

Novia UAS Campus Raseborg Research & Development 2018



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Sustainable bioeconomy - our responsibility and possibility in the work for combating climate changes

Research and development within the focal area bioeconomy at Novia UAS campus Raseborg, with its long-term focus on high quality research in sustainable bioeconomy, is of fundamental importance in our work for combating climate changes.

This Research Report of activities and achievement 2018 shows that we have both strengthened and widened our knowledge base in sustainable bioeconomy, management and the use of natural resources.

Our scientific and applied projects with research topics stretching from e.g. local economy, sustainable production and consumption, consumer behaviour, bio-based materials, changes in marine communities under changing climate, effects of cormorants on fish stocks, to evolutionary adaptations to environmental changes, is a strong base for our further work in strengthening our knowhow in sustainable bioeconomy.

We continuously work to enable our students to take part of the research work. This in order to give them insights into the latest advances in different research topics and increasing their understanding of the importance of research as a base for sustainable bioeconomy.

Our efforts continue in building a stronger knowledge cluster in bioeconomy and we are happy to welcome our new senior researchers that joined our Bioeconomy Research Team in 2018.

Eva Sandberg-Kilpi, Dean



Climate change and Baltic Sea plankton

Jonna Engström-Öst, Louise Forsblom, Matias Scheinin (Tvärminne Zoological Station), Anna Metso, Anna Jansson and Hernán Abad Ortega

We study how climate change and eutrophication affect plankton in the marine environment with focus on the Baltic Sea. We measure biomarkers, reproductive output and many other variables to increase our understanding of mechanisms behind the impact of warming and ocean acidification in the coastal zone.

Highlights of the year

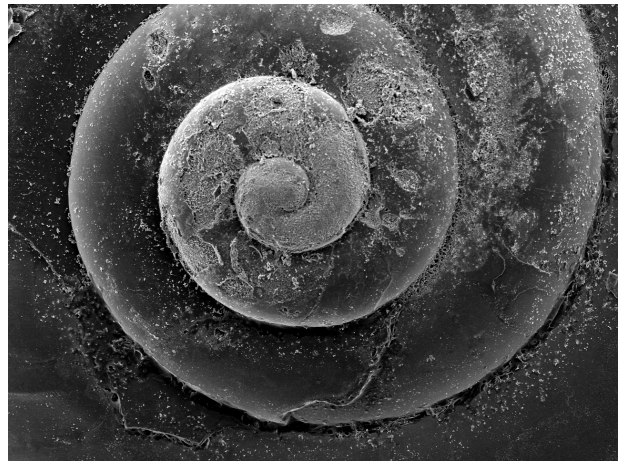
Between May and August 2018, we collected field data, and performed a large-scale laboratory experiment at Tvärminne Zoological Station. Due to the fairly time-consuming project, we shared the work between us, Hernán Abad Ortega, Anna Metso, Anna Jansson, and Jonna Engström-Öst. Zooplankton were collected at Storfjärden monitoring station and frozen for future biomarker analyses (Ella von Weissenberg's PhD thesis 2019-). Additionally, we incubated copepods to release eggs in three different temperatures, 12, 15 and 18C, and collected samples for oxidative stress. The main aim of the work was to study the potential trade-off between zooplankton reproduction and physiological stress during elevating temperatures.

Together with Nina Bednaršek and Richard A. Feely that we met onboard R/V *Ronald H. Brown* during the cruise to the California Current in 2016, we published the first paper on oxidative stress of pteropods, sampled



Good luck with your Master's in Kiel, Hernán. Photo: Hernán Ortega Abad

from an environment suffering from warming, ocean acidification and hypoxia. The paper was published in *Frontiers in Marine Science* and continued collaboration is under planning.



Pteropod *Limacina helinica* dissolving in low pH caused by ocean acidification. Photo: Nina Bednaršek

In August, Louise Forsblom, enrolled at Åbo Akademi University, participated in a PhD course *Arctic Marine Zooplankton* held at Svalbard, Norway, where she learnt more about zooplankton taxonomy, ecology and sampling on-board a ship. Louise came home with lots of new ideas for future work, which inspired us to establish contacts to the Svalbard research community in order to find a potential Arctic connection to our present work. Global change is likely to have strong effects in the northern marine environment, and many questions have not been studied due to the cold climate and the remoteness of the site.

Collaborators

- Bednaršek Nina, Southern California Water Research Project, USA (pteropod ecology)
- Brutemark Andreas, Calluna Ab, Sweden (plankton ecology)
- Candolin Ulrika, University of Helsinki, Finland (fish behaviour)
- De Stasio Bart, Lawrence University, USA (cyanobacteria-zooplankton interactions)
- Feely, Richard A., NOAA, USA (Pacific oceanography)
- Keister Julie, University of Washington, USA (Pacific ecology)
- Klais Riina, Estonian Research Information System, Estonia (functional ecology)
- Lehtinen Sirpa, Finnish Environment Institute, Finland (long-term data)
- Lehtiniemi Maiju, Finnish Environment Institute, Finland (microplastics, long-term data)
- Lindén Andreas, Novia University of Applied Sciences, Finland (time series modelling)
- Lips Inga, Tallinn University of Technology, Estonia (monitoring data)
- Långvik Otto, Novia University of Applied Sciences (pharmaceuticals in water)
- Pettersson Heidi, Finnish Meteorological Institute, Finland (long-term data)
- Riebesell Ulf, GEOMAR - Helmholtz Centre for Ocean Research Kiel, Germany (ocean acidification)
- Scheinin Matias, Tvärminne Zoological Station, Finland (phytoplankton ecology)
- Vuori Kristiina, University of Turku, Finland (biomarkers)

Hur påverkas plankton av en förändrad miljö? Vi forskar i hur klimatförändringen samt övergödningen i den marina miljön påverkar plankton i Östersjön. Vi jobbar främst med djurplankton och undersöker deras reproduktionsframgång, stressnivåer samt populationsdynamik. Projektet är finansierat av Svenska kulturfonden, Onni Talas stiftelse och Waldemar von Frenckells stiftelse, Finlands akademi (2018) och FunMarBio vid Åbo Akademi (Louise Forsblom).



The algae like it hot. Photo: Hernán Abad Ortega

Functional ecology of marine communities under changing climate

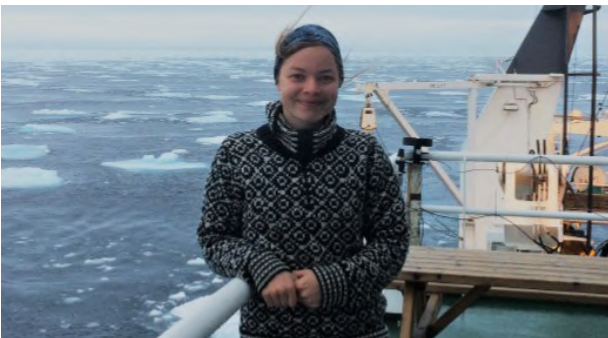
Anna Jansson, Ella von Weissenberg

In this project we study how climate change induced changes in environmental conditions affect the occurrence of biological traits, and induce trade-offs between reproductive output and coping with environmental stress. We study the trade-offs by measuring biomarkers that are used as biochemical proxies for stress, energy consumption and general condition.

Highlights of the year

During an extensive field season that lasted from April to August, we collected data on the effects of temperature increase on offspring production of a copepod *Acartia*. During the field sampling campaign, also lipid profiles and oxidative stress status were studied over the entire productive season, as well as by experimentally exposing the copepods to elevated temperatures.

These results will be part of Ella von Weissenberg's PhD thesis, as we were granted funding from Onni Talaan säätiö for



Ella von Weissenberg



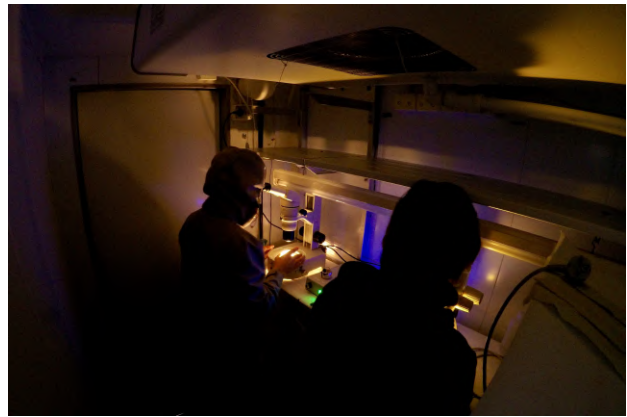
Anna Jansson

her PhD thesis work. Ella's PhD work starts in the beginning of 2019, and will investigate the sensitivity of zooplankton communities and their potential to adapt to future changes in temperature and salinity. Her studies will be conducted using different approaches: field work, experimental studies and mesocosm experiments. We also want to find potential mechanisms behind the sensitivities of certain species and communities explained by latitude.



Sampling littoral communities at Coastal Ecology I field course. Photo: Anna Jansson

The aim of my other current project is to use existing time series data to investigate spatio-temporal variation in functional biodiversity within zooplankton communities in relation to the changing environment. In this study, I work in close collaboration with Dr. Riina Klais, and I use zooplankton data from the Gulf of Riga, which is among the most extensive zooplankton datasets in the Baltic Sea.



Microscoping copepods in a climate chamber. Photo: Hernán Abad Ortega

Vi forskar i hur klimatförändringen påverkar djursamhällena i den marina miljön. Marina organismer måste fördela sina resurser mellan processer såsom förökning och överlevnad, och i förändrande miljöer blir denna investering av energi ännu viktigare. Vi undersöker dessa trade-offs och olika allokering av resurser bland annat genom att mäta biomarkörer som kan berätta hur stressade organismerna är.

Collaborators

- Jonna Engström-Öst, Novia University of Applied Sciences
- Riina Klais, Estonian Research Information System, Estonia
- Alexandra Lewandowska, University of Helsinki
- Raisa Turja, Kari Lehtonen, Finnish Environment Institute
- Patrik Karell, Novia University of Applied Sciences
- Camilla Gustafsson, University of Helsinki



Field sampling. Photo: Hernán Abad Ortega

Statistical Population Ecology

Andreas Lindén, Louise Forsblom (Åbo Akademi), Henry Hågerstrand, Marianne Karlemo (Åbo Akademi), Laura Montin, Andreas Otterbeck

Our aim is to produce sound scientific knowledge on questions related to population ecology and biodiversity, to support sustainable development. We do basic and applied research, using effective analytical methods that provide unbiased quantitative answers.

Highlights of the year

The research activity of the Statistical Population Ecology group (SPoEc) included topics, such as phenology, population dynamics and avian breeding ecology. Compared to earlier, our research was more applied, with larger emphasis on aquatic systems. Importantly, two new projects were initiated, both related to applied fisheries research, in the core of the broad framework of bioeconomy. The Åland Whitefish project (Lindén, Hågerstrand, Otterbeck) and the Great Cormorant project in the Gulf of Finland (Patrik Byholm, Lindén, Montin) were jointly funded by the EU and national funding sources. Descriptions of these projects can be found in separate sections of this report (Whitefish project on p. 11; Cormorant project on p. 27).

One of the highlights in 2018 was a commentary article by Lindén, published in PNAS (*Proc. Natl Acad. Sci. USA*). This commentary reflected the results of a research article by Kharouba *et al.*, published



Långskär on the Åland Islands is one of the study sites where data have been gathered for the Whitefish project. Långskär also hosts a well known bird observatory. Photo: Henry Hågerstrand



Phenological synchrony of interacting species is changing rapidly. For example, changed timing of migration in small song birds may affect the food availability of avian predators, such as the Eurasian Sparrowhawk (*Accipiter nisus*). Photo: Andreas Lindén

ed in the same issue of PNAS, and suggested some future directions. The authors detected drastic shifts in the phenological synchrony of interacting species over recent decades. Lindén suggested moving toward more explicit models for species interaction, accounting for species presence over the whole seasons instead of concentrating on synchrony in the timing of emergence or appearance in spring.

In May, Lindén visited Dr. Oscar Gordo for a one week research stay at the Doñana Biological Station in Sevilla (Spain). During the visit Gordo and Lindén continued their collaborative research on phenology, which was initiated during a half-year reserach visit by Dr. Gordo at Novia, hosted by SPoEc.

More specifically, the collaborative work focussed on a novel group of models that we call joint population-phenology models, which aim to increase the accuracy of both population dynamic analyses and phenological analysis using seasonal monitoring data. Lindén also gave a talk on these topics at the research seminar of the institution.

In June, Louise Forsblom and Lindén joined the International Statistical Ecology Conference (ISEC 2018) in Scotland, St Andrews. Forsblom had a talk about her new findings on environmental effects in phytoplankton in the Baltic Sea. This year, PhD candidate Forsblom also published her first scientific article, which presents novel results on the spatially synchronous population dynamics of six phytoplankton taxa in the Baltic Sea. At the conference Lindén talked about joint population-phenology models. Lindén's conference attendance and research visit to Doñana were funded by Svenska kulturfonden.

The Statistics Helpdesk is a free voluntary service ran by SPoEc (Lindén). Novia's students, teachers, researchers and project personnel may visit the helpdesk in order to discuss statistical problems, e.g. what type of analysis is appropriate for a particular question with a particular dataset. During

Collaborators

- Aleksi Lehikoinen, Sara Fraixedas, University of Helsinki, Finland
- David Gilljam, Marianne Mugabo, Steven M. Sait, University of Leeds,, U.K.
- Jonas Knape, Swedish University of Agricultural Sciences, Sweden
- Jonna Engström-Öst, Patrik Karell, Mikael Kilpi, Novia UAS, Finland
- Mikael Himberg, Tom Wiklund, Markus Öst, Åbo Akademi University, Finland
- Mike S. Fowler, Swansea University, U.K.
- Oscar Gordo, Doñana Biological Station
- Satu Ramula, University of Turku, Finland
- Sirpa Lehtinen, Maiju Lehtiniemi, Finnish Environment Institute, Finland



The group leader made a one-week research visit to Doñana Biological Station in Sevilla, Spain. On the fields around Sevilla one may encounter exotic bird species, such as the Great Bustard (*Otis tarda*). Photo: Andreas Lindén

2018 the helpdesk was visited by five students doing their Bachelors thesis..

Vi studerar frågor inom populationsekologi och biodiversitet, med syftet att bidra till en kunskapsbaserad hållbar utveckling. Med statistisk analys får vi tillförlitliga kvantitativa svar på både tillämpade och mera teoretiska frågor. Årets forskning hade fokus på fenologi, populationsdynamik och fåglars häckningsbiologi. Dessutom startades två nya EU-finansierade forskningsprojekt relaterade till fiskerifrågor (se skilda beskrivningar av "Skarvprojektet" på s. 27 och "Sikprojektet" på s. 11).

I maj gjorde Lindén ett forskarbesök till Doñana biologiska Station (Dr. Oscar Gordo) i Spanien under en veckas tid. I juni deltog Forsblom och Lindén i en konferens i statistisk ekologi i St. Andrews (Skottland), där de höll var sitt föredrag om sin forskning. Doktorand Forsblom publicerade sin första vetenskapliga artikel, som presenterar nya resultat om den spatiellt synkrona populationsdynamiken hos sex olika växtplankton i Östersjön.

The Whitefish on Åland Islands – spawning grounds and origin

Andreas Lindén, Henry Hägerstrand, Andreas Otterbeck

Novia initiated a project studying the status of the whitefish spawning on the Åland Islands. Our aim is to describe and map the spawning grounds of whitefish on Åland and to unravel the origin of the fish. This is important for maintaining a sustainable fishery of whitefish on the Åland Islands.

The project is funded by the European Maritime and Fisheries Fund (EMFF) and the Government of Åland. Two project researchers – Henry Hägerstrand and Andreas Otterbeck – were employed within the project, which continues to the end of November 2019.

We interviewed 40 of the most active local practitioners of whitefish fishery on their view about the state of whitefish at Åland. Further, 160 individuals of whitefish were acquired from traditional spawning sites on the Åland Islands for measuring the number of gill rakers, length and weight. Also whitefish fry from Guttorp hatchery were acquired.

Using a statistical method developed during this project, we analysed an earlier collected data set of gill raker counts from 709 whitefish sampled during the summer (outside the spawning season). We found that river spawning whitefish dominated the catches, however, with a proportion decreasing throughout the summer. We also estimated the proportion of a form of whitefish spawning in some bays around Mariehamn, possibly originating in hatchery-raised fish. We concluded that circa 0–6 % of the whitefish caught in summer consist of this form, but the proportion may be locally higher.



The average number of gill rakers differs between the river spawning and sea spawning ecotypes of whitefish. Statistical analyses on gill raker counts may be used to determine the proportion of fish of different origin in a sample. Photo: Henry Hägerstrand

Novia påbörjade ett nytt forskningsprojekt, som fortsätter till slutet av november 2019. Syftet är att beskriva och kartlägga den åländska sikens lekplatser, samt klargöra fiskens ursprung. Ett ytterligare delmål är att granska den utanför lektid fångade sikens ursprung. Denna information behövs för att förstå den åländska sikstammens tillstånd och betydelse för ett fortsatt hållbart fiske av sik på Åland.

Under året 2018 intervjuades 40 av de mest betydande utövarna av sikfiske på Åland. Sampel på 160 individer lekande sik, samt yngel från Guttorp fiskodlingsanstalt, införskaffades för biometrisk analys. Vi gjorde också en analys av proportionen älv- och havslekande sik i sampel på 709 individer som fiskats på Åland utanför lektid.

Novel biomaterials derived from the lignocellulosic feedstock promoting sustainable development and environmental protection

Otto Långvik

I'm a fairly new recruitment, joining the Novia Bioeconomy Research Team (NBRT) in mid-August, 2018. I feel that my contribution to the NBRT involves a strong knowledge of chemistry, particularly synthetic, organic as well as materials chemistry. The addition of these competence areas to the NBRT enables us to develop new combinations of the existing profound know-how of biological systems, e.g. marine and terrestrial biology, with chemical characteristics of novel bio-based materials available in Finland.

One example of a new, interesting and promising biomaterial I have studied is the galactoglucomannan (GGM) hemicellulose originating from the softwood timber, mainly spruce (*Picea abies*) (Figure 1). There are several interesting applications where the hemicellulose-based hydrogels can be utilized. One area I have enclosed in my work is to clarify to what extent chemicals, especially pharmaceuticals, are excreted from our industrialized societies to the surrounding environment at a local level. Our objective is to reduce this chemicalization of the environment. Initially we will conduct a detailed analysis of the local occurrences and concentrations of selected pharmaceutical compounds, both in surface waters and plankton populations. The second part of our work will focus on developing hydrogel-based materials (Figure 2) which could be used as



Figure 1. Wood is a durable mixture of different materials, mainly cellulose, hemicellulose and lignin.



absorbents removing chemicals from the waste water streams. Our novel hydrogel materials are created by utilizing a new and effective methacrylate functionalization of the GGM hemicellulose (Figure 3). Most of the early methods of functionalization and co-polymerization of hemicelluloses for producing hydrogels have turned out to be time and cost ineffective. We have recent results demonstrating a more straight forward and practical functionalization of the GGM using methacrylate anhydride at a controllable pH and temperature. Our results enable a simple, cost effective and scalable production of methacrylate functionalized

GGM materials. The adsorption of other types of contaminants, such as heavy metals and other inorganic contaminants, from municipal, industrial and mining wastewaters will also be evaluated and investigated in our laboratory studies. The most promising materials, for removing pharmaceuticals and other organic micro-pollutants, will eventually be used and evaluated using field studies.

During the relatively short period here at Novia I have been actively taking part in the education and courses, seminar series at Novia, publication activities and five different applications for external funding. Also, deepening and promoting the collaboration with Åbo Akademi University and Novia University of Applied Sciences has been an area of high priority for me. Furthermore, I have together with CH-Bioforce Oy managed to initiate a joint development project with a third private company focusing on the possible use of lignocellulosic materials to be utilized in the production of specific and specialized multilayer composite products.

Collaborators

- Patrik Eklund (Åbo Akademi University)
- Stefan Willför (Åbo Akademi University)
- Lari Vähäsalo (CH-Bioforce Oy)



Figure 2. Otto Långvik is interested in developing new materials from the lignocellulosic feedstocks. To the right you see a hydrogel made by copolymerizing methacryl acid with 10% methacryl functionalized galactoglucomannan.

Projektets långsiktiga målsättning är att minska kemikaliseringen av miljön. I ett inledande skede kommer vi att kartlägga förekomsten av läkemedelsrester i de lokala vattenmiljöerna samt bestämma i vilken utsträckning de individuella läkemedlen bioackumuleras från vatten till plankton. En betydande och väsentlig del av projektets verksamhet är fokuserat på att framställa nya hydrogelkompositer av vedbaserade material. Dessa nya biomaterial förväntas vara mycket lämpliga för vattenreningsapplikationer. Framställningen av dessa hydrogeler är en tillämpning av moderna bioraffinaderi-processer som befrämjar bio- och cirkulär-ekonomi.

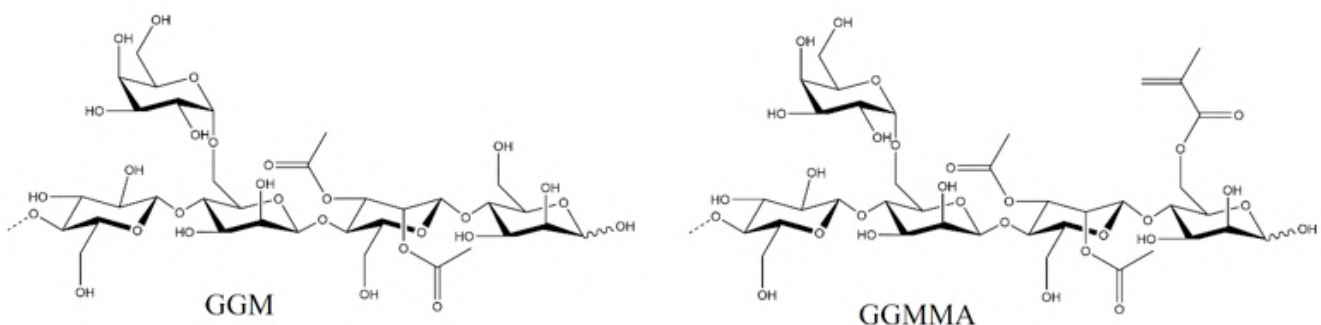


Figure 3. The Structure of *O*-acetyl-galactoglucomannan (GGM) and methacrylate functionalized *O*-acetyl-galactoglucomannan (GGMMA).

Seizing Bioeconomy Opportunities in Sustainable Food Developments

Ashkan Pakseresht

As a recently joined researcher to the Novia Bioeconomy Research Team (NBRT), I am studying bio-based economy. My contribution to the NBRT involve business research and economics with application to food, agriculture and natural resources. In particular, studying the consumer behaviour in adopting novel bio-based solutions. Consumer research is increasingly become important part of sustainable development.

Bioeconomy is privileged area of research with unprecedented multi-faceted insights to drive circular economy and commercialisation of sustainable solutions to our today challenges. A successful development of novel bio-based products entails a favourable overall public response. My current research centres on the examination of the opportunities from blue bioeconomy and consumer behaviour towards its application in food production.

Seizing opportunities and competence building of food innovation provided by blue bioeconomy requires a thorough understanding of challenges as well as competitive landscape of potential substitute alternatives. The first phase of the research includes a systematic review to identify research trends and gaps in the field, understanding of obstacles and opportunities, and therein provide clear propositions to guide future research. The review helps to identify the main research streams that study food innovations derived from blue bioeconomy and its sustainability impact.

It is widely contended that the blue bioeconomy is the solution to feed the increasing population of the world. However, the preliminary results from our review (which was presented at the "Sustainability Science Days" conference, Helsinki, organised by the Aalto University, May 9, 2019) indicated that despite its role in supporting local and regional growth, the blue bioeconomy constitute a small fraction



of total turnover in the EU bioeconomy and with limited innovative food prospects. Yet, the development of food from new marine resources as well as improvements in waste management seems to be promising. However, the review depicts that there is a lack of research on public attitudes and consumers' preference toward marine food and aquaculture. Blue bioeconomy seems very young compared to other disciplines and more research needs to be conducted especially regarding new food resources.

Prior joining NBRT, I was studying consumer behaviour related to use of novel food technologies. In particular, this research contributes to our knowledge about consumer decision-making and risk perception related to the use of biotechnology in food production. The results indicated that genetically modified (GM) food with

agronomic benefits is considered an inferior alternative to unmodified food products, but its direct consumer benefits were considered more desirable. Furthermore, consumer evaluation of biotechnology was largely insensitive to the type of food product. However, the type of gene modification was important for consumers' evaluation.

Key findings from this research is that policy context has a decisive influence on consumers' acceptance of innovative solutions in food production. Four articles stemming from this work have published so far in *European Review of Agricultural Economics (ERAE)*, *Energy Research & Social Science*, and *International Journal of Consumer Studies* (and three manuscripts are under review process). A paper published in *ERAE* has been awarded the best of the annual conference of the German Society of Economic and Social Sciences in Agriculture (GeWiSoLa, 2013) in Berlin.

An extension to the consumer acceptance of GM food is planned to be carried out in the view of Finnish biotechnology competencies.

Collaborators

- Dr. Masoomeh Rashidghalam (Tabriz University, Iran)

Ashkan Pakseresht är en av de nya specialforskarna vid Novias forskningsteam inom bioekonomi. Fokus inom hans forskning ligger på möjligheter inom blå bioekonomi och särskilt på konsumentbeteende i förhållande till innovativa lösningar inom matproduktionen. Före han anslöt sig till Novias forskningsteam undersökte han konsumenternas inställning till gen-modifierade livsmedel. Forskningen ledde till intressanta resultat om hur riktlinjer har ett avgörande inflytande på konsumenternas acceptering av innovativa lösningar inom matproduktionen. Forskningen ledde även till fyra vetenskapliga artiklar som publicerades i tidskrifterna *European Review of Agricultural Economics (ERAE)*, *Energy Research & Social Science* och *International Journal of Consumer Studies*. Dessutom är tre vetenskapliga artiklar för tillfället under granskning. Ett föredrag vid den årliga konferensen ordnad av German Society of Economic and Social Sciences in Agriculture i Berlin och som sedan publicerades i tidskriften *ERAE* utseddes till konferensens bästa inlägg. Fortsatt fokus inom forskningen av konsumenternas attityder till gen-modifierade livsmedel planeras med beaktande av finländsk kompetens inom bioteknik.

Functional ecology and applications

Patrik Karell, Chiara Morosinotto, Katja Koskenpato (University of Helsinki), Ruslan Gunko, Kia Kohonen (University of Helsinki), Kati Schenk & Martti Kujansuu

Our research group focusses both on fundamental questions dealing with the understanding of evolutionary adaptations to and demographic consequences of environmental change in natural populations, and on understanding the societal impacts of environmental variation and land use in an interdisciplinary framework.

Highlights of the year

The year 2018 kicked off with an experiment where we were interested in understanding the role of conspicuousness of the tawny owl colour morphs in winter landscapes. Katja led this work, which started with photographing tawny owl morphs in Helsinki and ended with a citizen science online owl game based on these pictures. The online game involved more than 5500 volunteers, who participated in the owl game distributed on the web pages of LUOMUS, University of Helsinki. During autumn Katja submitted a manuscript based on this experiment for publication (see Katja's page for details).

In March Chiara started as a post doc in the group. After quickly settling down in Ekenäs after the move from Padova Italy, she started to crunch the long-term data on the tawny owls. She was able to produce a draft for a



Matching colouration? Patrik and a grey tawny owl male



Chiara, Katja and a tawny owl nestling before putting it back up in the nest box after ringing and sampling

paper within a few weeks before the field work with the owls began. This manuscript was submitted for publication in autumn (see Chiara's page for details).

New for this year's field work was to equip the adult tawny owls with gps loggers combined with body temperature loggers. The idea with this is to understand the movement and physio-logical adjustments during harsh winter conditions. These data will be collected in spring 2019 when we recapture the owls again.

Kati finished her MSc at University of Helsinki on habitat selection in tawny owl colour morphs with a Laudatur grade! In spring we also took onboard Kia Kohonen: a new MSc student also affiliated with the University of Helsinki. Kia is working on prey choice and parental feeding investment in tawny owls. Martti Kujansuu finished his Master in Natural Resource Management at Novia on the use of GIS in municipality decision-making in autumn.

In summer Ruslan started his PhD project (Novia and University of Turku) where he studies how the state of the environment influences the life quality of citizens in the municipality of Raseborg (see Ruslans page

for details).

For Patrik and Chiara the autumn semester started with a one-year visit to Lund University as guest researchers. In Lund Chiara has started the molecular work with tawny owl blood samples with the aim to understand the life history consequences of cellular senescence. Patrik has been preparing the coming aviary experiments with tawny owls and the logistics and paperwork around the set up.

As an excellent finish of the year 2018 we got the exciting news that Ruslan was awarded a three-year grant from Kone foundation for his PhD-work. Patrik was also one of the PI:s in a workgroup that was awarded a four-year grant from Kone foundation for an interdisciplinary project where two PhD students will be testing the applicability of evolutionary models to the study of human decision-making processes in the context of natural resource management. Also Kia was awarded a grant for her MSc from Societas pro Fauna et Flora Fennica.

I vår forskningsgrupp försöker vi förstå processer i naturen på olika plan genom att studera olika modellsystem. Hur anpassar sig organismer till förändringar i miljön och vilka är urvalsprocesserna? Vi strävar även till att tillämpa data och resultat från dessa projekt med samhällsekonomiskt relevanta frågeställningar där vi kopplar ihop ekologiska data med kvantitativa surveyundersökningar. I hur stor utsträckning kan man avverka skog utan att utarma bio-diversiteten och ekosystem-tjänster och finns det lönsamhet i en sådan ekologiskt hållbar strategi? Vilken betydelse har närmiljöns vattenkvalitet för människors välbefinnande och hur påverkar olika typer av markanvändning belastningen i kust-vattnen?



Harry Potter? No, Ruslan holding a tawny owl

Collaborators

- University of Lausanne, Switzerland: Prof. Alexandre Roulin
- Lund University, Sweden: Prof. Staffan Bensch & prof. Jan-Åke Nilsson
- Karolinska Institute, Sweden: Dr. Muhammad Asghar, Karolinska Institute Stockholm, Sweden
- Novia: Senior Lecturer Patrik Byholm, Dr. Jonna Engström-Öst, Dr. Andreas Lindén
- University of Turku: Prof. Jon E. Brommer, Dr. Satu Ramula, Univ. Lecturer Timo Vuorisalo
- University of Helsinki: Dr. Aleksi Lehikoinen, Univ. Lecturer Hannu Pietiäinen & Dr. Jari Valkama, Drs. Sanna Mäkeläinen and Daniel Burgas, Dr. Matias Scheinin
- Åbo Akademi university: Univ. Lecturer Markus Öst, Doc. Lauri Rapeli
- University of Oulu: Assoc. prof. Heikki Helanterä
- University of Jyväskylä: Dr. Carita Lindstedt-Kairaksela



Kia investigates prey choice in tawny owl colour morphs in her MSc thesis. Here, the tawny owl father has brought a bank vole and several thrushes to the newly hatched nestlings in the nest box. The mother will share pieces of the prey to the nestlings.

Ecological economics in forestry

Patrik Karell, Patrik Byholm, Ruslan Gunko, Sanna Mäkeläinen (University of Helsinki), Daniel Burgas (University of Jyväskylä), Ari Nikula (Luke)

The bioeconomic strategy in Finland and Europe aims at simultaneously maximizing forest resource utilization and conserving functional biodiversity and different ecosystem services with an ultimate ambition to generate higher values from forest biomass. Despite the intriguing expectations of the circular bioeconomy model there is a risk of collision between economic and nature conservation interests. For that reason there is an urgent need to find solutions how economic profit can be achieved while maintaining a functional biodiversity with its ecosystem services in the forests. In this project we aim to understand the impacts of forest management on biodiversity.

The first step has been to investigate this topical question in forest bioeconomy – How can we simultaneously assure sustainable harvesting from an ecological perspective and sustainable economy from a forestry perspective? The goshawk (*Accipiter gentilis*) and its habitat preferences is a prime model system for such studies as the goshawk's presence is associated with high biodiversity forest types.

In 2018 we continued to further develop the work by Ruslan Gunko in his BSc thesis here at Novia, in which he used long-term monitoring data of a Finnish goshawk population and detailed GIS data of the landscape structure in the study area. The results show that the amount of mature spruce forests clearly explain whether a goshawk territory is occupied or not. Furthermore, the forest structure changes over an eight year period revealed that forest structure changes, mainly the increasing proportion of clear-cuts and loss

of mature spruce forests in the vicinity of the nesting sites, explains the decline of the goshawk. We also found that the amount of these mature spruce forests have not declined in general in the study area, which further indicates that forestry practices are (probably unintentionally) targeted at goshawk territories more than expected by chance. This highlights the notion that forestry practices may have stronger impact on biodiversity than expected since both birds (goshawks) and managers (forestry people) prefer similar types of forest habitats.

I forskningsprojektet tillämpar vi ekologiska data inom bioekonomiskt relevanta frågeställningar. Vi är bl. a. intresserade av att förstå i hur stor utsträckning man kan avverka skog utan att utarma biodiversiteten och ekosystemtjänster och om det finns en långsiktig lönsamhet i en sådan strategi?



During the last decade cutting of goshawk nest stands has not eased but accelerated.



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Ecophysiological adaptations to climate change

Chiara Morosinotto, Patrik Karell

I started to work in Novia as postdoctoral researcher in March 2018 on the project led by Dr. Patrik Karell on evolutionary dynamics under environmental change. Our study species in this project is tawny owl (*Strix aluco*), which is a widespread owl species in Europe and is characterized by a grey and a brown-reddish color morph. This coloration depends on the level of pheomelanin on the feathers and is genetically determined. Within this 2.5 years project, I will study how individuals with different color morphs vary in their physiology and behaviour across their life-time and how they respond to climatic variations.

For this project we take advantage of a long-term dataset where nests of tawny owls were monitored during breeding for 40 years in South-East Finland. Data on the breeding attempt and investment are collected every spring and all the birds are ringed, measured and the color morph is classified. During 2018 I used this long-term data set to study whether offspring condition and recruitment probability are affected by parental morphs. I found that offspring of brown parents are in better condition than those of grey parents and that offspring in



Male tawny owl equipped with small GPS logger on the back



better condition have higher probability to return to breed to the local population. I presented these results at the 27th International Ornithological Congress in Vancouver (IOC; 20th-27th August 2018) and the resulting manuscript is currently under review.

During April-June 2018 we also continued to monitor all the potential breeding sites in the study area, as well as ringing and color score all the breeding adults and nestlings. We provided all the breeding adults with GPS loggers that will record the movements

of the owls, as well as environmental temperature, throughout the winter. This data will allow us to investigate if owls vary in their movement patterns and activity level according to their color morph in winter and link their activity with climate. In addition, breeding females were provided with a subcutaneous temperature datalogger, allowing us to investigate the variation in their body temperature throughout the winter and thus how different color morphs cope with harsh winter conditions.

Since September 2018 I am visiting the Department of Biology at Lund University (Sweden). Here I started the laboratory analyses to measure telomere dynamics and parasite load between the color morphs in tawny owls. Telomeres are useful molecular biomarkers of aging and these results will allow us to understand how different color morphs vary in their metabolism and condition as offspring and through their adult life.

Collaborators

- Lund University (Sweden): Prof. Staffan Bensch and prof. Jan-Åke Nilsson
- University of Turku (Finland): Prof. Erkki Korpimäki, Dr. Suvi Ruuskanen, MSc. Giulia Masoero, Dr. Elina Koivisto
- Natural Resources Institute Finland (Luke; Finland): Dr. Toni Laaksonen
- University of Cape Town (South Africa): Dr. Robert L. Thomson
- Instituto de Investigación en Recursos Cinegéticos (Spain): Prof. Rafael Mateo
- University of Padova (Italy): Prof. Andrea Pilastro, Dr. Silvia Cattelan, Dr. Alessandro Grapputo, Prof. Matteo Griggio

In addition to this main project, I am also collaborating with the University of Turku (Finland) to study winter population dynamics of pygmy owls, PhD project of MSc Giulia Masoero, and maternal effects in pied flycatchers. In 2017 I also received the L’Oreal and Unesco “For Women in Science” award, which allowed me to start an ongoing collaboration, with the University of Padova (Italy), to investigate the impact of predation risk and maternal stress on offspring behaviour and telomere dynamics. This project has so far produced two master thesis.

Jag jobbar som post doc forskare i Patrik Karells akademiforskarprojekt om eko-evolutionär dynamik i respons till miljöförändringar med fokus på kattugglan och dess gråa och bruna genetiska färgmorfer. I min forskning undersöker jag skillnader i färgmorfernas fysiologi och beteende och hur detta hänger ihop med skillnader i överlevnad och förökning under varierande vinterförhållanden. Jag undersöker hur skillnader i den tidiga utvecklingen som unge påverkar överlevnad till vuxen ålder och fysiologin senare i livet med hjälp av långtidsdata och insamlade DNA prov. Under 2018 påbörjade vi också automatiserade mätningar av rörelse-mönster och kroppstemperatur hos uggorna i naturen genom att förse dem med GPS och temperatur loggers över vintern. Syftet är att förstå fysiologiska och beteendemässiga anpassningar till vinterklimatet och hur det hänger ihop med dokumenterade olikheter mellan färgmorfer i deras överlevnad under varierande vinterförhållanden.



Tawny owls plumage go from brown-red to grey according to the level of pheomelanin in the feathers

Ecological energetics of the colour polymorphic tawny owl under climate change

Katja Koskenpato, Patrik Karell, Alekski Lehtikoinen (University of Helsinki) and Kia Kohonen (University of Helsinki)

My PhD project focuses on ecological energetics of the colour polymorphic tawny owl under climate change. The main interest is to understand the mechanisms behind the different winter survival of the grey and the brown tawny owl morph and their adaptive ability to changing climate. I am doing my studies under the supervision of Patrik Karell (Novia, FEAT-group) and Alekski Lehtikoinen (LUOMUS, Hello-group).

The year 2018 began with photographing mounted tawny owls in Viikki, Helsinki. We took a set of identical pictures of a mounted grey and a mounted brown tawny owl roosting in coniferous trees with snowy and snowless landscapes. Volunteers were then asked to look at a photoset and find an owl as fast as possible from the pictures. The aim was to test if the grey morph has a better camouflage (meaning harder to find from a picture) in a snowy landscape compared to the brown morph, thus explaining the documented better survival of the grey



morph during snowy and cold winters. This "owl game" turned out to be quite a success, as over 5000 people participated in the study via the online study site and searched for owls from our study pictures. I also went to University of Jyväskylä to meet Carita Lindstedt-Kareksela who helped me to take UV-photos of the mounted tawny owls and model an avian vision to show how a mobbing passerine perceive the different colour morphs. Our results imply indeed that



the grey morph has a better camouflage in a snowy landscape.

To study the adaptive ability of the colour morphs to different environments, we have been gathering data on the spatial and temporal appearance of the morphs across Europe. We have used pictures of tawny owls taken in different parts of Europe. In addition to this, we have collected data on tawny owl skins from collections in many different European museums. We have defined the colour morphs from every picture of known location, aiming to study the geographical distribution of the morphs across Europe. As the colour morphs are expected to be adaptations to different



A brown and a grey tawny owl.

environments and Gloger's rule states that organisms are paler with increasing distance from the equator, we hypothesise that the grey morph is more common and better adapted to north, whereas the brown is more common and does better in south where food conditions are more predictable.

Kia Kohonen started her MSc thesis in the group during the spring 2018. She is studying the prey choice of tawny owl colour morphs. During the summer, she went through old nest remains to identify and count prey items. She also participated in vole trapping in autumn.



Kia with owl chick



Tawny owl skins form the collections of Finnish Museum of Natural History

I mitt doktorandprojekt undersöker jag kattugglans anpassning till olika livsmiljöer genom att studera kattugglans färgmorfer. Jag kartlägger distributionen av kattugglans färgmorfer runtom i Europa och undersöker kopplingar mellan deras förekomst och olika miljöfaktorer. Jag undersöker även skyddsfärgens betydelse för färgmorferna i miljöer med och utan snö och skillnader i deras fysiologiska och fysikaliska värmehushållning under varierande omständigheter.



Example of picture in the "owl game".

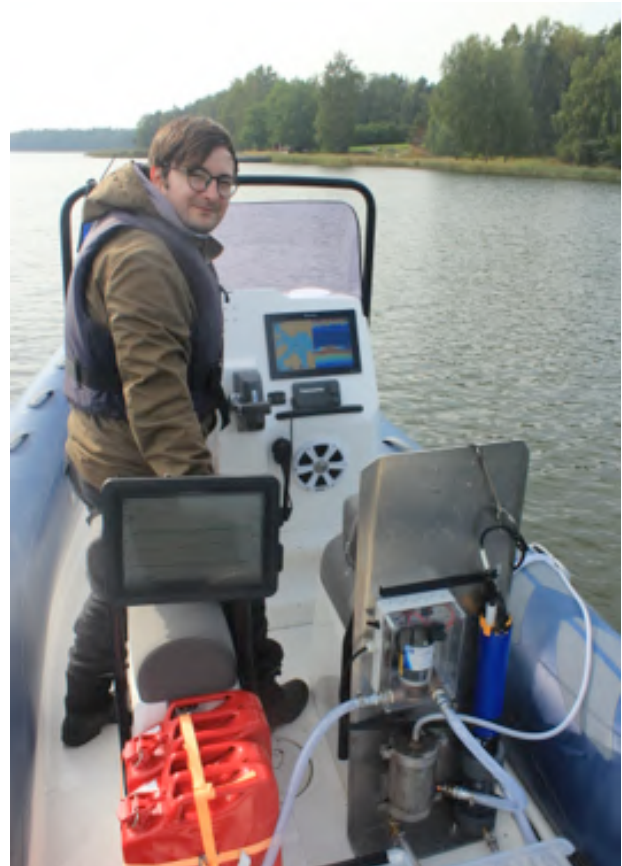
LES: Life quality in Raseborg

Ruslan Gunko, Patrik Karell, Lauri Rapeli (Åbo Akademi University), Timo Vuorisalo (University of Turku) and Matias Scheinin

LES is a simple acronym meaning Linking Environment and Society, which itself describes the main idea of the project. This is a PhD project executed at Novia and University of Turku in collaboration with Åbo Akademi and Tvärminne Zoological Station.

Life quality has become a hot topic last decade in Europe. Every year we hear in news new official and unofficial life quality ranks from different sources, which opens up discussions in societies. Moreover, improvement of life quality is one of the biggest tasks in EU. Thus, from year to year EU invest in this question hundreds and hundreds of millions euro.

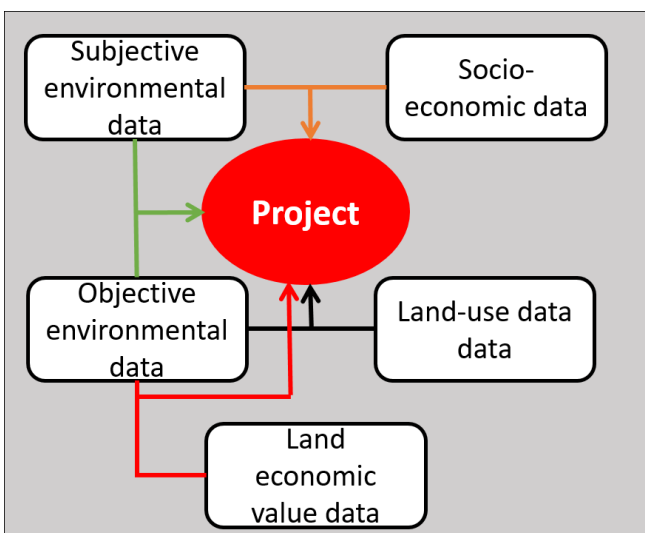
Nevertheless, we are still far from the final result and differences in life quality standards are huge in Europe. Furthermore, we can be confident in expecting these differences even inside countries themselves. Here is an intrinsic problem in all these modern ranks: they are focused on a country scale and not taking into account local features of small areas and underlying mechanisms. Also, these ranks are usually concentrated on socioeconomic factors and environmental impact is frequently underestimated. Our project is targeting to understand this impact with Raseborg as a case study.



Sampling in Ekenäs Archipelago. Photo: Matias Scheinin

LES is an interdisciplinary project aiming to link objective environmental data of coastal waters and subjective survey data on a local scale. Therefore, the research team consists of a wide expertise in both environmental and social sciences.

The objective environmental data we use consist of unique records of water quality parameters collected in Raseborg archipelago. In 2018 we did preparatory work for it: planned route and did first trial of collecting data with special equipment (water temperature, conductivity, turbidity, pH, dissolved organic matters, dissolved oxygen and total algae data). Main part of water quality data collection will begin in the



Simple scheme of the LES project

late spring 2019. Simultaneously we have done preliminary spatial analysis of land-use data and non-point pollution risk in order to find risk zones which require meticulous attention.

The main sociological features of the project are the subjective data collected by surveying people. These subjective survey data consist of the subjective opinions of people about water quality and life satisfaction together with socio-demographic parameters like age, education, relationship with property, etc. Thereby, we can link objective data to people's opinion and understand the importance of water quality for the life quality on a local scale. In the same time we will compare two types of data on water quality for understanding how well it corresponds with subjective opinion data for use in future analyses.

The results of the LES project will provide potential solutions for mitigating climate change effects on a local scale through changes in land use practice. Moreover, we aim to understand the societal importance and economic benefits of ecologically sustainable development in the region. Finally, we are expecting to develop framework for policymakers in Raseborg,

which can be modified according to local features and used in different regions around all Finland.



Matias Scheinin enjoying sunny day on a boat during sampling. Photo: Ruslan Gunko

LES är ett fyraårigt tvärvetenskapligt doktorandprojekt som utförs vid yrkeshögskolan Novia och Åbo universitet. Projektet kopplar ihop detaljerade mätningar av vattenkvalitet och avrinnings-data i Raseborg med enkät-undersökningar av ortsbefolkningen för att förstå betydelsen och uppfattningen av miljöns tillstånd för välbefinnande på ett lokalt plan.



Ecology of forest raptors and archipelago birds

Patrik Byholm, Martin Beal (Lund University), Julia Gómez-Catasús (University of Madrid), Sanna Mäkeläinen (University of Helsinki), Wouter Vansteelant (University of Amsterdam), Caroline Howes (University of the Witwatersrand), Andrea Santangeli (University of Helsinki)

We study the population and conservation biology of forest raptors and the Caspian tern. By combining traditional field work with new technology and statistical modelling, we aim to get better understanding of species' movement ecology, habitat use and factors limiting their distribution. How does individuals utilize their home range, how does environmental affect species performance and distributions?

Highlights of the year

The fact that the reasons behind the declines of many species in Finland are not well known, calls for study initiatives providing new information. The European honey buzzard is a species whose Finnish population has been in decline already for decades, but even so, there is very limited information about the reason(s) for the decline. In 2018, Novia's ongoing honey buzzard project provided new information shedding light over the situation. Thus, we showed that residues of neonicotinoids - a group of pesticides commonly used in agriculture and silviculture - were present in blood samples of a majority (80%) of birds sampled in Southwest Finland. While also other reasons are likely to add to the honey buzzards population decline and the direct link between neonicotinoids and honey buzzards population decline in practice is impossible to link directly, the finding should at least be taken as an early warning as neonicotinoids have been reported causing negative sublethal effects in other bird



Neonicotinoid residues were found in 80% of European honey buzzards sampled in Southwest Finland. Both juveniles (see picture) and adults were exposed.



It is possible to study the daily life of breeding Caspian terns using remotely operated surveillance cameras. Photo: Hans Viitasalo

species. Especially in migratory birds, also global environmental change, such as habitat loss outside national borders, is likely to affect species on their wintering grounds. During 2018 the link between such changes on the tropical wintering grounds in Africa was investigated as part of Caroline Howes's doctoral thesis project. Together with Wouter Vansteelant the ontogeny of migration at the individual level among a set of honey buzzards equipped with GPS-trackers as juveniles and transiting into adulthood during 2011-2018 continued. Using material collected during previous field seasons, Martin Beal completed his Master's thesis "(Pat)Terns in space and time: Movement, activity, and habitat preference in breeding Caspian Terns (*Hydroprogne caspia*)" at Lund University in Sweden in April 2018. In this work, he shows, among other things, that terns breeding in two colonies in Finland and Sweden show a strong preference for shallow coastal water for

shallow coastal water for foraging during the breeding season. However, in Sweden habitat use was more diverse compared to Finland, which may implicate differences in local prey conditions. Moreover, observed strong site fidelity in habitat selection patterns at the individual level indicates that individual specialization is of importance for resource segregation in Caspian terns too. The main results from the thesis are planned to be published in the form of a scientific article in 2019. New work on the metapopulation dynamics of the Baltic Caspian tern population was initiated as Julia Gómez-Catasús enrolled the project in autumn 2018. Using monitoring data collected by field ornithologist in Finland and Sweden during 1984-2018, the aim is to apply a new state-of-the art population modelling approach to unravel secrets of what factors are governing the colonization and extinctions of specific colonies (sub-populations). In addition, the aim is to unravel to what degree the colony dynamics has changed during the study period as a result of recent environmental change. Lastly but not least, the field work at the Finnish west and south coasts continued intensively: breeding success was monitored, birds were caught to be deployed with GPS-trackers and remotely operated camera surveillance was used in two colonies to monitor various colony activities.



Snapshot from a Caspian tern colony as delivered by a surveillance camera.

Collaborators

- Susanne Åkesson (Lund University, Sweden)
- Willem Bouten (University of Amsterdam, The Netherlands)
- Kouze Shiomi (National Institute of Polar Research, Japan)
- Ulrik Lötberg (BirdLife Sweden)
- Otso Ovaskainen (University of Helsinki)
- Antti Below (Metsähallitus)
- Torsten Stjernberg (LUOMUS)
- Willem Bouten (University of Amsterdam, The Netherlands)
- Craig T. Symes (University of the Witwatersrand, South Africa)
- Dave Goulson (University of Sussex, UK)

Under det gångna året kunde vi rapportera om utbredd förekomst av neonikotinoider - en grupp pesticider vida använda inom jord- och skogsbrukssektorn - i blodet hos finländska bivråkar. Dessa bekämpningsmedel har kunnat relateras till beteendestörningar och förgiftningar hos flera andra artgrupper. Även om en direkt länk mellan neonikotinoidbelastning och den finländska bivråkspopulationens minskning är mycket svår att i praktiken påvisa ger detta nya en hänvisning om att dessa två åtminstone delvis kan ha med varandra att göra. Under 2018 fortsatte också arbetet med att forska i artens flyttningsekologi och tropiska ekologi på övervintringsområdena i Afrika. Inom ramarna för skröntärneprojektet färdigställdes Martin Beals examensarbete 2018 och nytt arbete rörande Östersjöns skröntärnepopulations metapopulationsdynamik inleddes. Fältarbetet intensifierades bl.a. genom att utöka antalet GPS-sändaruppföljda individer.



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Waldemar von Frenckells stiftelse

The Great Cormorant project

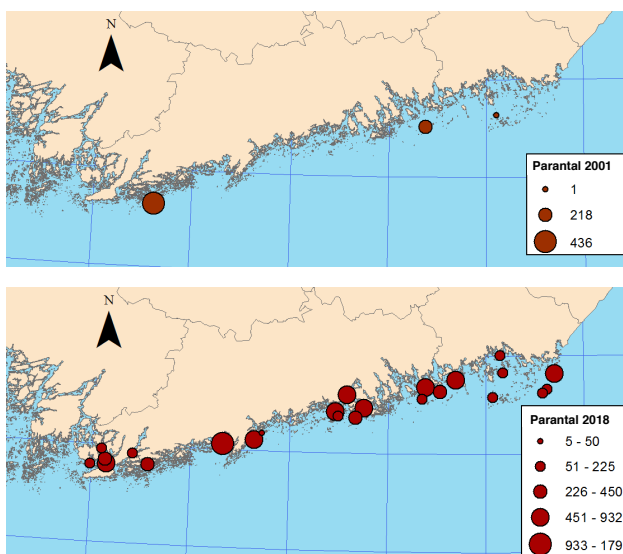
Patrik Byholm, Andreas Lindén, Laura Montin

In 2018 a new project was initiated to investigate the possible local effects of Great cormorants (*Phalacrocorax carbo sinensis*) on fish stocks in the Gulf of Finland.

The aim is to model how cormorants choose their fishing waters and how the presumed predation pressure from cormorants have affected fisheries catches at the local scale. The fishing behaviour of cormorants will be studied using GPS-transmitters mounted on eight adult individuals. The project is funded by the European Maritime and Fisheries Fund (EMFF) and national funding, through Etelä-Suomen kalatalousryhmä (ESKO) and the ELY-centre of Southwest Finland.

The project started in mid-October, and continues until the end of 2019. Because of the timetable, only few concrete results

emerged during 2018. The most important achievement was the recruitment of MSc Laura Montin to the project. She joined the Cormorant team in order to plan and initiate the collection of material needed for the scientific investigations to follow in 2019. This involved, among other things, formulating letters of attorney to be sent out to commercial fishermen in order to get their concessions regarding detailed catch statistics in the project. Correspondence with authorities and other stakeholders and planning the time schedule for activities in 2019 was also a part of her work picture.



The distribution and number of breeding pairs of great cormorants in the Gulf of Finland in 2001 and 2018. The rapid increase of the species has caused concerns about its possible negative effects on fish stocks.

Ett nytt forskningsprojekt om mellanskarpens inverkan på det kommersiella fisket i Finska viken inleddes i oktober 2018. Syftet är att med GPS-sändare undersöka hur skarvarna väljer sina fiskeområden och vidare analysera hur skarvens predation påverkar fiskfångster på lokal skala. Projektet fortsätter under 2019 då de första resultaten förväntas fås.

Collaborator

- Pekka Rusanen (SYKE)



Nesting colonies of great cormorants can sometimes contain more than 1000 pairs. Abundant droppings, the "guano", from nesting birds typically kills the trees on a colony island. Photo: Patrik Byholm



Teaching

The members of the research team contributes to the education at Novia University of Applied Sciences. Here is an overview of our teaching activities in 2018



Teachers and students participating open doors day at Tvärminne Zoological Station. Photo: Jonna Engström-Öst

Patrik Byholm

- Senior lecturer at Novia
- Head of Master-programme in Natural Resources Management
- Teaching courses in research methodology statistics, GIS and ecology (BSc and MSc level)
- Supervising MSc- and BSc-thesis projects

Jonna Engström-Öst

- Coastal ecology I (course teacher)
- Conservation Biology (course coordinator, course teacher)
- Monitoring of Aquatic Bodies
- Research Methodology
- Supervising MSc- and BSc-thesis projects

Anna Jansson

- Coastal ecology I (field course at Tvärminne Zoological Station)
- Conservation Biology
- Monitoring of Aquatic Bodies

Otto Långvik

- Environmental Impact Assessment

Andreas Lindén

- Conservation Biology (course teacher)
- Statistisk analys (course coordinator, course teacher)
- Statistics (course teacher)
- Viltbruk (guest lecturer)
- Linking data and ecological models (course teacher, University of Helsinki)
- Supervising MSc- and BSc-thesis projects
- Organises statistics helpdesk for students and staff at Novia

Ruslan Gunko

- GIS project (course teacher)

Publications

Scientific articles

Bednaršek N, Feely RA, Beck M, Glippa O, Kanerva M, Engström-Öst J (2018) El Niño-related thermal stress coupled with ocean acidification negatively impacts cellular to population-level responses in pteropods along the California Current System with implications for increased bioenergetic costs. *Frontiers in Marine Science* 5: 486.

Byholm P, Santangeli A, Mäkeläinen S, Goulson D (2018) First evidence of neonicotinoid residues in a long-distance migratory raptor, the European honey buzzard (*Pernis apivorus*). *Science of the Total Environment*, 639: 929-933.

Daiping W, Valcu M, Dingemanse N, Bulla M, Both C, Kempenaers B, Duckworth R, Drummond H, Karell P, Albrecht T, Forstmeier W (in press) Scrutinizing assortative mating in birds. *PLoS Biology*.

Forsblom L, Lehtinen S, Lindén A (in press) Spatio-temporal population dynamics of six phytoplankton taxa. *Hydrobiologia* 828: 301-314.

Gilljam D, Knape J, Lindén A, Mugabo M, Sait SM, Fowler MS (in press) The colour of environmental fluctuations associated with terrestrial animal population dynamics. *Global Ecology and Biogeography*. DOI: 10.1111/geb.12824

Glippa O, Engström-Öst J, Kanerva M, Rein A, Vuori K (2018) Oxidative stress and antioxidant defense responses in *Acartia copepods* in relation to environmental factors. *PLOS ONE* 13: e0195981.

Jacobsen L, Engström-Öst J (2018) Coping with environments; vegetation, turbidity and abiotics. In: *Biology and ecology of pike*. Eds. Nilsson, P.A., Skov, C., CRC Press.

Masoero G, Morosinotto C, Laaksonen T, Korpimäki E (2018) Food hoarding of an avian predator: sex- and age-related differences under fluctuating food conditions. *Behav Ecol Sociobiol* 72:159

Morosinotto C, Rainio M, Ruuskanen S, Korpimäki E (2018) Antioxidant enzyme activities vary with predation risk and environmental conditions in free-living passerine birds. *Physiol Biochem Zool* 91:837-848

Lehtiniemi M, Hartikainen S, Näkki P, Engström-Öst J, Koistinen A, Setälä O (2018) Size matters more than shape: ingestion of primary and secondary microplastics by small predators. *Food webs* e00097.

Lindén A (2018) Adaptive and nonadaptive changes in phenological synchrony. – *Proceedings of the National Academy of Sciences of the U.S.A.* 115: 5057-5059.

Öst M, Lindén A, Karell P, Ramula S, Kilpi M (2018) To breed or not to breed: drivers of intermittent breeding in a seabird under increasing predation risk and male bias. – *Oecologia*, 188: 129-138. <https://doi.org/10.1007/s00442-018-4176-5>

Ramula S, Öst M, Lindén A, Karell P, Kilpi M (2018) Increased male bias in eider ducks can be explained by sex-specific survival of prime-age breeders. *PLoS ONE*, 13: e0195415. <https://doi.org/10.1371/journal.pone.0195415>

Publications (cont.)

Popular articles

Abad Ortega H, Jansson A, Engström-Öst J (2018) Även havets minsta påverkas av algerna. *Finlands Natur* 3: 8-9

Metso A, Jansson A, Engström-Öst J (2018) Sinilevä vihertää rannat. *Suomen Luonto* 7: 10

Koskenpato K, Karell P (2018) Lehtopöllötutkimus syvenee ja laajenee. *Seuranta uutiset 2018*, pp. 36-37. LUOMUS, University of Helsinki https://www.luomus.fi/sites/default/files/files/seuranta uutiset2018_aukeamat_final.pdf

Newspaper columns

Byholm P. Den sjätte vågen. *Västra Nyland*, 26.6.2018.

Jansson A. Vaccinera eller inte? *Västra Nyland*, 18.12.2018.

Karell P. Ugglor i förändring. *Västra Nyland* 17.4.2018.

Lindén A. När molnen är sönder. *Västra Nyland*, 1.8.2018.

Engström-Öst J. Vem bryr sig om Östersjön? *Västra Nyland*, 9.10.2018.

Conference presentations

Abad Ortega H. Nutrient capturing wetlands, Coastal GIS2018, Isafjörður, Iceland 27.-28.9.2018

Beal M, Åkesson S, Byholm P. Foraging habitat use in breeding Caspian Terns (*Hydroprogne caspia*) of the Baltic Sea. 14th International Seabird Group Conference, Liverpool, UK, 3-6.9.2018

Byholm P. Goshawks in a changing forest landscape. University of Turku, Department of Biology, Turku, 27.9.2018

Byholm P, Vansteelant W. Mortality in GPS-tracked European Honey Buzzards (*Pernis apivorus*). Raptor Research Foundation, Annual conference, Kruger National Park, South Africa, 12-16.11.2018

Byholm P. Räyskän seuranta kamera- ja GPS-tekniikalla: mitä uutta olemme oppineet? Kanta-Hämeen Lintutieteellinen Yhdistys, Lintuilta, Hämeenlinna 24.10.2018

Byholm, P. Räyskän GPS-seuranta Suupohjassa ja maailmalla. Suupohjan Lintutieteellinen Yhdistys, Teuva 24.11.2018

Byholm P. Räyskä uudenlaisen seurannan kohteena. Porvoonseudun Lintuyhdistys, Räyskä ilta, Porvoo 12.12.2018

Byholm P. Uppföljning av skrântärna i Kust-Österbotten. Ostrobothnia Australis, Vasa 3.4.2018

Byholm, P. Uppföljning av skrântärna i Finska viken. Östra Nylands fågel- och naturskyddsförening, Lovisa 6.4.2018

Engström-Öst J. Kan vi rädda Östersjön med ett lass gips? Havsforskningens utmaningar i dagens samhälle. Rotary RYLA seminarium, Ekenäs 8.11.2018

Publications and media appearances

Engström-Öst J. Algbloomingen - hur är läget nu och i framtiden, Ekenäs segelsällskap, Ekenäs 28.11.2018

Engström-Öst J. Havsforskningens utmaningar i dagens samhälle. Raseborgs Natur r.f., Ekenäs 14.11.2018

Gunko R. State of environment as a determinant of life quality: a local scale approach (Poster presentation), Coastal GIS2018, Isafjörður, Iceland 27.-28.9.2018

Howes C. Byholm P, Symes CT. The Effect of Landscape Composition and Fragmentation on Wintering European Honey-buzzard (*Pernis apivorus*) Movement and Habitat Use. Raptor Research Foundation, Annual conference, Kruger National Park, South Africa 12-16.11.2018

Karell P. Pale grey tawny owls are more cryptic than reddish-brown ones in snowy landscapes. Molecular ecology and evolution seminar, Lund University, Sweden 22.11.2018

Koskenpato K. Crypsis of tawny owl colour morphs in different winter landscapes, University of Helsinki, LUOVA Spring Symposium, Helsinki 5.-7.3.2018

Koskenpato K. Studying tawny owl colour morphs, University of Helsinki, Ecology of Owls, Helsinki 28.2.2018

Lindroos L. Environmental variables driving phytoplankton population dynamics. International Statistical Ecology Conference, St. Andrews, Scotland 2.-6.7.2018

Lindroos L. Environmental variables driving phytoplankton population dynamics (Poster presentation), Aura symposium 2018, Turku 26.4. 2018

Lucena-Moya P. Improving GIS-learning for higher education programs on coastal management, Coastal GIS2018, Isafjörður, Iceland 27.-28.9.2018

Media appearances

Patrik Byholm

Suomen Luonto magazine (pesticides in wild birds, interview)

30.5.2018, Suomalaisista mehiläishaukoista löytyi neonicotinoideja <https://suomenluonto.fi/uutiset/suomalaisista-mehilaishaukoista-loytyi-neonicotinoideja/>

Svenska YLE (species loss, interview)

14.4.2018; <https://svenska.yle.fi/artikel/2018/04/14/faglarna-minskar-forskare-i-europa-larmar-om-katastrof>

Syd-Österbotten (great cormorant nesting numbers, interview)

10.8.2018; <https://www.sydin.fi/Artikel/Visa/221254>

MTV3 (honey buzzard migration, interviews)

8.5.2018; <https://www.mtvuutiset.fi/artikkeli/paivi-haukan-pesimaan-ehdiminen-jalleen-epavarmaa-samanlainen-jannitysnytelma-kuin-ennenkin/6899246>

29.8.2018; <https://www.mtvuutiset.fi/artikkeli/mtv- uutisten-kummilintu-paivi-haukan-pelattiin-kuolleen-sielta-loytyi-vain-pari-sulkaa/7048030>

6.11.2018; <https://www.mtvuutiset.fi/artikkeli/paivi-hauka-on-jalleen-matkalla-etelan-lampoon-mutta-miksi-mtv-uutisten-kummilintu-myohastelee-jatkuvasti-eika-opi-virheistaan/7152940>

Patrik Karell

Iltasanomat (with Katja Koskenpato)

20.4.2018; <https://www.is.fi/kotimaa/art-2000005649167.html>

Iltalehti (with Katja Koskenpato)

26.4.2018; <https://www.iltalehti.fi/kotimaa/a/201804252200902221>

Västra Nyland (with Ruslan Gunko)

5.10.2018; <https://www.vastranyland.fi/artikel/satt-betyg-pa-din-narmiljo/>

Svenska Yle (with Ruslan Gunko)

12.11.2018; <https://svenska.yle.fi/artikel/2018/11/12/vad-tycker-du-som-ar-man-ung-eller-finsktalande-om-livskvaliteten-i-raseborg>

Research and Development in Bioeconomy at Novia University of Applied Sciences

Marianne Fred

Bioeconomy is one of five focal areas of Research and Development at Novia UAS. We have the unique opportunity to combine applied projects with fundamental research-projects thanks to the Novia research team in Bioeconomy and the R&D focal area in Bioeconomy. Because of this Bioeconomy is currently the largest of the five focal areas at Novia UAS with a total project portfolio of 8.5 Meuros and 28 projects in 2018.

In our focal area of Bioeconomy we are continuing to work towards long-term goals. As an exercise, I decided to have a look at the UN Sustainable Development Goals (SDG) to see how we fall into them. I could place our research- and development projects and activities into SDG's like:

12. Responsible Consumption and Production;

Sustainable production and consumption can be identified by, among other things, its innate circularity in terms of resource use. The term "local economy" means that local entrepreneurs offer goods and services and money stays in the local community. Responsibility in consumption and production build on transparency and trust. For goods and services that cannot be locally produced responsibility and sustainability are equally important. Responsible production hence builds on the cooperation between networks of responsible producers world-wide hand in hand with local economies. We work for a living rural countryside and the establishment of responsible local economies particularly around food-systems and the hospitality sector. Our projects Kustens Mat, Matregion Nyland, St Olav Waterway, Bioekonomi i Västnyland and Smart Marina are examples of projects where the development and awareness of local economies is supported.



13 Climate Action;

Responsible production and consumption is key for taking climate action! Within our hospitality projects Smart Marina and St Olav Waterway we work with developing tourism with a small carbon footprint and lasting personal experiences.

Increasing the level of processing of virgin resources in a responsible, transparent way as part of a local economy also increases the opportunities of developing climate-smart methods and processes. We work with increasing the level of processing in the timber-industry in projects such as Bioekonomi i Västnyland and Smart med Skärgårdsvirke.

Increasing the level of circularity in different systems is Climate Action as well. The national project Kiertotalous - Cirkulärekonomi where most Finnish applied Universities work together on shared education in circular economy is an example of taking climate action by increasing knowledge.

14. Life below Water;

Several research projects work with life below the surface, increasing our knowledge on how it is affected by for instance climate change and reduced salinity. Understanding how cormorants affect local fisheries in the project Storskarvens lokala effekter på fiskstammar i Finska Viken is a way of better understanding how life below the surface affects the possibilities for rural livelihoods today. The applied projects such as Smart Marina work with life below the surface in a more hands-on way by increasing the number of harbors with waste management for small boats. Smart Marina works with an overall increase of the level of sustainability by raising environmental standards in harbors to reach levels where sustainability certification such as Blue Flag can be implemented.

Fokusområdet i Bioekonomi vid YH Novia jobbar med såväl forskning som utveckling tillsammans med forskarteamet i Bioekonomi. Tack vare samarbetet uppgick den externa finansieringen i projekt-portföljen för fokusområdet i Bioekonomi till 8.5 miljoner euro och allt om allt 28 projekt år 2018.

För att nämna några få projekt jobbar vi med att utveckla livsmedelssystem där den unika prägel för vårt landskap kommer fram, att hitta våra styrkor inom området Bioekonomi och jobba fram en strategi, samt ökad hållbarhet inom besöksnäringen både i småbåtshamnar och som del av en Nordisk Pilgrimsled. Ledord för vårt arbete är samarbete, lokal ekonomi, hållbarhet, transparens och ansvar. Just nu jobbar vi full fart på de sista åren i denna EU-programperiod medan vi redan lite snusar på den kommande programperioden. Med ambitionen att vara en högskola med stark forskning och utveckling som jobbar i regionerna med relevanta frågor tillsammans med andra för en hållbar framtid.

15. Life on Land

Increasing the use of heirloom species in agriculture be it plants or animals, affects the life on land as well as below water. Heirloom species of grain for instance do not require artificial fertilizers to grow since they firstly do not need as much nutrients to grow and secondly have very deep root systems and hence can utilize nutrients deep in the soil for growth. Heirloom breeds of livestock similarly can utilize unfertilized natural grasslands or forests for sustenance producing meat of high quality and small ecological footprint. Grazing of semi-natural grasslands is one of the most important actions to take to maintain biodiversity in agricultural landscapes in Europe today. Matregion Nyland works with local produce and increasing the uniqueness of a produce as well as enhancing its terroir.

17. Partnership for the goals.

Partnering up with other organisations is the bread and butter of project-based developmental work today. Typical of the projects we run at the focal area of Bioeconomy is that each projects has several partners and many have Nordic and international partners as well. Finding other organisations with similar goals and values and finding solutions to shared question is possibly the most rewarding part of project life! The key to finding any solution is to work on it together with others.

Overall, I think we are on the right track. Improvement is always possible and even small steps towards it are valuable. We are running full speed ahead for these last years of financing within the current EU-program period whilst looking forward to making improvements to the new one. I hope you will enjoy reading about the projects we have been working on in 2018.

Sincerely,
Marianne Fred
Head of R&D in Bioeconomy
Forskningsledare i Bioekonomi

Food Artisan Products – new products with local identity

Ann-Louise Erlund

The purpose of the Food of the Coast project 2016-2018 was to introduce the concept of Food Craftsmanship to entrepreneurs as well as to customers in Finland. The concept means a new kind of entrepreneurship, which demands new knowledge but means new possibilities in rural and urban areas and alternative products for customers interested of small scale products. The introduction of the concept went through with arranging courses within Food Craftsmanship and the Open Finnish Championships in Food Craftsmanship.

The concept of Food Craftsmanship means: Through Food Craftsmanship unique products is created containing rich flavors and distinct identities, where their manufacture takes place through the gentle processing of mainly local produce. Food Craftsmanship preserves, develops and reveals local food culture and the wealth of knowledge contained therein.

The two courses (1½ year each) within Food Craftsmanship were organized twice in regional cooperation between organizations from Ostrobothnia, Turku Archipelago and the Aland Islands and all together 83 Food artisans from the regions attended the courses.

The Open Finnish Championships in Food Craftsmanship were organizing in Raseborg on Finland's south coast and Novia was the organizer through the Food of the Coast project. During the Championships, the focus is on judging the products but also seminars, field trips and other programs that attract and unite enthusiasts in Food Craftsmanship were organized. About 140

Food artisan businesses sent about 400 products for judging by Food Craftsmanship experts within different categories.

One of the remarkable results of the project was the establishment of the Food artisan association Mathantverk i Finland rf – Suomen Artesaaniruokary in 2017. In coming years the association will be the main actor together with a regional co-worker to organize Championships to come. The association will certainly expand during coming years, to a national network with good knowledge about Food Craftsmanship. The association has an important task in bringing together Food artisan entrepreneurs in Finland and motivating and inspiring them to develop their businesses. Consumers' awareness about artisan food products increases through the competition and the winning products.



Photos: Martina Österberg and Eva Tordera Nuno

Åland och Österbotten under åren 2016 – 2018. Projektets målsättning var att introducera begreppet Mathantverk i Finland. Projektet ordnade bl.a. två mathantverksutbildningar, FM i mathantverk tre gånger och årliga regionala Mathantverksdagar. För att garantera Mathantverkets framtid i Finland har det under projektets gång grundats en förening; Mathantverk i Finland rf – Suomen Artesaani-ruokary. Föreningen kommer att vara en central aktör för att bevaka mathantverkarnas intresse i olika frågor samt kommer att samarbeta med arrangörer av utbildning och FM i mathantverk.

Matregion Nyland – Ruokamaakunta Uusimaa

Samuel Pettersson

The latest food project in R&D Bioeconomy at Novia commenced in August 2018. It is a three year project designed to create a long-term strategy for a sustainable and growing food system in the region of Uusimaa. Thus improving the overall production of food originated from Uusimaa, original produce as well as refined in restaurants, catering and hotel enterprises and last but not least by artisan food entrepreneurs. The scope is broad and the horizon is wide!

The first four months of the project has been a time of getting to know the key stakeholders in the food system in Uusimaa as well as smallholders of all sorts and food artisans, mostly along the coast. The forming of networks is key to the process and there are many contacts to be “inherited” from the other food projects in R&D Bioeconomy at Novia.

The project has close connections to the Food of the Coast project and therefore I had the opportunity to participate in the artisan food students visit to Lombardy in October. A truly genuine and enriching experience to see how small businesses and artisan food entrepreneurs can thrive in a competitive market through top class products and with a consistent marketing strategy on social media and other platforms. Definitely examples to be inspired by. The Food of the Coast projects final two day seminar for the Artisan Food education at Fiskars Village with the tour of the beverage producers Ägräs, Kuura Cider and Fiskars Brewery was also a very important get together.

The project was also present with an information desk at the Slow Food Festival at



Samuel Pettersson and Anna Alm in her Einkorn field at Mörby gård

Fiskars Village in October and at the Nyländsk Bondedag (Swedish speaking Farmers Day) in November. One of the more interesting fields in the projects near future is public meals, mainly focusing on school meals and meals for the



Ägräs Distillery

elderly. Thus came the seminar on Finnish free school meals celebrating 70 years very timely in early December at Hanaholmen Cultural Center. Johan Andersson, from Jämtland in Sweden, was one of the keynote speakers also featured at the Slow Food festival this year. The two day event on nature produce in Turku was also an eye opener to the rich variety of products from mother Natures own larder that Finland is blessed with.

Projektet Matregion Nylan – Ruokamaakunta Uusimaa är ett treårigt projekt ägnat att utveckla en strategi för ett långsiktigt hållbart livsmedelssystem som lyfter och tar tillvara kunskande och kvalitet bland nyländska livsmedels- och matproducenter. Offentlig gastronomi är en viktig del i projektet liksom att uppmuntra till breda och innovativa samarbeten mellan olika aktörer i livsmedelskedjan.



LANDSBYGD 2020



Europeiska jordbruksfonden för landsbygdsutveckling: Europa investerar i landsbygdsområden

St Olav Waterway

Anna Karin Abrahamsson

The aim of the St Olav Waterway - project is to create a new cultural pilgrims trail from Finland (Turku) via the archipelago to the Åland Islands and Hudiksvall in Sweden. The route will be incorporated into other St Olav routes in Sweden on the way to its final destination Trondheim/Nidaros in Norway. The new route is unique, it is the only pilgrim trail that also includes waterways.

St Olav Waterway is named after a Norwegian saint. Sankt Olav used to be one of the most important Nordic saints and a unifying force between countries. Nidaros was one of Northern Europe's most significant pilgrimage site for 500 years. In the Middle Ages pilgrims would commemorate Sankt Olav by travelling from Novgorod to Nidaros.

The project St Olav Waterway started in 2016. The hiking route is 625 km long, provided with signposts and finalized in time for the Official Opening on Friday, May 24.2019. In December 2018, St Olav Waterway was awarded a certificate as an official Olav way in the Nordic countries by the Association for the Cultural Route of St. Olav Ways.

The Official Opening will take place in the form of an international seminar the afternoon of May 24, 2019 at Novia University of Applied Sciences in Turku. That same night a Vesper (Evening Prayer) will be arranged in Turku Cathedral at 18.00. Information and program can be found here: <https://stolavwaterway.com/en/eventcalendar/opening-seminar-and-the-premier-tour/>

On Saturday, May 25, the Opening Hike of St Olav Waterway will start from Turku Cathedral at 10:00. This hiking relay will be used to convey a message from the Bishop

of Turku to the Bishop of Trondheim. The relay is open to the general public. Hikers can choose the segments they will participate in.

Students from Novia University of Applied Sciences work with different assignments in close cooperation with the St Olav Waterway-project. The students are being supervised by appointed teachers and the work is carried out with the local entrepreneurs as clients. During 2018 students have been working with e.g. accessibility questions on the trail and the official opening seminar.

Målsättningen med projektet St Olav Waterway är att skapa en ny rutt, en S:t Olavsled, från Åbo i Finland genom skärgården och Kökar, Sottunga och fasta Åland till Grisslehamn i Sverige och därifrån norrut för att bindas samman med tidigare framtagna S:t Olavsleder i Sverige och Norge. Denna nya led skulle bli den första pilgrimsleden som också kommer att dras över stora områden hav och skärgård, den blir därför unik i världen. Ett av projektets huvudmål är att öka besökarnas antal under lågsäsong dvs. från april-juni och augusti-oktober.



Internationalisation, improved quality, marketing results

Niklas Andersson

During the fourth project year we worked with keeping the established quality improvement and marketing concepts rolling and measuring results. This year's new focus was at the same time the project's last focus area, international contacts and internationalization at Campus Raseborg. The development project "Pro Naturbruk" started in 2014 and will continue to 2019.

Evaluating results from the quality processes

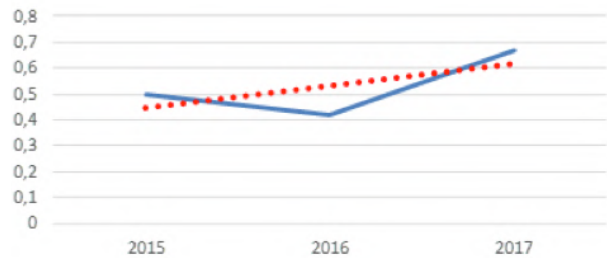
Staff and students have annually provided feedback on the past year and initiatives for improvement. This feedback is valuable to evaluate the work we have done during the project. Generally, we can see a trend of more positive feedback during the years. Quality can of course be measured in many ways, and we have also looked into performance indicators. For the students studying forestry and agriculture, the performance has risen during the project. This is a result of resources that the project has provided, and more importantly, a result of a dedicated teaching staff that have worked with the students to instruct and help them to do better.



Teaching visit to Habari Maalum College in Tanzania

Results from the marketing concept

While the general performance from the students has gone up during the recent years, one other interesting and important indicator to follow are the marketing results. Since the bases for all performance are motivated students and staff, we of course need to have enough applications to our programs. In 2014 we established a

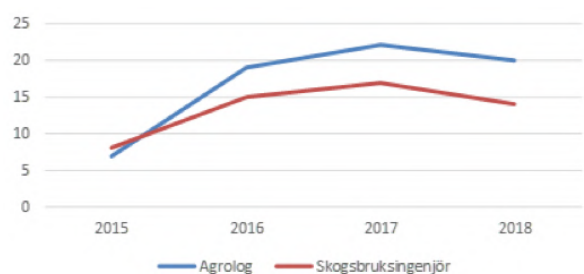


The performance of annual 55 study-points by students studying agriculture and forestry during the years 2015 - 2017 marketing concept that we have followed through the years. In 2016 we launched a separate campaign for the secondary schools, and we have visited most of the Swedish speaking secondary schools since that. With this campaign we have provided lectures and information about the bio-economy sector for classes and a competition for the students.

The key performance indicator for all the marketing efforts has been the number of applicants in the annual application process. During the project we have been able to increase the number of applicants.

Teaching personnel in R&D - projects

One aim with the project has been to increase the exchange between R&D-projects and our students. The method we chose to do this, was to engage the teaching



Applications to agrology- and forestry studies at Campus Raseborg 2015 - 2018

personnel in R&D-projects and start applying for funding new projects where this could easily happen. By 2018, every person in the bioeconomy teaching staff had a role in at least one project. This has led to on one hand the possibility for the teaching staff to engage in interesting development processes and on the other hand possibilities for students to do practical training and final reports in real projects. By the end of 2018 we had increased the total external funding budget with 400 000 euros in new projects initiated by Pro Naturbruk.

International contacts and future prospects

The year 2018 focus was on working with internationalizations. During the project we have been able to fund international study tours for students and staff. This year we were able to achieve a signed memorandum of understanding with Visayas State University. We visited SLU Alnarp in Malmö, Sweden and Lleida University in Spain for discussions of cooperation. There are a lot of possibilities for exchange with SLU, and the information gathered on these meetings will be valuable for future collaboration.

Another international highlight of the year 2018 was Patrik Byholm and Niklas Andersson teaching a course in Natural Resources Management at Habari Maalum

College in Arusha, Tanzania, as a staff education project. This project was funded by the Ministry of Foreign Affairs in Finland, and provided a possibility to share some of our knowledge in sustainable management of natural resources with the world. Habari Maalum College wants to develop a new curriculum in NRM for professionals in Tanzania.

Pro Naturbruk is financed by Finlands-svenska Jordfonden, Konst-samfundet and Utbildningsstiftelsen Sydväst.

Pro Naturbruk är ett femårigt projekt med finansiering från Finlandssvenska Jordfonden, Konstsamfundet och Utbildningsstiftelsen Sydväst. Ett av målen i projektet är att engagera undervisande personal i forsknings- och utvecklingsprojekt. År 2018 var samtlig utbildande personal inom bioekonomi engagerad i åtminstone ett FoU-projekt. Engagemanget i FoU verksamhet ger möjligheter för den utbildande personalen att fortbilda sej i arbetet, nätverka och få delta i ny utveckling. För studerande betyder engagemang inom FoU-projekt uppslag till examensarbeten och nätverkande på fältet. Vid slutet av 2018 hade Pro Naturbruk medverkat till en ökning av extern finansiering på 400 000 euro sedan projektet började.



Agriculture students attending a technical course in cooperation with Optima

Stora Komet: Enhancing Career Management Skills and thinking about the future

Nina Hillo, Taina Sjöholm

Stora Komet 1.3.2016 - 28.2.2019, a project that focused on facilitating the transition from one phase of life to another.

We worked with Swedish-speaking young people in the Helsinki-Uusimaa region and with their teachers, counsellors and career helpers. Transitions (school-to-school, school to work, military service to school/work) are often critical in the lives of young people and they need guidance to make transitions smooth.

Novia University of Applied Sciences was the project owner and the third sector actor Luckan was partner in the project. The European Social Fund funded Stora Komet. The project cooperated with Arcada University of Applied Sciences and vocational schools like Axxell and Prakticum and others interested in the future and in guidance. An interesting cooperator was also Nyland Brigad with lots of young people pondering about their future. Dana Björkström-Jung led the project.

We gave career guidance visibility. Part of our material came from collaboration with the Institute for Future Research at the University of Turku. Important was to find out what other actors had done in the field of guidance. The aim was to make these actors, their models and methods visible and accessible besides developing own methods and tools.

The project ended in February 2019 and we have now spread the results in various ways. The easiest way for you to find out what the project worked with is to investigate the projects website (link to <http://novia.fi/storakomet>) with loads of different future guidance tools, exercises, infographics and workbooks. The newest workbook is one describing how we developed a process for individual study planning that includes career management. We call it the HUPS-

process. Other results are that we have smoother recognition of previous learning. We also have easily available information about the possibilities to take UAS courses during the end of vocational studies. We have met teachers, counsellors, students, unemployed, young men and women doing military service and provided them with information, experiences, guidance and in-service training in future guidance combined with positive psychology. We created three different courses during the project. One was a summer course in future guidance for counsellors. We tested it at Hangö Sommaruni. One was a course in career planning for Nylands Brigad. The last one we developed was an online course in life management, relaxation and stress management. All the courses are available for reuse and development.

Next step? We can clearly say that there is still a lot of work to do in the field of future guidance. There is a clear need for (digi?)education of Swedish speaking counsellors. We could see during the project that the theory based counselling knowledge is not yet on a satisfying level among

Stora Komet arbetade 1.3.2016-28.2.2019 med att göra övergångarna mellan olika utbildningsstadium smidigare och utveckla och synliggöra olika typer av vägledningstjänster och verktyg. I vår värld av ständiga förändringar behöver vi skaffa oss nya kompetenser för att kunna möta framtidens arbetsliv. För det behövs fram-tidsvägledning. Kärnan i Stora Komet var framtidsvägledning. För mera information se <https://www.novia.fi/storakomet>

counsellors and teachers. We also experienced that the cooperation between especially counsellors but also teachers could be better and that thinking together about possible futures should be on the agenda more often. We clearly need to stop thinking in terms of "my corner" and "yours" and cooperate inter-disciplinarily and over language borders and branches of industry. The future will show if there will be new projects - new parties!

Hävkraft från EU 2014-2020



Europeiska unionen
Europeiska socialfonden



Smart Marina - Contemporary harbours with soft energy technology

Rasmus Karlsson

The Smart Marina project is aiming to improve services in 32 guest harbours spread across the Central Baltic Sea. We will promote the use of energy efficient technologies in the harbours as well as implement sustainable solutions to comply with the standards of environmental certificates for guest harbours. Safety will be improved by educating harbour staff and investing in safety equipment. Seminars on different aspects of marketing will be held and an application for harbour services developed.

The core of the project are the guest harbours, of which the seven harbours in Finland, excluding Åland islands, are co-ordinated by Novia. The Finnish harbours' focus of investment will be renovation and renewal of jetties at the end of their life-cycle. The harbour visitors increasing demand for better services will also be met by investing in new service buildings offering sauna, showers and facilities for doing laundry. Additionally, investments will be made to improve waste recycling and installing water purification plants to provide seafarers (and other harbour visitors) with fresh water.

The first year of the project, beginning in February 2018, was set to be challenging right from the start. It was no surprise that a project of this scale, different from any other project on Novia in the past, would require a lot of research into how to administrate the project efficiently and correctly. After a lot of coordination and co-operation between the administration and the project management, pieces slowly fell in to place, and by the end of the year we were ready to make the first investments in a few harbours. Old jetties in poor condition were replaced by new ones on Stenskär, Nagu and Lillbacka brygga, Högsåra.

An important aspect of the project is getting the harbours together to learn from each other. Besides visiting other harbours in the project, the participating harbour operators will also have the opportunity to make study

visits to harbours with high standards, already awarded with the Blue Flag or Blue Star Marina certificate. On our first trip we visited the Netherlands in the autumn of 2018. On the next one we will head to Denmark during the spring of 2019.

The project agenda is packed with different aims and goals and it will be a busy three years to manage to accomplish everything. We got off to a good start the first eleven months, but 2019 will be crucial to get every aspect of the project running.

32 gästhamnar i centrala Östersjön har fått finansiering för att utveckla servicen genom att investera i ny infrastruktur i hamnen. Novia fungerar som koordinator för de finska hamnarna i projektet. Vi har inte drivit ett liknande projekt tidigare och stora administrativa utmaningar var att vänta. I slutet av 2018 började bitarna slutligen falla på plats och de första investeringarna kunde genomföras.



Digitalisaatiolla luonnonvarat biotalouteen - DLB

Romi Rancken

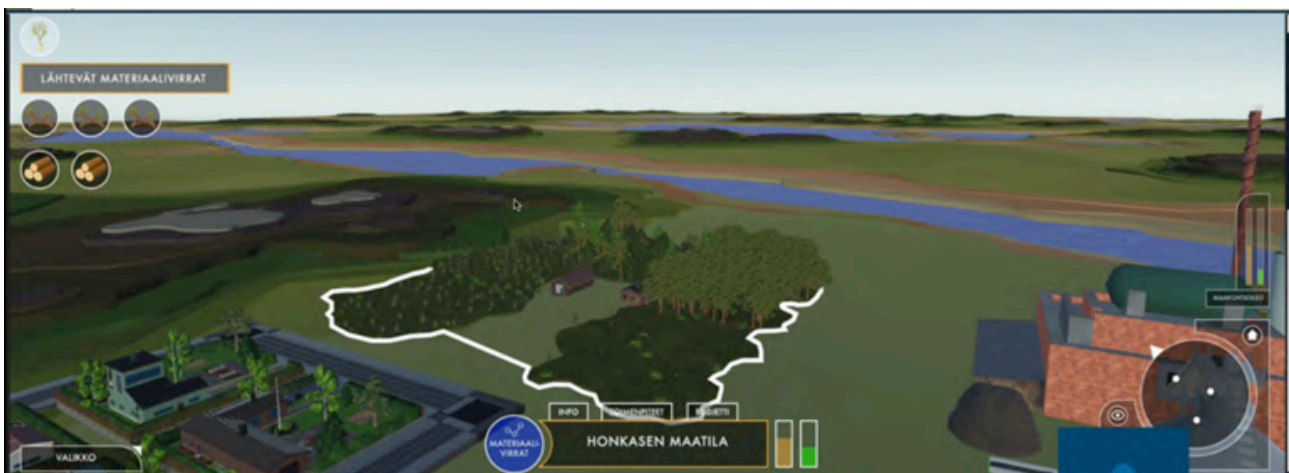
From natural resources to bioeconomy through digitalization

The Ministry of Education and culture gave universities of applied sciences a number of grants for so-called key projects in the year 2017. One grant of 1,7 million € was awarded a consortium of 11 universities for a three year long project with the goal to strengthen digitalization in the Finnish bioeconomy education. Novia is one of the partners in the consortium, which consists of all the universities of applied science offering education within the bioeconomy sector.

The most visible product of the project will be a bioeconomy game. The computer-based game can be used as a pedagogical aid in many courses in the curricula for forestry, agronomy, landscape planning and other students within the bioeconomy sector. The game will give the students a possibility to practice decision-making and to experience the economic and ecological consequences of their decisions in a safe environment. Lapland UAS is in charge of the technical development of the game, but the content is produced collaboratively by dozens of teachers from the universities involved in the project.

Another central part of the project consists of the production of a number of web-based courses covering themes like bioenergy, production of protein-rich plants and circular bioeconomy. Novia has organized two GIS courses, 5 credits each. The courses follow the recently published quality criteria for web-based courses and have received very positive feedback from the participants.

DLB-projektet är ett treårigt spetsprojekt finansierat av UKM. Huvudmålsättningen är att stöda den digitala utvecklingen av undervisningen i bioekonomi på YH-nivå. Det här ska uppnås bland annat genom att utveckla ett bioekonomispel som ska stöda undervisningen i olika ämnen och överbrygga ämnes- och yrkesgränserna. Vidare utvecklas ett tiotal webbkurser av lärarna i de 11 yrkeshögskolor som är med i projektet. Novia har ordnat två av kurserna, temat för dem har varit GIS inom bioekonomin och undervisningsspråket har varit engelska.



A beta version of the Bioeconomy game.

Bondenyttan

Paul Riesinger

Praktisk samverkan bidrar till ett hållbart jordbruk

Bondenyttan startades våren 2018 vid agrologutbildningen på Yrkeshögskolan Novia i Raseborg. Bondenyttan finansieras av Svenska Småbruk och Egna Hem, Finlandssvenska Jordfonden. Ansvarig för Bondenyttan är AFD Paul Riesinger, lektor i växtodling vid YH Novia.

Bondenyttan utgår från ett samarbete mellan i regionen verksamma lantbruksföretagare och agrologutbildningen vid YH Novia. Detta samarbete har följande syften:

1. Innehållsmässigt syftar samarbetet till att höja skördenivåerna. Skördebegränsande faktorer identifieras och olika åtgärdsalternativ undersöks på gårdsnivå i form av fältförsök samt på Västankvarn försöksgård i form av småruteförsök. Lärdomarna från undersökningarna och försöken skall göras tillgängligt genom fältstigar, studiebesök, seminarier, föredrag och publikationer.
2. I samarbetet mellan Lantbrukare, agrologstuderande och lärare tillämpas nya utbildningskoncept: För lantbrukarnas del skall det deltagardrivna arbetet utgå från de medverkande lantbrukarnas behov och intressen, med avseende på studerande och lärare skall arbetet bidra till en praxisinriktad

och mångsidig, och därmed en inspirerande och aktiverande utbildningsmiljö.

3. Försöken planeras, utförs och utvärderas i samarbete mellan agrologutbildningen, en ring av lantbrukare, Västankvarn gård, Västankvarn försöksgård och lantbruksrådgivningen (NSL). Bondenyttan drar nytta av och understöder ett redan befintligt naturbrukskluster.

4. Vid sidan om kunskapsnyttan, den pedagogiska nyttan och samarbetsnyttan resulterar projektet Bondenyttan i positiva sociala effekter. Lantbrukare och agrologstuderande involveras såväl fackligt som socialt i ett samarbete och bekräftas således i sin yrkesroll.

Under odlings säsongen 2018 utfördes tre projekt:

1. Förutsättningar för odling av lusern (Mårten Holmberg)
2. Fånggrödor i ärt (Erik Perklén)
3. Radhackning i stråsäd (Mathias Weckström)

I samtliga projekt deltog agrologstuderande, med målet att med utgångspunkt i respektive projekt utföra sitt examensarbete.



Markkartering hos Mårten Holmberg, Karis.

Smart med skärgårdsvirke

Johnny Sved

Smart med skärgårdsvirke is a development project in Uusimaa. The local forest owner's association Södra skogsreviret is lead partner in the project and Novia is assisting partner. The project's main goals are to increase the interest in timber from the archipelago among local timber processing industry and to find logistical solutions for wood harvesting in the archipelago

Regional use of timber

We have interviewed small scale timber processing industry in the region to find out their interest in and attitudes towards timber origination from the archipelago. In the interviews we try to find out whether the companies think they can benefit from timber from the archipelago in their marketing. We also ask about production volumes, quality requirements on the timber they procure and how they plan to develop their companies in the near future.

Energy wood and logistics

Ms Jasmin Winqvist made her bachelor thesis on the procurement of branches and tops for energy wood in timber harvesting on the islands in Raseborg. Winqvist described logistical alternatives and compared the costs for different ways of handling the energy wood. She also interviewed landowners to find out how they would like the logging residuals (branches and tops) to be handled if they would harvest timber on their land. Winqvist found that some of the landowners have an interest to buy services to increase the recreational values after timber harvesting, hence it would be possible to procure energy wood from the archipelago.

New products for the construction industry

One of the findings in the project is that vast amounts of principally high-quality timber is lost due to the quality requirements from the sawmilling industry. The minimum length of sawlogs is today 43 dm. This requirement is often hard to meet on timber from the islands and good sawlogs are for this reason degraded to pulpwood of lower value. New

engineered wood products like CLT (Cross Laminated Timber) can possibly bring a change to the minimum length requirement. The standard height on CLT-elements is only 34 dm and this opens a possibility to utilize logs from the archipelago in products of higher value. Ms Wilma Lapiolahti made her bachelor thesis on the use of CLT elements.



Smart med skärgårdsvirke är ett utvecklingsprojekt som drivs i samarbete mellan Yrkeshögskolan Novia och Södra skogsreviret r.f. De centrala målen i projektet är att höja intresset för virke från skärgården och undersöka logistiska lösningar för virkesanskaffning i skärgården. En ny möjlighet att förädla för skärgården typiska korta stockar kan öppnas i och med att byggsektorn tar i bruk nya produkter. CLT, cross laminated timber, är byggsivor som består av korslimmade plankor och som kan förädlas till byggnadselement. I och med att standardhöjden på dessa skivor är 34 dm kunde det öppna en möjlighet att få ett högre förädlingsvärde ur virke från skärgården.

Bioeconomy in Western Uusimaa II

Klaus Yrjönen

Bioeconomy strives for an economic growth which is based on sustainable use of renewable resources. Potential of growth based on bioeconomy in the region of Western Uusimaa was identified in the six month preparatory project, Bioeconomy in Western Uusimaa I.

The current project started in August 2017 and continues to end of July 2019. The project is financed by regional EU-funding, cities and municipalities and Novia. There are two main objectives for the project. The first is to promote the small and medium scale private bioeconomy business in the region and the second objective is to build up a bioeconomy strategi for the region together with the other stakeholders. The bioeconomy business is promoted by various means as workshops, seminars and study visits. The project actively utilizes existing networks and also creates new ones in order to broaden the base for co-operation among businesses. The focus of the work is at bioeconomy themes that was defined in the preparatory part of the project: Bioenergy, nature tourism, local production and processing of agricultural product, processing of forest raw materials and water protection. The project co-operates broadly with other development projects, Novia education and associations



as well as municipalities and businesses in the region. The work with bioeconomy strategy for the region will support the continuation of development based on bioeconomy in the future.

The project arranged or participated in arrangement of following seminars during 2018: Fire Safety in wooden houses, Bio-packaging of food, Green Care (two seminars) and Eat as a King (local food and tourism). Preparation of bioeconomy strategy for the region started by the thematic working groups and the strategy will be finalized during the spring 2019 in an interactive process with the stakeholders in the region.

Projektet boekonomi I Västnyland II började I augusti 2017 och avslutas i juli 2019. Projektets mål är att stöda regionens företag i bioekonomi branschen samt att utarbeta en bioekonomisk strategi för regionen. Projektet fokus ligger på de valda ämnesområdena: Bioenergi, naturturism, förädling av lokala naturprodukter (närmät), träförädling och byggande i trä samt vatten och vattenvård. Projektet ordnade 2018 bl.a. följande evenemang: Bioförpackningar för närmät, två Green Care-seminarier, studiebesök med trähus byggande som tema. Strategiarbete påbörjades under 2018 och ska slutföras våren 2019 i en interaktiv process med regionens aktörer.



Europeiska jordbruksfonden för landsbygdsutveckling: Europa investerar i landsbygdsområden



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