application for the Soil Call was ultimately unsuccessful, we were able to better articulate why a living lab approach to supporting farmer transition is a desirable way of organizing efforts locally. The establishment of a living lab remains a priority heading into 2026 with the reorganization of the teams and the creation of the Resilient Agriculture and Forestry focal group, which I lead.

Simultaneously, the head researcher from Oslo also invited us to participate in a second Horizon Europe application addressing a Biodiversity Cluster Call. Here, we focused on the integration of agroecology with riparian zone habitat restoration. Our goal was to remove the artificial dividing line between where farming takes place and where nature is expected to recover and provide beneficial ecosystem services. Locally, our intent was to help build on regional projects such as

the Raseborg Å project, which has been highly successful in promoting “water friendly farming” practices in our region. As with all of our projects, I have taken a feet-on-the-ground perspective in crafting the projects and Novia’s role in them: I continually emphasize the need for practices to be economically viable for land managers.

Closer to home, I used my time as team leader to investigate the possibility of acquiring a preparatory grant (valmisteluraha) of 5 000 euros for addressing water quality issues at the Lill-Nägels farm that hosts our agroforestry pilot site. Our irrigation water is drawn from an artificial farm pond that has trouble with pathogenic microbes and sedimentation. While off-the-shelf water treatment solutions exist, we envisioned implementing an “ecological machine” which uses species from across the kingdoms of life to biologically filter and control pathogens; so-called ecological machines have been installed in a variety of contexts around the world and could be useful for us. The key benefit of such a system is that not only is the irrigation water we need ideally purified, but the source of the irrigation water itself can also be remediated. Given that such a system requires organisms to perform its functions, those organisms also grow and bioaccumulate nutrients from the process. These organisms can be processed on farm to produce biofertilizers – lacto-acid fermented algae and water plants as well as the creation of protein hydrolysates from bivalves could all be possible. In this way we could clean water as well as produce useful farm inputs from the same system. Our grant was accepted and we will continue investigating the feasibility of this system through May 2026.

Lastly, work we did to provide reports to the EU CAP Network’s Focus Group on Crop Associations was revised into a chapter for the forthcoming “Trap Cropping” book edited by Heikki Hokkanen. Our chapter is called "Integrating trap cropping as a crop association in farming systems - a comparative analysis" and includes the perspectives of six experts.

Anita Storm, project leader of the Dammussla project, shows off root biomass from trial floating islands at the pond in Lill-Nägels. Floating gardens are a key piece of the ecological machine concept we are investigating. September 10th, 2025. Photo: Joshua Finch

Highlights of the year

The surprise on Anita Storm's face and in her voice as she counted the living duck mussels in the autumn at Lill-Nägels, despite the turbid water and tough conditions was a moment of relief as well as optimism for our joint effort to bring floating ecosystems into new challenging scenarios

Another highlight was working with the Technical University of Munich to reduce the complexity of multi-strata agroforestry systems enough to secure a recommendation for funding from the Agroecology Partnership, which offers our team at Bioeconomy the chance to work on an EU level.

Projects:

- Humlor
- Agroforestry i Nyland - NylAF

Summanfattning på svenska

Under 2025 gjordes förnyade insatser för att erhålla finansiering på hög nivå till projekt inom regenerativt jordbruk, agroekologi och återställande av livsmiljöer. Utöver denna finansiering såg jag till att vi även arbetade mot lokala mål för att åtgärda problem med vattenkvaliteten i anslutning till vårt pilotområde för agroforestry. Dessutom fortsätter arbetet från tidigare år i EU CAP-nätverkets fokusgrupp för grödkombinationer att nå nya målgrupper genom omarbetningen av vårt material till ett kapitel i en kommande bok om trap cropping. Även om två av våra ansökningar till Horisont Europa i slutändan inte gick igenom, har vi lärt oss mycket om processen och hur viktigt det är att upprätthålla nätverk som siktar högt. Processen är dock inte den enda lärdomen; genom den tid vi ägnat åt ansökningarna har vi fått en bättre förståelse för våra lokala finska partners, deras behov och vad vi kan göra tillsammans på regional nivå. Vi är glada att kunna meddela att vår ansökan om ett agroekologiskt partnerskap, finansierat av Horizon Europe, rekommenderades för finansiering till det finska jord- och skogsbruksministeriet. Om detta projekt finansieras som förväntat kommer vi att leda ett finskt Living Lab som inrättar försöksfält för diversifiering av undervegetationen i odlingssystem för träiga växter, utvidga deltagandet till lokala medborgare, leda den ekonomiska analysen av jordbruket för det europeiska konsortiet och tillhandahålla viktig kunskap och expertis inom samhällsvetenskaplig forskning om ämnet.

AGROFORESTRY IN NYLAND

The Agroforestry in Nyland (2024-2026) development project underwent serious recalibration last year (2025). As our larger team heads into its final year, we have found success and growing momentum on the back of this strategic shift.

Highlight of 2025 – Feedback from one of our Agroforestry Exploration Program workshop attendees:

"… heartfelt thanks to you and your team. The programme you put together is literally world class. I am not just saying this. I think it is rare to have the knowledge, enthusiasm, and willingness to support in the same venue. I came away with inspiration and courage. […] I was showing the maps Aurelie prepared and the work we did to the climate farmer soil consultant. He was amazed and impressed at the decision support and resources provided."

WP1: Agroforestry Design Teams

The original ambition of producing ten comprehensive case studies evolved into a more pragmatic target: ten design briefs. A design brief consists of the same four parts as a case study, but requires less work to complete. While it is simpler, a design brief still provides the farm with a clear vision of what they mean to achieve, how they will achieve it, and whether the plan is realistic or not. Completing a simplified holistic design process once provides the skills and confidence – along with the material foundation – to add new information and detail if the concept is promising. This adjustment reflected farmers' limited time and the project's commitment to maintaining an upskilling focus without crossing into advisory services. To enable this shift, a Project Expert – Janne Lassila – was hired in May, bringing new energy and networks to the program. The Agroforestry Exploration Program was launched, combining pre-workshop interviews, intensive design sessions at Novia, and post-workshop support. Two workshops were held before year-end, including a critical trial run with Nyland Agroforestry Design Team members and a public session in December, with strong registrations for Finnish language events in early 2026. By the end of January 2026, 17 farms have completed the first two steps of our Agroforestry Exploration Program.

Iiris Mattila explaining Keyline design for agroforestry on July 29th, 2025, during a Nyland Agroforestry Design Team workshop hosted at her farm, Kilpiän tila. Photo: Joshua Finch.

WP2: Advisors and Policy

Engagement with advisory professionals deepened through field visits, workshops, and policy dialogue. The Finnish Agroforestry Summit was scheduled for March 2026, aiming to verbalize objectives for the Finnish Agroforestry Nework (Suomen puustoisen maatalouden verkosto). Collaboration with Horizon projects (AF4EU, DigitAF) and participation in a Helsinki-based EU Commission forestry event allowed for exchange of viewpoints, expertise, and broadened the reach of the project. Importantly, Janne's work on subsidy system clarification advanced through discussions with ELY-Keskus, which will culminate in a public webinar on the subject in 2026. By the end of 2025, a new deliverable – a streamlined, open-source map workflow – was identified as a priority for advisors, which allows us to utilize work conducted in 2024 and early 2025 for the original WP1 plan again.

On January 28th 2025, project manager Joshua Finch presented on the topic of "Not only forest: tree planting in agroforestry" to the EU Commission's "Workshop on the Implementation of the European Commission's forest guidelines in the Boreal Region" in Helsinki, providing an opportunity to reach across the agriculture – forestry divide. Photo: Joshua Finch.

WP3: Lill-Nägels Agroforestry Pilot Project

The pilot site entered a decisive transition from our original goal of exploring soil bioremediation to more mainstream regenerative fertility management. Soil amendments, including calcium carbonate and Polysulphate, were applied alongside foliar treatments, supported by the installation of a Dosatron fertigation system. Early indicators suggest improved soil chemistry and organic matter, while sap analysis of black currants (*Ribes nigra*) guided foliar applications to address particularly boron deficiencies and associated low plant calcium and sugars. Despite understandable setbacks in garlic production, the system delivered its first tangible yields in accordance with the original relay cropping schedule: rhubarb has begun production while currants are making progress as well. Alleys were successfully converted to annual cropping with winter wheat cover, and operational upgrades – such as a two-wheel tractor – will enhance management in 2026. Beyond in-field progress, the site served as a catalyst for EU-level collaboration, contributing to project applications under the Agroecology Partnership.

Despite two years of limited nutritional input, by June 27th 2025, the system at Lill-Nägels has begun to take shape quite nicely. The rhubarb, for example, has recovered well from its very first harvest and re-occupied the low strata of the multi-layered system. Photo: Joshua Finch

Summary and Final Year (2026) Plans

In sum, 2025 was a year of adaptive strategy and progress. By aligning farmer realities with practical design tools, strengthening advisory networks, and refining technical management at the pilot site, Agroforestry in Nyland is well poised for a very strong final year. Our last year of the project is focused on conducting a large number of practical workshops, low-threshold design events modeled after our Agroforestry Exploration Program, and site visits to our innovation hub at Lill-Nägels. The major deliverable of our project will be a written compendium of lessons from each work package, with the design briefs of the farmers serving as a testament to agroforestry's potential in Finland.

Project Partners

Agroforestry in Nyland is a 3-year development project aiming to lower the threshold for implementation of agroforestry practices in Uusimaa and Finland. The project is publicly funded by the EU Rural Development fund through Uusimaa's ELY-Keskus and privately by Novia University of Applied Sciences, Svenska kulturfonden, and Stiftelsen Finlandssvenska Jordfonden.

JOSHUA FINCH
PROJECT LEADER

Sammanfattning på svenska

Projektet Agroforestry in Nyland genomförde 2025 omfattande förändringar av sitt första och tredje arbetspaket. I det första, ”Agroforestry Design Teams”, minskades omfattningen och ambitionerna för resultaten för jordbrukarna för att bättre anpassas till deras tidsbegränsningar och behov. Framstegen har varit stadiga sedan projektet anställt experten Janne Lassila och 17 gårdar har nu slutfört två av tre etapper i det nya programmet för utforskning av agroforestry. Arbetet med att stödja det finska agroforestry-nätverket fortsätter med ett finskt agroforestry-toppmöte som anordnas på Novias campus den 19 mars 2026. Slutligen, i det tredje arbetspaketet, fungerade 2025 som ett övergångsår under vilket den artificiella begränsningen av näringsämnen som tillfördes jorden togs bort, baserat på både direkt erfarenhet och laboratorieanalyser som tyder på att framstegen när det gäller näringsupptag från jordreserverna var för långsamma för att ha en positiv inverkan på systemets hälsa. Projektet ser fram emot sitt sista år med många praktiska aktiviteter och gruppaktiviteter planerade från vinter till sommar.

LOCAL ECONOMY

ULRIKA DAHLBERG
TEAM LEADER

In times of geopolitical turmoil, we come to realize that we cannot always count on global markets and international collaboration or lay back and rely on the principles of commodities being produced where it is cheapest to produce and then shipped to us for consumption. There can be sudden and unexpected taxes, sanctions and policies, or issues related to unsustainable use of natural resources, exploitation of cheap labor force – or even dictatorship and war making it impossible to continue international trade.

I see local economy as a way of approaching economy, society and policies from the perspective of us ordinary people and our relation to land and community. It may sound small and unimportant. We are not talking about businesses worth billions of euros or inventing the next big export technology. Instead, we are talking about developing de-centralized circular systems for production and consumption, and environments where people thrive and feel that they can influence their life sphere. Altogether, this also plays a significant role for the national economy and security. The aim is not to go all in for protectionism and isolation, but to ensure that we have some locally based structures alongside the global ones, ensuring self-sufficiency and transparency. In Finland, our level of self-sufficiency is quite good, but there are things to improve, especially when it comes to the conditions of primary producers and rural businesses. Also, working together with rural dwellers in an empowering way, and promoting integration of newcomers in the countryside are areas where our work is needed.

In 2025 we continued working with Nordic non-food supply chains from agriculture through our natural fibres projects. We also started a new project about integration on Swedish speaking villages called Inkluderande byar and welcomed the project KERÄ - for sustainable rural areas and a just transition to the team.

Projects:

- F.E.L.T. WOOL – Future Emergence of Local Textiles based on WOOL
- NorNa – Nordisk naturfiber i cirkulär ekonomi
- NyNässla - Nässla för fiber och mat i Nyland
- Slätbergets naturstig
- Inkluderande byar
- KERÄ - för hållbara landsbygder och en rättvis omställning

Sammanfattning på svenska

Arbetet med lokal ekonomi lyfter fram hur decentraliserade och cirkulära system kan stärka samhällen genom att bygga på relationer mellan människor, plats och natur. Syftet är att komplettera globala strukturer med lokala lösningar som ökar självförsörjning, transparens och trygghet, särskilt för primärproducenter och landsbygdsföretag. Det finns fortfarande förbättringsbehov, bland annat när det gäller villkoren för landsbygdens företagare och ett mer inkluderande arbete med både lokalbefolkning och nyinflyttade. Under 2025 fortsatte teamet arbetet med nordiska naturfiberkedjor och startade två nya projekt: Inkluderande byar, med fokus på integration i svenskspråkiga byar, samt KERÄ, som stöder hållbar landsbygdsutveckling och en rättvis omställning.

F.E.L.T. WOOL – FUTURE EMERGENCE OF LOCAL TEXTILES BASED ON WOOL

The overall goal of the F.E.L.T. WOOL project was to reduce the amount of wool waste throughout the whole value chain. Wool is a natural material with a wide range of beneficial properties like insulation, breathability and durability. It is a sustainable, biodegradable locally produced material. Still, it is thrown away or destroyed in many European countries, including the Nordic and Baltic. The focus of the project has been on coarser wool usually deemed as unsuitable for textile use, and how it can be used for example in felted products. The project activities were centered around study visits to the home countries of all project partners: Lithuania, Estonia, Finland, Norway and Sweden.

In 2025 the two final study trips were made to Norway and Sweden. In Norway, the businesses visited were located around Trondheim. Selbu Spinneri, which is also the leading party of the project, was one of them. The spinning mill started from the insight that using the wool and paying the sheep farmers for it is the best way to preserve native sheep breeds. The mill focuses on using resources that industry does not want – in addition to sheep's wool, it also uses fibre from domestic animals such as dogs, angora rabbits, alpacas, llamas, cashmere goats and long-haired cows. The spinnery manufactures yarn both for its own products and as contract spinning, i.e. customers send in their wool and get it back as yarn. Selbu Spinneri has played a crucial role for several companies in the region that develop products from local wool. Entrepreneurs we meet during the trip tell us that they have developed a yarn together with Selbu Spinneri specifically for manufacturing their own products. One of the partners is Selbu Husflidscentral, a household centre dedicated to the preservation and promotion of local crafts.

The Finnish team in Norway: Maja Wikström, Ulrika Dahlberg, Piritta Mäkinen and Anna Vasko. Photo: Ulrika Dahlberg

In Sweden workshops were organized with felt artists and there were discussions with sheep farmers and industry activists in the travel programme. The workshops focused on repurposing coarse wool into art and functional products emphasizing felting's creative potential. The Swedish project partner's wool mill Rodens Ullbruk is promoting the use of local wool by manufacturing yarns and other products and functioning as a center for knowledge in handicrafts, ancient methods and modern techniques to process wool. Through Arena Svensk Ull, a local organization, solutions like farmer training programs, a national wool classification system and data driven standards have been developed to boost the industry. Axfoundation is another Swedish actor driving development forward together with larger brands such as Filippa K and Tiger of Sweden, through projects like The Swedish Wool Initiative and The Nordic Wool Initiative. Also using wool in products like furniture, building insulation, and garden pellets is moving forward in Sweden.

Felting as a technique was explored from different perspectives during the trips, for example by felting squares from wool from native Norwegian sheep breeds by hand, felting together with artists and testing machine felting. The result depends on the technique, how the wool has been prepared and, on the quality, for example amounts of tog (the long, coarse, water-resistant outer coat adding durability) and thel (the short, soft, fine inner coat that offers insulation and warmth).

The project ended in August 2025 and created a base for further Nordic and Baltic collaborations around wool. As the project brought together people from different sectors; primary producers, industrial actors, artists, researchers and developers, many new connections were made.

Highlights of the year

- Trip to the Trondheim area in Norway, where the spinnery Selbu spinneri has created a cluster of businesses using local wool
- Trip to Sweden, where both felt artists and larger scale wool industry is thriving
- Felting experiments with wool from native sheep breeds

ULRIKA DAHLBERG
PROJECT LEADER

Nordplus

Sammanfattning på svenska

Projektet F.E.L.T. WOOL hade som övergripande mål att undersöka hur man kunde undvika spill genom hela värdekedjan för fårull. Ullen är ett mångsidigt material. Det isolerar, andas och är hållbart. Trots allt slängs eller förstörs en betydelsefull del av all producerad ull i de nordiska och baltiska länderna. Projektets aktiviteter kretsade kring studiebesök organiserade av partners i Litauen, Estland, Finland, Sverige och Norge. Under 2025 gjordes de två sista projektresorna till Norge och Sverige. På agendan fanns besök till spinnerier som främjar användning av ull från ursprungsraser genom att utveckla garn av ullen, både för andra lokala företag och privatpersoner, och sprida information om traditionell och ny användning av fårull. Även tovning utforskades ur olika perspektiv under resorna: tovning av rutor med olika norska fårrasers ull, tovning tillsammans med konstnärer och maskinell tovning.

NORNA – NORDIC NATURAL FIBRES IN CIRCULAR ECONOMY

NorNa is an information project focusing on Nordic natural fibres, mainly flax, hemp, nettle and sheep wool. During 2025 the project entered its final year, which meant work on compiling information gained from numerous study visits and discussions with businesses, researchers and projects. Two interns have been distributing surveys and conducting targeted interviews and desktop research. The final report of the project is published in Novia's publication series.

There was also time to organize events and study visits. A seminar about the role of natural fibres in the green transition and in Finnish design was held at Novias campus in Turku in April. Professor Kristiina Lång from the Natural Resources Institute spoke about how fribre crops on rewetted peatlands can contribute to a large reduction in greenhouse gases per hectare. Some of the crops that thrive in wetlands are Cattail, Peat moss, Common reed, Reed canary grass and Willow. The biomass from the plants can be used, for example, as construction materials or for making paper. At the same time, the pressure to use forest biomass for packaging material or for replacing plastic and peat lessens. Professor Pirjo Kääriäinen from Aalto university gave an insight into the current development of bio-based materials in design and art. Hemp, flax and nettle are much used and researched materials for use in e.g. textiles and buildings, but there are also attempts to develop materials from agricultural side streams such as straw and flower waste. From the realm of trees, willow is a versatile material used in crafts, construction, gardening and dyeing textiles and yarn. Tommi Pohjakallio, a sheep farmer with impressive experience in the textile industry, told us about his work to develop a local textile supply chain based on wool from the native Åland sheep.

Fibre info at a wool event at Leineperi Ironworks. Photo: Ulrika Dahlberg

Interns:
Maja Wikström (Agrolog YH)
Chanika Jayawardana (Sustainable Coastal Management)

The project also organized a study visit to Mustiala educational and experimental farm at HAMK- Häme University of Applied Sciences in September, together with staff and students from Novia. The participants got to see the modern barn with milking cows, fields, machinery, a laboratory with new exciting inventions, a local gene bank for heritage grains, as well as a small mill and flaking machine. The staff told us about the history of the farm and its current activities. HAMK:s Lecturer Annika Michelsson, who is an expert on old cereal varieties and other cultivated plants, emphasized the importance of farmers knowing the principles of cultivation, despite of new technologies, and to have the ability to produce food for their own community in case of a crisis.

A trip to Denmark was made together with the NyNässla project. The first place visited was VIA University College's campus in Herning, which offers education in design and has a unit for applied research in textiles, design and circularity. VIA is involved in the project Hemp4Tex, with focus on improving local capacity and supply chain reliability. The project works on the whole supply chain from cultivation, harvesting, processing, and extraction of hemp fibres to practical production, spinning, weaving, and knitting of fabrics. The next stop was Copenhagen and a meeting with designer Mia Kappelgard, as well as with robotics and intercropping expert Professor Svend Christensen at the University of Copenhagen, and participating in the seminar 'Biotextiles – green breakthrough, dead end or just the beginning?'

In order to have more material to show at different events, a folder presenting wool, flax, hemp, nettle, cattail and linden bast with text, images and fibre samples was created.

Highlights of the year

- A seminar about the role of natural fibres in the green transition revealed there is a significant amount of research and development around natural fibres and new bio-based materials going on.
- The project's contact network expanded to Denmark through a study visit.
- The project released its final report and organized a final seminar with visitors from the wool sector in Sweden.

ULRIKA DAHLBERG
PROJECT LEADER

NorNa | Svenska kulturfonden

Sammanfattning på svenska

NorNa – Nordisk naturfiber I cirkulär ekonomi sprider information om naturfibrer, främst lin, nässla, hampa och fårull. Projektet inledde sitt sista år och har jobbat med att sammanställa information från surveys och diskussioner med experter. Ett seminarium om naturfibrernas roll i den gröna omställningen och finländsk design ordnades, samt en studieresa till HAMK:s undervisnings- och försöksgård i Mustiala. Samarbetsnätverket breddades med ett besök till Danmark, till VIA-yrkeshögskolan med forskning kring textil, design och cirkularitet, och till Köpenhamns universitet med expertis inom robotik och samodling, samt biotextilier.

NYNÄSSLA – NETTLE FOR FOOD AND FIBRE IN UUSIMAA

NyNässlas' aim is to gather practical information about commercial nettle cultivation for food and fibre in Uusimaa conditions through a three-year demonstration cultivation of nettles (Urtica dioica), to assess how farming methods affect fibre quality, and to get farmers in Uusimaa interested in growing nettles. The idea is to both diversify and make production more efficient, by adding a perennial crop like nettle to the range of cultivated plants at farms, and by utilizing the whole plant when it is harvested.

The project's demo cultivation in Västankvarn in Ingå has been monitored regularly and adjustments to the cultivation plan have been made based on observations. During the 2025 growing season, it was found that the nettle seeds that were sown in autumn 2024 had not germinated. A germination test in the laboratory confirmed the poor germination rate. Instead, wild nettle seedlings were transferred to test plots in the field. The growth of the seedlings was monitored weekly by the project staff. The transfer of plants proved to give good results, even though it is more time-consuming than sowing, and even though the plants were eaten by caterpillars. A small number of plants were harvested in September to test the fibre quality during the winter of 2025–2026. The project had an intern, Veena Aryasena, who also wrote her bachelor's thesis based on the data from the monitoring.

The solutions presented ranged from e.g. nettle production together with greenhouse production, manufacturing eco-cosmetics, running a local food shop and a hotel to sheep production with shearing (cutting wool), a butcher, a dairy plant and a restaurant. Interesting questions that arose during the workshop were, whether vegan businesses could collaborate with animal producers, and if plant- and animal fibres can be mixed.

Nettle plants at the project demo site. Photo: Ulrika Dahlberg

Focus was also turned towards other countries for the purpose of collaboration and sharing experiences. The project staff has had discussions with potential partners regarding fibre research and processing in Finland and other Nordic countries, as well as Estonia. A group of students from Novia's international master's programme in Natural Resources Management has conducted a mapping of European companies that use nettles as raw material in their products. The group identified 39 companies from eight European countries, showing that nettle is already embedded in a surprisingly diverse set of value chains, from artisanal felting fibres and niche fashion fabrics to teas, tinctures, pellets and extracts. Most of these actors are small or medium-sized enterprises, mainly from rural areas, making nettle a niche in the bioeconomy driven by SMEs and crafts, not industry.

Project partner:
Nylands Svenska Lantbrukssällskap (NSL)

Project team:
Ulrika Dahlberg, Project Leader
Samica Sadik, Project Expert
Veena Ariyasena, Intern
Natural Resources Management team: Jenni Möller, Dácil Merelles, David Schwezoff

Highligts from the year

- Wild nettle plants transferred to trial plots were successful.
- European companies using nettle as raw material were mapped by students.
- A workshop about local natural fibre business was organised at the Science for Sustainability conference in Helsinki.

ULRIKA DAHLBERG
PROJECT LEADER

Medfinansieras av Europeiska unionen
Svenska kulturfonden
STIFTELSEN FINLANDSSVENSKA JORDFONDEN

Sammanfattning på svenska

NyNässlas mål är att samla in praktisk information om kommersiell nässelodling för livsmedel och fiber i nyländska förhållanden genom en treårig demonstrationsodling av nässlor (Urtica dioica). Tanken är att både diversifiera och effektivisera produktionen genom att lägga till en flerårig gröda som nässla i utbudet av odlade växter på gårdar, och genom att utnyttja hela växten när den skördas. Under växtsäsongen 2025 konstaterades att höstsådden misslyckats och demo-odlingen omstrukturerades till provrutor med överförda vilda nässelplantor. Plantorna klarade sig väl och odlingsmetoden verkar lovande. Utöver odling har projektet med hjälp av studerande kartlagt europeiska företag som använder nässla som råvara och etablerat samarbetsnätverk för informationsutbyte och förädling av fibrer och bladmassa.

SLÄTBERGETS NATURSTIG - SLÄTBERGET NATURE TRAIL

In 2025 the project Slätberget nature trail focused on completing the trail infrastructure in Västankvarn, Ingå. The two trail loops were color coded, orange for the longer loop (3.2 km) and blue for the shorter loop (1.75 km). Students from the Sustainable Coastal Management programme at Novia contributed to field work alongside the project team during summer. Content development advanced in parallel with fieldwork. Each information sign was prepared in three languages (Swedish, Finnish, English). Texts highlighted climate change, eutrophication, biodiversity, old-growth forest values, lichens, dead wood, and the role of bog moss in mires. Final maps of the trail were prepared for public use by Spatial Competence center, Novia UAS. Illustrations for the signs were created by Frisko Design, while Kylttipaja Oy handled printing and fabrication. In June MI Forest installed the signs along sign posts.

The trail website https://www.novia.fi/slatbergetsnaturstig/ was launched. It provides a downloadable map, a photo gallery, and complementary information on local habitat types and biodiversity, including simple actions visitors can take to support nature. Three signs, at the parking area, the wetland, and Slätberget, were equipped with QR codes linking to the site. During autumn two bridges were built at the wetland. A picnic spot at the lower viewpoint received a log table, and on the summit of Slätberget log stools were placed around a boulder to form a simple seating circle.

Pictures from the nature trail. Photo: Anna-Karin Almén.

The trail opened to the public in autumn 2025. A press release and promotion through Novia's website and social media channels informed residents and visitors. Information about the new trail was also shared with municipalities in the region, encouraging schools and local groups to use the route for outdoor learning and recreation. The launch of the trail was a great success. The trail had a lot of visitors during autumn and positive feedback was received.

The project has met its goals and delivered a functioning recreational area that combines nature experiences and environmental education in Västra Nyland. The new trail is a valuable community resource with potential for further development. The project was done in collaboration with Västankvarn gård. Funding was received from EU through the Leadergroup Pomoväst.

Highlights during the year
In 2025 the full infrastructure for Slätberget nature trail, including two marked loops, with multilingual educational signs, maps, bridges, and road signs were completed.
Slätberget nature trail was opened to visitors and the webpage was launched, providing a new recreational and environmental education resource that received strong visitor engagement and positive feedback.

Project Team:
Anna-Karin Almén, Project Leader
GIS expert: Aurelie Noel (Spatial Competence center, Novia UAS)

Collaborator: Västankvarn Gård

ANNA-KARIN ALMÈN
PROJECT LEADER

Medfinansieras av Europeiska unionen

LEADER Pomoväst

Västankvarn Gård

WWF

Sammanfattning på svenska

Projektet Slätbergets naturstig genomfördes 2025 med fokus på färdigställande av stigens infrastruktur och pedagogiska innehåll. Två färgmarkerade slingor anlades och kompletterades med flerspråkiga, vackert illustrerade informationstavlor, kartor, broar, vägvisare och två rastplatser. Naturstigens egen websida med miljöinformation och ett fotogalleri färdigställdes och publicerades. Projektet har uppnått sina mål och levererat en hållbar och väl genomtänkt naturstig lämplig för motion och rekreation. Slätbergets naturstig har potential för utveckling och fortsatt samarbete kring naturvård, skogsbruk och pedagogisk användning. Projektet utfördes i samarbete med Västankvarn gård och finansierades av EU genom Leadergruppen Pomoväst.

INKLUDERADE BYAR - INCLUSIVE VILLAGES

In mid-September 2025 the Inclusive Villages project began its implementation at the Bioeconomy Department of Novia University of Applied Sciences. The project partner is the Swedish-speaking Villages of Finland, who are experts in rural development at the Swedish Agricultural Society (SLF).

The aim of the project is to organise integrative and inclusive activities in Swedish-speaking villages in Finland over a 2-year period. The goal is to promote the integration of newcomers to rural areas, be they from within Finland or abroad, and at the same time to increase the visibility and attractiveness of villages.

The project is run in cooperation with the local governments of Raseborg (Uusimaa), Pargas (Southwest Finland) and Närpes (Ostrobothnia). These rural and bilingual areas face the combined challenges of population decline, reduced services and immigrant integration.
Two villages from each region are to be selected to implement the project activities. Each village association will organise a series of events and workshops that promote the attractiveness and inclusivity of their village. Over the 2 years, the aim is that each village will host up to 12 events. This means 24 events per region and 72 in total over the lifetime of the project.

The events will be varied, attractive to a range of ages and interests from within and without the village, and widely marketed for outreach. Locally based and ecologically designed, the events will at times include traditional cultural activities and employ local entrepreneurs and experts. Environmental, social, cultural and economic sustainability and the local economy are recurring themes throughout.

Malin Wikström, of Backgränd village association, Raseborg, in their village hall. Photo: Benjamin Hammond.

As well as supporting rural development and immigrant integration, the project aims to strengthen relationships, networks and cooperation both within the participating villages, and between them and their municipalities. Our work supports the local circular economy, active citizenship, and encourages the increased use and maintenance of community village halls.

In the autumn of 2025, the project was launched with networking meetings between Novia and SLF, as well as with the participating municipalities. The first of the participating villages was chosen – Backgränd in Raseborg – and planning began for their events beginning in 2026. Potential collaboration partner organisations and networks in the Third Sector, were contacted. These included, for example: Raseborgs Byaforum, Finlands Byar, Suomen Kerho, and Suomen 4H-liitto. The project timeline, communication plan, and systems for collaborating and reporting were begun. The first workshops, seminars and articles about the project were planned for 2026. The project's remaining funding was also applied for.

Inclusive Villages is primarily funded by the European Union, through the Finnish government agency that is now known as Elinvoimakeskus (Livskraftscentralen in Swedish). Additional funding was granted by Svenska kulturfonden in February 2026.

BENJAMIN HAMMOND
PROJECT LEADER

Sammanfattning på svenska

Projektet Inkluderande byar startade i september 2025 vid Novia i samarbete med SLF och städerna Raseborg, Pargas och Närpes. Syftet är att främja integration och attraktionskraft i svenskspråkiga landsbygdsbyar genom inkluderande aktiviteter under två år. Sex byar deltar och ordnar upp till 72 evenemang totalt. Aktiviteterna ska vara hållbara, lokalt förankrade och engagera olika målgrupper samt lokala aktörer. Projektet stärker nätverk, samarbete och lokal ekonomi. Det fokuserar särskilt på att integrera nyinflyttade och invandrare i bygemenskapen. Planering och nätverkande inleddes 2025, medan aktiviteter startar 2026. Finansiering kommer från EU samt Svenska kulturfonden.

KERÄ - FOR SUSTAINABLE RURAL COMMUNITIES AND A JUST TRANSITION

The rural policy network project KERÄ - För hållbara landsbygder och en rättvis omställning focuses on sustainability issues that are timely at the national, regional, and local levels, and brings all dimensions of sustainability into the discussion: ecological, social, cultural, and economic.

The network coordinates the Sustainable Development Week as a platform for rural sustainability dialogue and engages different actors from small grassroot level associations to nationwide organizations in sustainability work. KERÄ enhances the capacity of municipalities and organizations to integrate sustainable development into their own activities through dissemination of knowledge and practical tools. KERÄ facilitates multi-voiced dialogue nationally, regionally, and locally. The network operates bilingually (Finnish - Swedish).

The objectives of the KERÄ network project are to:

1. Expand the Sustainable Development Week into a national event
2. Develop mechanisms to improve regional equality in sustainability matters
3. Promote the development of indicators that describe the local dimensions of sustainable development
4. Integrate sustainable development into the routine practices of municipalities and organizations
5. Advance justice and inclusion in issues related to land use, the energy transition, and the digital transition
6. Compile and disseminate information and analyses to support decision-making and preparation

KERÄ participated in “Puurobaari”, an annual informal meeting organized by the Finnish Rural Policy Council for parliamentarians and their assistants to discuss current topics of rural development. Photo: Nora Backlund.

KERÄ is implemented by Svenska lantbrukssällskapens förbund, Yrkeshögskolan Novia, and Maaseudun Sivistysliitto. Novia began as an implementing organization for KERÄ on 1 June 2025.
KERÄ network advanced its sustainability objectives through active collaboration, events, and expert work across Finland. In September, the Sustainable Development Week highlighted local sustainability efforts, gathering over 200 registered events and broad participation from communities, schools, municipalities, companies, and national actors. KERÄ organized a range of dialogues, thematic discussions, and webinars on topics such as rural sustainability, local sustainability indicators, and environmental decision-making. The activities included environmental dialogues, the three-part Environmental Parliament webinar series, and sustainability-focused events such as the Ekotreffit webinars. KERÄ also produced several blog articles and created a bilingual Sustainable Development Advent Calendar featuring contributions from 24 organisations.

The network contributed to national rural policy work by participating in the National Rural Policy Council Secretariat and supporting municipalities and organizations in the integration of sustainability into everyday operations.

Highlights of the year:

- In December KERÄ was accepted as a partner in the EU Climate Pact. Participation in the Climate Pact community enables broader networking, learning, and knowledge sharing on sustainability issues.
- Our cooperation with the Finnish National Commission on Sustainable Development was further developed. As part of this cooperation KERÄ contributed to Finland's Agenda2030 country report a paper Promoting Sustainable Development from the Rural Perspective.

The project is financed by the Ministry of Agriculture and Forestry, and Svenska Kulturfonden.

TIINA SAARESRANTA
PROJECT LEADER

MAASEUTUPOLITIIKKA
LANDSBYGDSPOLITIK

Svenska kulturfonden

Sammanfattning på svenska

Det landsbygdspolitiska nätverket KERÄ – För hållbara landsbygder och en rättvis omställning, Oikeudenmukaisen siirtymän ja kestävien maaseutujen puolesta – fokuserar på aktuella hållbarhetsfrågor på nationell, regional och lokal nivå och lyfter fram alla dimensioner av hållbar utveckling: ekologiska, sociala, kulturella och ekonomiska. Nätverket stärker Hållbarhetsveckans verksamhetsmodell som en central plattform för dialog om hållbarhet på landsbygden. Genom att erbjuda kunskap och praktiska verktyg stödjer KERÄ kommuner och organisationer i att integrera hållbarhetens olika delområden i sin ordinarie verksamhet. KERÄ främjar en mångsidig dialog i hela landet och verkar tvåspråkigt (finska/svenska).

SUSTAINABILITY

RUSLAN GUNKO
TEAM LEADER

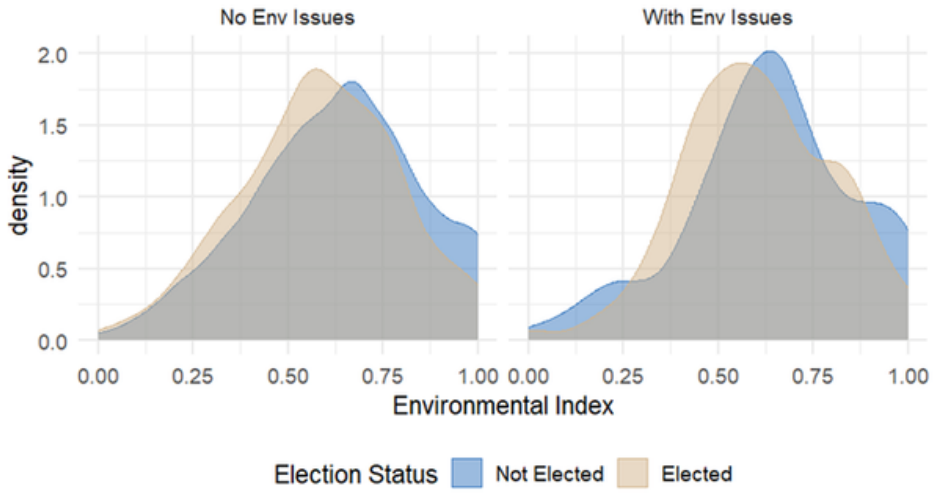
We are “pleased” to live in an era of polycrisis, or, as it is often described in popular science and among political journalists, in “interesting times”. In a sense, this is not the first time we have faced such circumstances, and the Doomsday Clock had been actively moving even before. However, the decades of rising democracy and liberal values worldwide have made our societies more sensitive to change and, thus, we tend to perceive the chain of modern-day impacts as a direct attack on our established systems. As a result, even the Doomsday Clock seems to be moving much faster than we would have ever expected.

In this context, the role of science-based solutions to new challenges is becoming increasingly important due to the lack of capacity within existing systems to compensate for the stresses people are facing. This is very much in line with what we are interested in and already doing in the Sustainability team at Novia. The cruel full-scale Russian invasion of Ukraine has brought enormous grief to the Ukrainian people and has stimulated huge waves of displacement, both internal and external. The continuity of the war and the prolonged stress have put several important questions on the agenda: how to resist stress? How to keep an identity? How do you rebuild the country afterwards? What Finland and Europe could learn out of it?

Together with a group of researchers from Ukraine and Sweden, we are trying to answer these questions through the prism of the role of natural environments. In our work, we show how important nature is for people’s capacity to resist the stress of war and even the stress of occupation by alien forces. This approach challenges the common and well-defined post-war restoration practices we have seen before, where infrastructure was prioritized over the restoration of natural environments. We advocate that post-war recovery must acknowledge the synergy between different restoration needs. This is an important lesson for the future, as the era of global turbulence may not yet have reached its peak. We plan to develop further research within this topic and broaden its impact through active participation in IUFRO Task Force where our team is an active member. This task was created in 2025, in collaboration with key partners from Ukraine, Sweden, Armenia, Germany, and the United States, to strengthen collaboration, advance research efforts, and enhance knowledge exchange in this field

Photo: Alex Fedorenko/ Unsplash

At the same time, it is also important to pay attention to local changes occurring under such circumstances and not only identify them but also offer potential solutions. Local elections are crucial, as they are a tool through which every community member has an almost direct impact on the future of their home commune. However, there is another unfortunate trend observed in Europe: voter turnout in well-established traditional democracies (including Finland) is declining, and interest in local elections does not correspond to their actual significance. In this context, we became interested in whether the presence of environmental issues at the municipal level has any impact on bringing more environmentally oriented candidates into power. We used the 2021 and 2025 elections for this comparison, and the analysis is still ongoing. However, we can already state that we have not found evidence that being an environmentally friendly candidate increases one's chances of being elected, nor that the presence of environmental issues at the municipal level improves the electoral success of such candidates (Figure 2). More detailed results will be published in a scientific paper currently under preparation. The findings were also presented at the RDI seminar "People and Nature in Times of Change", which featured a presentation by invited speaker and active collaborator Marine Elbakidze.



Distribution of environmental index scores by election outcome and presence or absence of environmental issues; the index reflects candidates' environmental friendliness.

Finally, we continue developing a larger international project aimed at investigating the balance between environmental and conventional security. The idea stems from the increased militarization in Europe, including Finland. The reasons for such developments are well-defined and understandable, as governments are under pressure to respond to objective and perceived threats, and such demands are also coming from society (for example, in Finland public support for these measures is high). However, this process is accompanied by increasing impacts on natural environments. Thus, we aim to investigate to what extent societies and individuals are ready to compromise environmental values in favor of a greater sense of security. The project is planned to involve partners from Finland, Åland, Ukraine, Armenia, and Iceland, and the project proposal has been submitted for funding.

2025 was a particularly active year for the Sustainability team, yet the challenges facing our communities in the era of polycrisis demand an even more comprehensive, science-based approach. We argue that relationships between people and nature lie at the core of societal resilience and must be central to how we respond to uncertainty, recovery, and long-term transformation.

Sammanfattning på svenska

Vi lever i en tid av polykris där snabba globala förändringar sätter press på både samhällen och människor. Hållbarhetsteamet vid Novia arbetar med vetenskapsbaserade perspektiv på hur relationen mellan människa och natur stärker motståndskraft, särskilt i krig och kris. Forskningen belyser naturens betydelse för återhämtning, demokrati och säkerhet. Detta blir allt viktigare i en värld präglad av osäkerhet och långvarig samhällelig turbulens.

SUSTAINABLE FOOD SYSTEMS

HEIDI BARMAN-GEUST
TEAM LEADER

The sustainable food systems team had six ongoing projects during 2025. The projects covered everything from developing education in natural resource management, the greenhouse industry to the cultivation of heritage grains. The projects were both local, regional, and national.

The team has continued to strengthen networks in the Nordic and Baltic countries and to initiate new projects in sustainable food systems. Recently, the focus has been more on food production than on food processing. Through the Future Vegetables project, we also address aspects of logistics and consumer behavior and work with the economic side of food production.

Through projects and project applications, the team has collaborated with several universities of applied sciences, universities, and organizations in agriculture and forestry. In addition, the team collaborates with many companies and associations. The team continued to be part of two networks: AGFO in Sweden and Valio Food 2.0 in Finland

Projects:

- Pro Bioekonomi 3.0
- Framtidens grönsaker
- Bondenyttan
- ProBio+
- Flexibelt till agrolog och skogsbruksingenjör – Österbotten
- Kaunis Kaura – maatiaisviljoista elinvoimaa

Sammanfattning på svenska

Teamet för hållbara livsmedelssystem drev sex projekt under 2025, med fokus på allt från utbildning inom naturresurser, växthusnäringen till odling av kulturspannmål. Arbetet skedde på lokal, regional och nationell nivå. Teamet stärkte sina nordiska och baltiska nätverk och initierade nya projekt, med ett ökande fokus på livsmedelsproduktion. Genom projektet Framtidens grönsaker arbetade teamet även med logistik, konsumentbeteende och ekonomi. Samarbeten gjordes med flera yrkeshögskolor, universitet, organisationer och företag, och teamet deltog fortsatt i nätverken AGFO i Sverige och Valio Food 2.0 i Finland.

PRO BIOEKONOMI 3.0

Pro Bioeconomy 3.0 aims to strengthen the capacity and quality of education under the guidance of funders who safeguard UAS education as day studies in bioeconomy in Uusimaa and Turku.

The largest single investment in the project is the partial funding of two natural resources lecturers, capacity additions to education and for research and development. The project has also carried out activities to promote cooperation between education and working life, promote natural resources education, and offer students expert lectures and study visits both nationally and internationally. The bioeconomy staff have integrated into teaching, carried out various pedagogical development measures, and worked on the curriculum for 2027.

Through marketing activities, Pro Bioeconomy 3.0 has made the programmes visible and offered visits to YH Novia. During the year, visits were organized for upper secondary school students via the new Turku campus to Västankvarn Gård. The participants took part in a program of lectures and a tour to get acquainted with the practical learning environment that YH Novia offers bioeconomy students through collaboration with Västankvarn Gård.
The project has given exam students the opportunity to participate in various events together with partners. One example is the students' study visit with the project Greppa marknaden, to southern Sweden. Students and staff also participated in the SPACE Livestock Fair in France, which provided international perspectives and contacts in the agricultural sector as well as visibility in the magazine Landsbygdens Folk. Forestry engineers did a study visit to Elmia Wood in Sweden.

The teaching staff at Västankvarn Farm. Photo: Christel Holmlund-Norrén.

During the year, several study visits and expert lectures have been arranged in Finland. Students have had the opportunity to visit companies and organizations in agriculture and forestry, which has provided concrete insight into development and future opportunities. Invited experts have shared their experiences and current findings, which have contributed to a work-related connection in the curriculum's courses in collaboration with the teacher.

Work on the curriculum 2027 began during spring and continued throughout the autumn with workshops where the staff have worked on competencies and structure in the curriculum that will be introduced in 2027. During these sessions, the focus has been on identifying future competencies for agrologists and forestry engineers. Consultations with the labor market have been carried out to ensure that the training programmes meet the needs of the industry and are developed in line with the requirements of the labor market.

The staff have also worked with pedagogical development by integrating AI into teaching, reflecting on its development and what it means in education. Concepts for work-based studies have been developed in broad collaboration with the counselling organizations in agriculture. In addition, work has been underway to further develop the Moodle learning environment to support the studies of day students.

In summary, Pro Bioeconomy 3.0 has implemented many initiatives during the year to strengthen the capacity of education, which have been made possible thanks to the support of the funders.

CHRISTREL HOLMLUND-NORRÈN
PROJECT LEADER

STIFTELSEN FINLANDSSVENSKA JORDFONDEN

Utbildningsstiftelsen Sydväst

Sammanfattning på svenska

Pro Bioekonomi 3.0 har under året stärkt utbildningens kapacitet och kvalitet inom bioekonomi genom finansiering av två lektorer inom naturresurser samt förstärkning av utbildnings- och FoU-verksamheten. Ett viktigt fokus har varit att utveckla samarbetet mellan utbildning och arbetsliv genom expertföreläsningar, studiebesök och internationella aktiviteter som gett studerande bred branschkontakt.

Projektet har även synliggjort utbildningarna genom marknadsföring och studiebesök, bland annat för andra stadiets studerande. Studerande har deltagit i nationella och internationella evenemang och studieresor som stärkt deras praktiska kompetens och nätverk. Under året har arbetet med läroplanen 2027 fortsatt i nära samverkan med arbetslivet, samtidigt som pedagogiken utvecklats genom bland annat AI i undervisningen, arbetsplatsförlagda studier och vidareutveckling av Moodle.

OPEN UAS STUDENTS IN OSTROBOTHNIA BECAME DEGREE STUDENTS IN BIOECONOMY

In 2025, work continued to make bioeconomy education visible and develop in Ostrobothnia, as well as strengthening the paths from open UAS studies to degree-oriented blended studies. One of the most important results of the year was the admission of open UAS students to degree studies: fifty-four students were admitted during the period 1.8–30.10. The number marked a milestone for education and showed the demand for blended study opportunities in the region.

The visibility continued through participation in regional and specific contexts for bioeconomy. In June, the students took part in SLC's congress, which strengthened the interfaces between students, working life and networks in natural resource management. The project also took part in the Natural Resources Platform's meetings and in activities that highlight bioeconomy education.

A key focus area during the year was the students' community and learning environments. Ten open forums for communication and information between the staff and students of the program, and the project co-financed two study trips: Bachelor of Natural Resources - students travelled to Uusimaa, as part of the course Applied Cultivation Technology in the Field 9-11.7.2025. The program consisted of study visits to farms in Uusimaa and a field walk at Västankvarn Farm. Forestry engineering students took part in field studies at the Hyytiälä forest station in Juupajoki on 29.7.-1.8.2025, as part of the course Managing peatland forests. In addition, local study visits and field studies were conducted in Ostrobothnia in various courses.

Students on a studyvisit to rågmästare Ulf Härtull in Vörå.

During the year, work also continued developing courses, monitoring teaching models and building networks for teaching objects in the region. The department's curriculum work intensified during the autumn with monthly workshops and a working life hearing in November where future skills needs were in focus for both programs.

Overall, 2025 strengthened the structure, visibility, and students' path to graduation. Through active collaborations, pedagogical development and targeted activities, the conditions for blended learning in bioeconomy continue and respond to the region's needs. Blended studies require a significant effort from bioeconomy teachers as well as flexibility and adaptation to flexible blended studies. Blended learning also demands efforts from students, both in terms of working time priorities and resilience.

The project would like to thank the working community, both organizations, companies, and individual entrepreneurs for taking part in education through expert lectures, participation in field studies and by enabling study visits for students in Ostrobothnia as well as to the project funders.

CHRISTREL HOLMLUND-NORRÈN
PROJECT LEADER

SLC Svenska lantbruksproducenter centralförbund

Handlande Gustaf Svanljungs Donationsfondt

Aktiastiftelserna Sparbanksstiftelserna

Sammanfattning på svenska

Ett centralt mål 2025 var att underlätta övergången från öppna YH-studier till examensstudier. Under hösten antogs 54 öppna YH-studerande till flerformsstudier i Österbotten. Kommunikation har varit viktig, med tio öppna forum som skapade dialog mellan studerande och personal och stöd i studieplanering, progression och gemenskap.

Under året genomfördes även studieresor och fältstudier som stärkte det praktiska lärandet, bland annat inom odlingsteknik och skogsskötsel samt genom lokala studiebesök och deltagande i SLC:s kongress. Parallellt inleddes ett läroplansarbete för att möta framtida kompetensbehov, där arbetslivshörandet gav värdefull input. Sammantaget har studerandes aktiva deltagande och samarbetet med regionalt arbetsliv stärkt utbildningens kvalitet och relevans.

FRAMTIDENS GRÖNSAKER - FUTURE VEGETABLES

The Future Vegetables (Framtidens grönsaker) project is a collaboration between Novia University of Applied Sciences and Hanken School of Economics. Partners include the Ostrobothnia Swedish Farmers' Association (Österbottens Svenska producentförbund) and the vegetable packing companies Vasa Grönsaker, Närpes Grönsaker, and Botnia Grönsaker. The project began on 1 January 2025 and runs until 31 March 2027. Its aim is to support greenhouse vegetable production in Ostrobothnia by identifying trends that influence vegetable demand and by examining consumers' needs and preferences.

Within the work package "Future Vegetable and Food Trends", the team has reviewed trend reports and interviewed experts. The findings show that the major trends revolve around health and well-being, environment and climate, origin and transparency, convenience and price, technology and digitalization, as well as food culture and identity.

The work package "Consumer-Based Vegetable Supply" focused on consumers. A large quantitative study of 1000 respondents was carried out, along with personal interviews and focus groups interviews. The results show that Finns are very traditional: we mainly consume cucumbers and tomatoes and are not very eager to introduce new vegetables into our diet. Most people also do not meet the nutritional recommendation of eating 500–800 grams of vegetables, fruit and berries per day.

Henrik Virtanen, Heidi Barman-Geust, Lena Korkea-aho, Marko Kapanen (Vasa Grönsaker), Peter Björk (Hanken) and Tomas Lindfors (Närpes Grönsaker). Photo: Lisa Niemistö

Highlights of the year

During the year, the project group visited all three packing facilities involved. In spring, we visited Vasa Grönsaker, and in autumn Botnia Grönsaker and Närpes Grönsaker. These visits provided valuable insight into the greenhouse vegetable value chain and the practical work of a packing company. In autumn, the team also visited the greenhouse company Siggården in Närpes, and more visits and interviews with producers will follow next year.

In November, the project organized a seminar in Närpes where the audience learned about the results from the second and third work packages. In 2026, the project will continue to investigate the entire value chain and organize innovation workshops based on the findings.

Project Team

- Lena Korkea-aho, Business Administration, Novia, Project Leader
- Henrik Virtanen, Business Administration, Novia
- Heidi Barman-Geust, Bioeconomy, Novia
- Peter Björk, Hanken
- Lisa Niemistö, Hanken

The project is funded by the European Agricultural Fund for Rural Development through the Ostrobothnia Centre for Economic Development, Transport and the Environment.

HEIDI BARMAN-GEUST
PROJECT LEADER

Framtidens grönsaker

Närings-, trafik- och miljöcentralen

Medfinansieras av Europeiska unionen

Sammanfattning på svenska

Projektet Framtidens grönsaker (2025–2027) stöder växthusproduktionen i Österbotten genom att kartlägga trender som påverkar efterfrågan och genom att undersöka konsumenternas behov. Studier visar att hälsa, klimat, ursprung, bekvämlighet och pris präglar framtidens trender, medan finländare fortfarande föredrar traditionella grönsaker som tomat och gurka. Projektet har besökt packerier och odlare för att förstå värdekedjan och ordnade ett seminarium i Närpes. Arbetet fortsätter 2026 med fler studier och innovationsverkstäder.

SWEET OATS – VITALITY FROM HERITAGE GRAINS

The project Kaunis Kaura –maatiaisviljoista elinvoimaa (Sweet Oats – Vitality from Heritage Grains) started in September 2025 and will run until the end of 2027. It is a national project carried out in collaboration between Häme University of Applied Sciences (HAMK), the Natural Resources Institute Finland (LUKE), and Novia University of Applied Sciences. The project is led by Annika Michelson at HAMK. From Novia, Heidi Barman-Geust and Ulrika Dahlberg are participating. In addition, several people from HAMK and LUKE are involved in the project.

The aim of the project is to promote the cultivation of heritage oats—old varieties that are well suited to organic farming. When introducing old oat varieties into cultivation, knowledge about their characteristics and cultivation requirements is needed. The project therefore collects historical information and complements it with new insights into changing cultivation conditions and usage needs. During the project, pilot cultivations will be carried out at Häme University of Applied Sciences' research farm in Mustiala. These trials will take place in 2026 and 2027.

Another important aspect is the multiplication of heritage grains. A national network of farmers who work with the propagation of landrace oats already exists. During the project, this network will be developed and strengthened, and regional ambassadors will be appointed. Local farmers can contact these individuals regarding the cultivation of heritage grains.

Another part of the project is to explore new uses for oats. This includes using oats in cooking as well as utilizing the oat straw. During the project, we will produce a recipe booklet containing both historical recipes and new, innovative recipes developed in collaboration with food entrepreneurs. In the autumn, the extensive work of collecting historical recipes began. The project has received significant help from students at Häme University of Applied Sciences, who have gathered old recipes, historical photographs, and information on the traditional uses of oat straw.

SweetOat
Vitality from Heritage Grains

Highlights of the year

The work to strengthen the network began already in the autumn, and in 2025 the project succeeded in appointing three ambassadors for heritage grains:

- Soile Wartiainen, Åland
- Lauri Takala, Kymenlaakso
- Ina Liljeström, Pohjois-Savo

As the project is an information dissemination project, communication is particularly important.

During the autumn, a project website was created. In addition, the project will work on developing the website viljalaari.fi, which was created in earlier projects. A newsletter model was developed, and the first newsletter was sent out in December. The newsletter already has over 250 subscribers.

The project will participate in several conferences and events during its duration. Furthermore, the project will host the Nordic Heritage Grain Seminar, which will be held in 2027 in Mustiala.

The project is funded by the European Agricultural Fund for Rural Development (2023–2027) through the Häme Centre for Economic Development, Transport and the Environment.

HEIDI BARMAN-GEUST
PROJECT LEADER

HAMK Hämeen ammattikorkeakoulu · Luke Luonnonvarakeskus · Yrkeshögskolan Novia · Elinkeino-, liikenne- ja ympäristökeskus

Sammanfattning på svenska

Projektet Kaunis Kaura (2025–2027) främjar odlingen av lanthavre genom att samla historisk och ny kunskap samt genomföra pilotodlingar i Mustiala. Ett nationellt nätverk för uppförökning av kulturspannmål stärks och regionala ambassadörer utses. Projektet utforskar även nya användningsområden för havre och tar fram ett recepthäfte med historiska och nya innovativa recept. Kommunikation är central med webbplats, nyhetsbrev och deltagande i evenemang. Finansiering sker via EU:s landsbygdsfond.

PERSONNEL

Almén, Anna-Karin, Project Researcher
Barman-Geust Heidi, Project Leader
Byholm Patrik, Senior lecturer
Dahlberg Ulrika, Project Leader
Engström-Öst Jonna, Special Researcher
Finch Joshua, Project Leader
Fred Marianne, Faculty head of RDI
Gómez-Paredes Jorge, Researcher
Gunko Ruslan, Researcher
Hammond Benjamin, Project Leader
Heinänen Stefan, Senior Lecturer
Holmlund-Norrén Christel, Project Leader
Koutsandrea Andriana, PhD student
Lassila Janne, Project Expert
Lilloja Kadi, Senior Lecturer
Noel Aurelie, Project Leader
Otterbeck Andreas, Project Researcher
Riesinger Paul, Senior Lecturer
Saaresranta Tiina, Project Leader
Sadik Samica, Project specialist
Selenius-Holmström Marianne, Project Leader
Sevelius Nina, Senior Lecturer
Storm Anita, Project Leader
Yliluikki Henna, Project Researcher

AFFILIATED PERSONNEL

Mozumder Mohammad
Rancken Romi
Öst Markus

PUBLICATIONS, PRESENTATIONS AND MEDIA APPERANCES

A1 Peer-reviewed scientific articles

Brutemark, Andreas (2025) Climate change–induced terrestrial matter runoff may decrease food web production in coastal ecosystems, Limnology and oceanography, Limnology and Oceanography.

Bucciolini, Gian Luigi; Morosinotto, Chiara; Brommer, Jon; Vrezec, Al; Ericsson, Peter; Nilsson, Lars-Ove; Poprach, Karel; Øien, Ingar Jostein; **Karell, Patrik** (2025) Lifetime Fitness Variation Across the Geographical Range in a Colour Polymorphic Species, Ecology and Evolution, (15) 4.

Byholm, Patrik (2025) Dispersal, maturation and recruitment in a long-lived, intercontinental migrant bird, Animal Behaviour, (230).

Ekblad, Camilla; Lindén, Andreas; **Öst, Markus**; Below, Antti; Jaatinen, Kim; Lokki, Heikki; Seimola, Tuomas; Tikkanen, Hannu & Laaksonen, Toni (2025) Living with the enemy: the return of an apex predator is associated with habitat shifts in a common but rapidly declining prey population, Landscape ecology, (40) 7.

Elbakidze, Marine; Kuns, Brian; **Gunko, Ruslan**; Kruhlov, Ivan; Maslyukivska, Olena; Karamushka, Victor; Adamenko, Olha; Holub, Oleksandra; Kleba, Liudmyla; Melnyk, Yuliia; Mylysiuk, Yana; Pidust, Olha; Slobodian, Ivanka; Tkachenko, Yevheniia; Yamelynets, Taras (2025) Understanding the impact of the war on people-nature relationships in Ukraine, Ecosystem Services, (73).

Fluhr, Julie; Duriez, Olivier; Blary, Constance; Chambert, Thierry; Almasi, Bettina; **Byholm, Patrik**; Buitendijk, Nelleke H.; Champagnon, Jocelyn; Dagys, Mindaugas; Fiedler, Wolfgang; Francesiaz, Charlotte; Jiguet, Frédéric; Lee, Simon; Millon, Alexandre; Monti, Flavio; Morcelet, Lucile; Nathan, Ran; Nolet, Bart A.; Nuijten, Rascha; Pilard, Philippe; Ponchon, Cécile; Roulin, Alexandre; Santos, Carlos D.; Spiegel, Orr; Schalcher, Kim; De Seynes, Aurélie; Spanoghe, Geert; Wikelski, Martin; Žydelis, Ramunas & Besnard, Aurélien (2025) Eoldist, a Web Application for Estimating Cautionary Detection Distance of Birds by Automatic Detection Systems to Reduce Collisions With Wind Turbines, Wind energy (28) 2.

Gómez-Catasús, Julia; Below, Antti; Lokki, Heikki; Stjernberg, Torsten; Lötberg, Ulrik & **Byholm, Patrik** (2025) Predator control reduces colony size fluctuations and enhances recolonization of Caspian terns breeding in the Baltic sea, Biodiversity and conservation, (35) 1.

Gómez-Paredes, Jorge; Malik, Arunima; Lafortune, Guillaume (2025) SDG-nexus and spillovers at the heart of Agenda 2030, PLOS sustainability and transformation, (4) 1.

Gunko, Ruslan; Rapeli, Lauri; Scheinin, Matias & **Karell, Patrik** (2025), Does environmental quality play a role in determining housing prices in a coastal community?, Finnish journal of social research.

Gunko, Ruslan; Rapeli, Lauri; Scheinin, Matias; Wikström, Jenny & Tynkkynen, Nina (2025) Navigating Environmental Percptions: Exploring the Impact of Political Orientation and Climate Change Beliefs on the Evaluation of the Local Environment, Environmental management, (75).

Karimi, Farid; Marzban, Ehsan & **Dahlberg, Ulrika** (2025) Navigating the future of carbon capture and storage technology: the interplay of social acceptability and political development, Journal of integrative environmental sciences (22).

Mohring, Bertille; Angelier, Frédéric; **Jaatinen, Kim;** Steele, Benjamin & **Öst, Markus** (2025) Habituation or sensitization? Short-term adjustment of flight initiation distance in incubating common eiders, Animal Behaviour (219).

Morosinotto, Chiara; Stier, Antoine; Ruuskanen, Suvi; Garcin, Natacha & **Karell, Patrik** (2025) Does colour-morph variation in metabolic physiology and oxidative stress match morph-specific life–history strategies?, Oecologia, (6) 89.

Orlando, Giuseppe; **Passarotto, Arianna; Morosinotto, Chiara**; Dominoni, Davide M. & **Karell, Patrik** (2025) Experimental Exposure to Noise Affects Hunting Behavior Already From a Young Age in a Nocturnal Acoustic Predator, Ecology and Evolution, (15) 10.

Passarotto, Arianna; Morosinotto, Chiara & Karell, Patrik (2025) Experimental noise and light pollution alter prey detection in a nocturnal bird of prey, Journal of Animal Ecology, (94) 7.

Perrault, Charlotte; Baltazar-Soares, Miguel; **Morosinotto, Chiara; Karell, Patrik**; Poprach, Karel; Nilsson, Lars-Ove; Eriksson, Daniel; Ericsson, Peter; Grašytė, Gintarė; Rumbutis, Saulius; Baroni, Daniele; Anderson, Katy; Øien, Ingar; Casero, Maria; Brommer, Jon E. (2025), Dressed for the Weather: Tawny Owl Feather Adaptations Across a Climatic Gradient, Ecology and Evolution, (15) 6.

Skov, Henrik; **Heinänen, Stefan**; Mortensen, Lars O.; Månsson, Johan; Nilsson, Lovisa; Tjørnløv, Rune S. & Zydelis (2025) Ramunas Flight Altitude of Common Cranes (Grus grus) Crossing the Arkona Basin (Baltic Sea): Implications for Offshore Wind Farm Development, Ecology and evolution, (15) 12.

Tuominen, Laura S.; Wikstrom, Mikael; Helantera, Heikki; **Karell, Patrik;** Rapeli, Lauri; Vuorisalo, Timo & Brommer, Jon E. (2025) Positive social relationships in hunting groups are related to compliance with the higher-level moose management, Ecology and society, (30) 4.

A3 Book section, Chapters in research books

Leinonen, Johanna (2025) Introduction: Forced migrants in Nordic histories, Forced migrants in Nordic histories.

Leinonen, Johanna (2025), Forced migrants in Nordic historiographies, Forced migrants in Nordic histories.

Schneider, Petra & **Mozumder, Mohammad Mojibul Hoque** (2025) Integrated water resources management: a framework for transboundary water governance, Handbook of Nature-Based Drought Solutions.

B1 Non-refereed journal articles

Backman, Torgny & **Byholm, Patrik** (2025) Humlor i Sydösterbotten - ett treårigt humleäventyr, OA-natur, (27) 44-53.

C2 Edited book, conference proceedings or special issue of a journal

Leinonen, Johanna; Tervonen, Miika; Frøland, Hans Otto; Hoffmann, Christhard; Jalagin, Seija; Jønsson, Heidi Vad; Thor & Tureby, Malin (2025) Forced migrants in Nordic histories.

D1 Articles in a professional journal

Balotari-Chiebao, Fabio & **Byholm, Patrik** (2025) Silltruten och vindkraften på kollisionskurs, Finlands natur, (84) 2.

Barman-Geust, Heidi (2025) Betesskogsbruk på Strömbo gård, Luomulehti, (1) 36-37.

Barman-Geust, Heidi (2025) Trädjordbruk kombinerar träd och buskar med lantbruk, Skogsbruket, (3) 28-29.

Dahlberg, Ulrika (2025) F.E.L.T. WOOL -hanke: miten karkeampi villa saadaan käyttöön?, Filtti ry jäsenlehti, 6-9.

den Herder, Michael; **Finch, Joshua**; Mattila, Iiris; Kähkönen, Tanja & Lawson, Gerry (2025) Agroforestry in CAP Strategic Plan, EURAF Policy Briefing, (34).

Riesinger, Paul (2025) Skördebildningen av fyra lusernsorter i blandning med timotej och rörsvingel, Landsbygdens folk, (9) 16–17.

Riesinger, Paul (2025), Skördebildningen av fyra lusernsorter - vid etablering utan respektive med skyddsgröda, Landsbygdens folk, (4) 30–31.

Sadik, Samica & **Dahlberg, Ulrika** (2025) Nokkoskuitu monipuolistaa tuotantoa, Luomulehti, (1) 48–49.

Samica, Sadik & **Dahlberg, Ulrika** (2025) Novia undersöker odling av nässlor för livsmedel och fiber, Trädgårdsnytt, (8) 8–9.

Selenius-Holmström, Marianne (2025) Yrkeshögskolan Novia bjöd in andra stadiets naturbruksstuderande till besöksdagar, Landsbygdens folk, (51–52) 13.

D2 Article in a professional research book

Finch, Joshua (2025) Agroforestry in Nyland, Novia Publikation och produktion, Serie R: Rapporter, (5) 28-32.

D4 Research report or study

Almén, Anna-Karin (2025) Slätbergets naturstig och Investering för Slätbergets naturstig – Slutrapport, Novia Publikation och produktion, Serie R: Rapporter (11).

Barman-Geust, Heidi (2025) Trender som formar framtidens grönsakskonsumtion, Novia Publikation och produktion, Serie R: Rapporter (8).

Sved, Johnny (2025) Smart med skärgårdsvirke – Slutrapport, Novia Publikation och produktion, Serie R: Rapporter, (1).

D6 Edited professional work

Barman-Geust, Heidi (2025) Novia UAS, Research & Development Report 2024. Faculty of Bioeconomy, Novia Publikation och produktion, Serie R: Rapporter (5).

E1 Popular articles, newspaper articles

Almén, Anna-Karin (2025) Slätbergets natural trail, Novia UAS, Research & Development Report 2024. Faculty of Bioeconomy, Novia Publikation och produktion, Serie R: Rapporter (5) 41.

Barman-Geust, Heidi (2025) Agroforestry i praktiken: Exempel från Finland, Bioekonomibloggen, 12.12.2025.

Barman-Geust, Heidi (2025) Härlig havre – livskraft från kulturspannmål, Bioekonomibloggen, 25.11.2025.

Barman-Geust, Heidi (2025) Nytt projekt stöder växthusproduktionen av grönsaker i Österbotten, Bioekonomibloggen, 14.3.2025.

Barman-Geust, Heidi (2025) Sustainable food systems, Novia UAS, Research & Development Report 2024. Faculty of Bioeconomy, Novia Publikation och produktion, Serie R: Rapporter (5) 47.

Barman-Geust, Heidi; Björk, Peter & Virtanen, Henrik (2025) Grönsaker i framtiden - vad och hur vill vi äta?, Vaasa Insider, 8.7.2025.

Dahlberg, Ulrika & Wikström, Maja (2025) Ullresa i Norge: ursprungsraser, ullinsamling och unika produkter, Bioekonomibloggen, 25.4.2025.

Dahlberg, Ulrika (2025) F.E.L.T. WOOL - future emergence of local textiles based on wool, Novia UAS, Research & Development Report 2024. Faculty of Bioeconomy, Novia Publikation och produktion, Serie R: Rapporter (5) 39.

Dahlberg, Ulrika (2025) Imagine Manufacturing: a workshop on natural fibres and materials in local systems, Bioekonomibloggen, 24.10.2025,

Dahlberg, Ulrika (2025) Local economy, Novia UAS, Research & Development Report 2024. Faculty of Bioeconomy, Novia Publikation och produktion, Serie R: Rapporter (5), 33.

Dahlberg, Ulrika (2025) Nettle Cultivation: When Field Experiments don't go as Planned, Bioekonomibloggen, 16.9.2025.

Dahlberg, Ulrika (2025) Nordiskt samarbete - och ull - är viktigare än någonsin, Västra Nyland, 11.4.2025 s. 40.

Dahlberg, Ulrika (2025) NorNa - Nordic natural fibres in circular economy, Novia UAS, Research & Development Report 2024. Faculty of Bioeconomy, Novia Publikation och produktion, Serie R: Rapporter (5) 34.

Dahlberg, Ulrika (2025) Nynässla - nettle for fibre and food in Uusimaa, Novia UAS, Research & Development Report 2024. Faculty of Bioeconomy, Novia Publikation och produktion, Serie R: Rapporter (5) 37.

Dunaeva Tatiana & **Heinänen, Stefan** (2025) From Trees to Trust: Lessons from two Finnish cities, Natural Resources Management blog, 28.5.2025.

Engström-Öst, Jonna (2025) Eco-physiological responses of marine biota to warming waters and ocean acidification - focus on benthic-pelagic coupling, Novia UAS, Research & Development Report 2024. Faculty of Bioeconomy, Novia Publikation och produktion, Serie R: Rapporter (5) 8.

Engström-Öst, Jonna (2025) Kan man kalka havet?, FUI-bloggen, 4.11.2025.

Finch, Joshua (2025) Green ecosystems, Novia UAS, Research & Development Report 2024. Faculty of Bioeconomy, Novia Publikation och produktion, Serie R: Rapporter (5), 26.

Fred, Marianne (2025) How to make the fun at work sevenfold and find treasure!, Novia UAS, Research & Development Report 2024. Faculty of Bioeconomy, Novia Publikation och produktion, Serie R: Rapporter (5), 5-6.

Fred, Marianne (2025) Skogen i vågmästarroll, Västra Nyland, 31.1.2025 s. 14.

Gomez-Parades, Jorge (2025) Does happiness matter? Bioekonomibloggen, 5.5.2025

Gomez-Parades, Jorge (2025) Energy transition, Novia UAS, Research & Development Report 2024. Faculty of Bioeconomy, Novia Publikation och produktion, Serie R: Rapporter (5), 16.

Gómez-Paredes, Jorge (2025) Why climate action is not firefighting, and inaction ignites a vicious cycle, Bioekonomibloggen, 16.12.2025.

Gunko, Ruslan (2025) Mini-Houses and Co-Sharing in Lindnäs, Svartå: Exploring new paths for rural development, Bioekonomibloggen, 24.11.2025.

Gunko, Ruslan (2025) Nature and well-being: political, environmental, and war impact perspectives, Novia UAS, Research & Development Report 2024. Faculty of Bioeconomy, Novia Publikation och produktion, Serie R: Rapporter (5) 45.

Gunko, Ruslan (2025) Naturen är en helande kraft för att övervinna krigets ärr, Västra Nyland, 15.8.2025 s. 24.

Gunko, Ruslan (2025) Sustainability, Novia UAS, Research & Development Report 2024. Faculty of Bioeconomy, Novia Publikation och produktion, Serie R: Rapporter (5) 43.

Holmlund-Norrén, Christel (2025) Agrolog och skogsbruksingenjör 2028 – Österbotten, Novia UAS, Research & Development Report 2024. Faculty of Bioeconomy, Novia Publikation och produktion, Serie R: Rapporter (5) 53.

Holmlund-Norrén, Christel (2025) KOMIO - Eudcational cooperation on climate competence in the land use sector, Novia UAS, Research & Development Report 2024. Faculty of Bioeconomy, Novia Publikation och produktion, Serie R: Rapporter (5) 51.

Koutsandrea, Andriana (2025) Eco-physiological responses of marine biota to warming waters and ocean acidification - focus on benthic-pelagic coupling, Novia UAS, Research & Development Report 2024. Faculty of Bioeconomy, Novia Publikation och produktion, Serie R: Rapporter (5), 10.

Lilloja, Kadi (2025) Ett kortare mässbesök till Frankrike, Bioekonomibloggen, 21.10.2025.

Noel, Aurélie & **Almén, Anna-Karin** (2025) Slätberget nature trail – Where recreation meets education, Bioekonomibloggen, 2.9.2025.

Noel, Aurélie & **Heinänen, Stefan** (2025) Learning-(MSP)-by-doing (and learning-by-teaching), Reseskildring, 4.4.2025.

Noel, Aurélie & Lindfors, Edvard (2025) Using spatial data to highlight sustainable tourism paths in Uusimaa, Bioekonomibloggen 30.9.2025.

Noel, Aurélie (2025) Geospatial systems, Novia UAS, Research & Development Report 2024. Faculty of Bioeconomy, Novia Publikation och produktion, Serie R: Rapporter (5)18.

Noel, Aurélie (2025) Novia pursues its literacy mission with the Spatial Competence Centre, Bioekonomibloggen, 10.9.2025.

Noel, Aurélie (2025) Spatial Competence Center, Novia UAS, Research & Development Report 2024. Faculty of Bioeconomy, Novia Publikation och produktion, Serie R: Rapporter (5), 20.

Otterbeck, Andreas (2025) När en skräntärna öppnade en helt ny värld för mig, Bioekonomibloggen 10.12.2025.

Raja-aho, Severi & **Balotari-Chiebáo, Fábio** (2025) Protracted disputes in the north: Visualizing land use conflicts between reindeer herding and forestry in Upper Lapland, Natural Resources Management blog, 16.12.2025.

Saaresranta, Tiina (2025) Dialog och verksamhetsmodeller för att främja landsbygdens hållbarhet – Plock från KERÄ-nätverkets verksamhet 2025, Maaseutupolitiikan blogi, 19.12.2025.

Saaresranta, Tiina (2025) Hur mäta? Perspektiv på utveckling av indikatorer för lokal hållbarhet, Maaseutupolitiikka.fi: blogi, 2.10.2025.

Saaresranta, Tiina (2025) Leader-grupperna utbyter tillsammans med KERÄ-nätverket idéer kring behov, verksamhet och effekter för hållbarhetsarbete, Landsbygdspolitikens blogg, 16.6.2025.

Sadek, Samica & Jayawardana, Chanika (2025) Strengthening Nordic Wool: Insights from the F.E.L.T. WOOL Visit to Sweden, Bioekonomibloggen, 10.6.2025.

Selenius-Holmström, Marianne (2025) Branschambassadörer – när verkligheten möter klassrummet, Bioekonomibloggen, 11.12.2025.

Selenius-Holmström, Marianne (2025) Pro Bioekonomi 2.0, Novia UAS, Research & Development Report 2024. Faculty of Bioeconomy, Novia Publikation och produktion, Serie R: Rapporter (5) 48.

Selenius-Holmström, Marianne (2025) Så bygger vi broar mellan utbildning och arbetsliv inom bioekonomi, Bioekonomibloggen, 11.12.2025.

Storm, Anita & Harald, Jonas (2025) Dammusslor som mat, Bioekonomibloggen, 9.9.2025.

Storm, Anita (2025) Dammussla - utredning om musslans tillväxt i olika vattenmiljöer, Bioekonomibloggen, 7.10.2025.

Storm, Anita (2025) Flytande plattformar i Kyrkslätt – en lösning för en övergödd damm?, Bioekonomibloggen, 24.10.2025.

Storm, Anita (2025) Sötvattensmusslor som biofiltrerare, Bioekonomibloggen, 6.11.2025.

Storm, Anita (2025) The Duck mussel project - a study on aquaculture, Novia UAS, Research & Development Report 2024. Faculty of Bioeconomy, Novia Publikation och produktion, Serie R: Rapporter (5), 13.

Yliluikki, Henna (2025) Studying zooplankton from the ‘natural laboratory’ in Méthana, Greece: setting up a novel project, Reseskildring, 22.4.2025.

Yliluikku, Henna (2025) ZETA - losing weight in marine biota, Novia UAS, Research & Development Report 2024. Faculty of Bioeconomy, Novia Publikation och produktion, Serie R: Rapporter (5), 10.

F1 Published independent work of art or performance

Dahlberg, Ulrika & Sadik, Samica (2025) Naturfiber, Luonnonkuidut, Natural Fibres - mapp med textilprover, Novias serie.

Presentations

Barman-Geust Heidi: Hållbara livsmedelssystem för människa och miljö, Seminariet Mat och hållbarhet i skolan, Mikaelskolan, Raseborg, 28.2.2025.

Barman-Geust Heidi: Trender som formar framtidens grönsakskonsumtion, Seminariet Framtidens grönsaker – trender och konsumentperspektiv, Närpes 17.11.2025.

Byholm Patrik: Miten muuttolinnut löytävät perille? Föredrag för skolelever inom ramarna för ”Tutkija tavattavissa”-programmet, Laajalahden koulu, Esbo, 25.4.2025.

Dahlberg Ulrika & **Sadik Samica:** Regional textile economies based on natural fibres, Local Economy Seminar, Novia UAS, Raseborg, 13.2.2025.

Dahlberg Ulrika: Natural Fibres and Local Economy, the course Bioeconomy Innovation, the Graduate Program in Sustainable Coastal Management, Novia UAS, Raseborg 14.2.2025.

Dahlberg Ulrika: Luonnonkuidut tekstiileissä (workshop), Karjaan lukio, Raasepori, 3.3.2025.

Dahlberg Ulrika: Mångformigt, resilient lantbruk som gynnar beredskap, the webinar Klimatförändringens utmaningar, Maasta elinvoimaa -project, Online 22.5.2025.

Dahlberg Ulrika: Naturfibrer och Fibershed, Närpes Marthor, Online, 7.11.2025.

Engström-Öst Jonna: Klimatförändring i havet – vad innebär det? Ekenäs vinterbadare – årsmöte, Raseborg, 25.3.2025.

Engström-Öst Jonna: Systemic change for sustainable futures (Key note), RDI days, Novia UAS, Jakobstad, 9.4.2025.

Engström-Öst, Jonna: Blue Ecosystems, RDI seminar, Novia UAS, Raseborg, 24.4.2025

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Read our Bioeconomy blog!
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The Novia Bioeconomy Research Team

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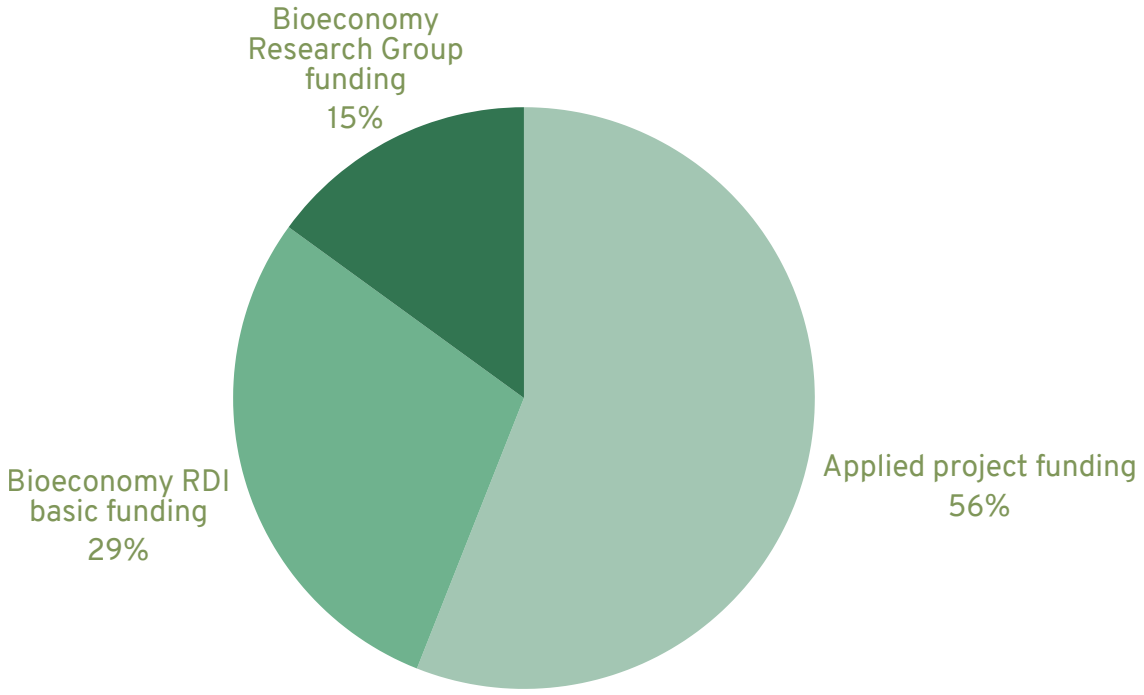

The division of RDI-funding at the Faculty of Bioeconomy in 2025. The result for 2025 was 970 000 euro. We have been granted, and started up projects for a total value of 1 016 165 euro in 2025 and submitted applications for funding for a total of 2 161 315 euro in 2025.