NOVIA
UNIVERSITY OF APPLIED SCIENCES

RESEARCH & DEVELOPMENT 2022

Novia UAS Faculty of Bioeconomy

Ruslan Gunko (edit), Novia University of Applied Sciences Research & Development Report 2022. Faculty of Bioeconomy

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Systemic Transformation to Build Resilience

We specialise in making the world a better place, by finding regenerative approaches within bioeconomy.

Natural resources are the foundation of human society, well-being, and sustainability. Natural resource management is non-negotiable and a generational priority.

Finding solutions based on facts, sharing processes, and society engagement are just some of the building blocks of RDI in Bioeconomy and Sustainable Use of Natural Resources at Novia University of Applied Sciences. Our core tools are cemented within collaboration, networking, and the co-creation of knowledge.

Our goals and achievements are materialised within projects of many sizes, with custom curated courses for a wide range of professions, life-stages, and ambitions. Cooperational and cross-disciplinary projects give us exceptional opportunities to tackle dynamic problems, to implement and apply science, and extract knowledge through grassroot activities - injecting new knowledge right back into the foundations of the field.

We believe this is the best place to begin the transformation and we would love to do it in collaboration with you!

Our core expertise

SPATIAL PLANNING

Using GIS-tools to combine natural sciences with society and humanities in order to gain new perspectives.

ECOSYSTEM SERVICES

Coastal areas, where marine and rural systems meet, are at the heart of our research and development.

LOCAL ECONOMY

Returning revenue back into the local societies builds resilience and rural livelihoods.

FOOD SYSTEMS

Food systems, including regenerative agriculture, direct sales, and artisanal processing are the foundations for the alternative systems we are developing.

FOREST MANAGEMENT

Based on knowledge from social and ecological systems enhance long-term sustainability.

ENERGY SUPPLIES

Fair and available energy supplies rely on cross-sectoral knowledge to succeed.

Our prioritised

SUSTAINABLE DEVELOPMENT GOALS

Open Science

Bioeconomy and Sustainable Use of Natural Resources

Coasts are more than just where the sea and land meet, they are gradients, meeting points, and even melting pots. At the Faculty of Bioeconomy, coasts have been the common ground for RDI and education since the birth of Novia UAS, in 2009.

Coastal areas worldwide are special in many respects. Coastal communities are rich in biodiversity and are continuously influenced by the proximity of land and water. Entrepreneurship, flexibility, knowledge, contacts, and communication are the central building blocks for flourishing communities, as well as for transformation towards sustainability.

We aim to create systematic change towards resilient and regenerative coastal areas by co-creating knowledge and communication, whilst working in collaboration with local communities, all over the world.

For further information, please contact
Research Manager PhD Marianne Fred
marianne.fred@novia.fi

Novia RDI Project Portfolio 2022

- Bioeconomy and Sustainable use of Natural Resources
- Sustainable Energy Technology
- Automation and Maritime Simulation
- Interprofessional Health and Welfare
- Business Development
- Arts, Culture and Entrepreneurship

Research, development and innovation at the Faculty for Bioeconomy

Marianne Fred

Transitions is the word that comes to mind thinking about 2022.

Moving from one state to another, changing shape, moving place, in transit, underway. The planet is undergoing change at an accelerating pace, wars are fought, climate is shifting, pandemics arise. Not only people are in transit without an idea of where they will eventually end up, but large numbers of non-human species are also in transit, and some have seized to exist because there was nowhere to go. There needs to be a transition from fossil fuels to renewable fuels, from animal protein to plant protein, from virgin resources to upcycled resources. A whole lot must change from today. Not a very uplifting scenario, right?

In fact, these crises have also led to positive changes. Being alerted to crises really leads to change. However, our mindset might not be tuned in to positive vibes. Some experts say the big challenge now is for us to set our mind towards the positive, towards seeing and imagining positive futures. If we do not succeed in making space in our minds for positive futures we will be stuck in reverse, which in the case of moving into the future is counterproductive. Futures science is all about making futures happen, and how that takes place. Futures researchers say there are weak signals of futures already present today. This to me seems immensely exciting! In our everyday lives, a whole palette of possible futures are making themselves known through weak signals that are there for us to discover. Furthermore, imagining

these good futures are the first step to them happening! If this seems a bit too rosy coloured, bringing the whole concept down to earth, it simply means we can begin to make conscious changes when we have explicitly formulated and verbalized where we would like to end up. A well-known coach used the metaphor of getting into a taxi and telling the driver about all the places where you did not want to go. This was not going to be a very useful strategy for getting where you wanted to go. Same with futures, we need to say where we want to go! I think we need to be bold and brave, saying where we want to go. Put up an umbrella against negative comments that will rain down on us, wear our gumboots to wade through cynicism and be prepared with those sunglasses when the sun starts shining!

Project wise there have been more projects rounding up in 2022 than new ones starting in the faculty of Bioeconomy. This too has to do with transitions to some extent. We are currently moving from one EU-programme period to the next. We have been focusing on making a missions-based roadmap together. The process has been to find our common strengths and to formulate where our focus lies. Our common great goal is Systemic transformation for sustainability and our mission is Supporting transformation by implementing regenerative approaches in order to improve resilience. Without really thinking in terms of futures, we have taken our first steps into them by formulating what we think is important and what we are doing. Maybe we have even managed to hear some weak signals about the futures ahead.

I hope you enjoy reading about our activities and projects and that they give you some good vibes for the futures :)

MARIANNE FRED

Spatial Conservation Prioritisation: protecting birds from wind energy expansion

Fabio Balotari-Chiebao and Patrik Byholm

We study the distribution and vulnerability of birds in relation to wind energy in Finland. We combine long-term, georeferenced data on birds with wind energy distribution to address a number of questions for the future conservation of birds. One of our aims is to reduce conflicts between birds and wind energy by identifying high-priority areas for bird conservation, that is, areas inhabited by species or species assemblages that are known to be vulnerable to wind energy, and that should ideally be spared from wind energy development. In parallel, we study and aim to quantify the land impacts of wind turbines and associated infrastructure.

Highlights of the year

In 2022, we published a study in *Biological Conservation* – a leading journal in the field of Conservation Biology. The study, which focused on 214 Finnish bird species and existing and planned wind farms, was entitled "Wind energy expansion and birds: identifying priority areas for impact avoidance at a national level". To identify priority areas for bird conservation, that is, areas inhabited by species particularly vulnerable to wind energy, we used a Spatial Conservation Prioritisation software called Zonation. A main result of this study was the production of so-called priority maps, which display, in grid cells of 10 x 10 km, the relative priority ranks across the country. We showed that Finland's coastal and adjacent areas form a long stretch of high bird priority areas. This unevenness in the distribution of priority areas results in clear differences between regions, meaning that regions harbour species with very different conservation priorities.

By overlaying our main priority map and the national network of protected areas (PAs), we were able to show that only a fraction of high priority areas (e.g., 15% of 10% top priority areas) currently enjoys some level of legal protection. This indicates that the network of PAs is not extensive enough to safeguard species, including threatened

species, that are susceptible to the negative impacts of wind energy. In particular, the west coast, where high bird priority areas and extensive wind energy development co-occur, concentrates areas of potentially high conflict. Thus, the option of focusing conservation action away from areas already extensively targeted by wind energy cannot fulfil the conservation needs of many sensitive species, some of which occur exclusively or mainly in coastal areas. Based

FABIO BALOTARI-CHIEBAO

on this study, our main recommendations are that wind farm construction be avoided in high bird priority areas and that spatial planning be conducted carefully in coastal and potentially high conflict areas. Lastly, Finland, like other countries, will need to expand its network of PAs to meet conservation targets of international initiatives. Our results can contribute to the design and spatial planning of future bird conservation schemes, while addressing the challenges posed to biodiversity conservation by the ongoing energy transition.

In parallel, we started directing our attention to a similar and equally important conservation issue: the land footprint of wind energy. Land-use change is of high concern to researchers and conservationists because it threatens biodiversity worldwide. The construction of a wind farm – with its turbines and associated infrastructure – is accompanied by habitat loss, fragmentation and degradation. In Finland, most wind farms are known to be located in forest environments, but the detailed nature and extent of their land impacts require a proper quantitative assessment. Here, we will carry out a regional assessment focusing on wind farms in Ostrobothnia, one of Finland's regions with greatest wind energy development.

Collaborators

- Sirke Piirainen (University of Helsinki)
- Andrea Santangeli (University of Helsinki & Institute for Mediterranean Studies, Spain)

Vårt arbete tangerar frågor för bevarandet av fåglar och deras livsmiljöer relaterat till den pågående vindenergiutbyggnaden i Finland. I en vetenskaplig studie vi publicerade 2022 visade vi att olika regioner hyser fågelarter med högst olika bevarandeprioriteringar. Finlands kustområden och till dessa angränsande områden utgör de högts prioriterade fågelområdena i landet. De flesta av områden med hög prioritet faller dock utanför det nuvarande nätverket av skyddade områden. I en annan studie håller vi som bäst på att i detalj studera frågor om vindenergins markanvändningseffekter i Österbotten, en av de regioner i Finland med störst vindenergiutbyggnad. Resultaten av denna studie kommer, bland annat, att ge en detaljerad bild av både omfattningen och vilken typ livsmiljöförluster som går förlorade i samband med byggandet av vindkraftsparker i regionen.

Svenska kulturfonden

FABIO BALOTARI-CHIEBAO

Ecology of forest raptors and archipelago birds

Patrik Byholm and Julia Gómez-Catasús

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 and migration ecology, habitat use and factors limiting their distribution to give recommendations for conservation actions.

Highlights of the year

In 2022, we published a study making use of GPS-tracking data amassed since 2011 regarding one of our least known forest raptor species, the European honey buzzard (*Pernis apivorus*). In the paper we present findings on how honey buzzards that were tracked during multiple years negotiate the atmospheric environment and achieve efficiency in the use of wind support to select their routes while migrating between Finland and Africa. In shorth, and in opposite to our expectation that experienced individuals would utilize the best thermal uplift conditions more than inexperienced ones, the analyses showed that experienced and inexperienced birds negotiated winds in roughly the same manner. Wind support was important for birds in all of their migrations. To get better insight into this paradoxical result – why does not birds learn to utilize thermals better as they age – new collaboration to study the ontogeny of migration in European honey buzzards was kicked-off. The new project which is led by Dr. Elham Nourani aims to investigate the role of expertise accumulation in performance of soaring flight and, consequently, migratory performance in in European honey buzzards. As part of the work, 25 young honey buzzards were tagged with GPS-trackers in July-August in southern Finland, all but two birds that were shot in the Mediterranean region made it to the wintering quarters in Sub-Saharan Africa.

Regarding the Caspian tern (*Hydroprogne caspia*), two papers were published in 2022. In the first study, we followed all members of specific tern families (adults and young) on their first outbound migration to the wintering areas using GPS-tracking technology. While it has long been known that Caspian terns migrate in family groups, using this material we were able to show that male parents, not female parents, are the ones that are responsible for migrating together with their young. The bond between parents-young dissipated only on the wintering grounds. During their first solo migration, sub-adult terns remained faithful

PATRIK BYHOLM

Caspian tern fathers are responsible for guiding their offspring during migration, Hattula 2020 (Photo: Petri Hirva).

to routes and stopover sites they took with their parents as young. This shows that in Caspian terns, sex-biased parental care *en route* shapes migration through social learning and provides evidence for cultural inheritance of migration knowledge in a long-distance bird migrant. In the second published paper, we compared wind support achieved by adult and subadult Caspian terns their crossings of the Sahara Desert. There was no difference between age groups in autumn when young were flying with adults, but subadults had lower wind support during their first solo north-ward crossings than did adults. However, this was not related to differences in movement skills between the two age groups, but to differences in timing of the passage. In similar with the study comparing experienced and inexperienced honey buzzards, also this finding calls for future more detailed studies to better understand the evolution and ontogeny of migratory skills in relation to wind patterns in birds.

Finally, we submitted a manuscript for publication where we assessed the effectiveness of predator control as a conservation strategy for breeding seabirds using material collected in 81 Caspian tern colonies during 1990-2021 hosting ca. 85% of the entire Baltic Sea population. We expect the work to be published in 2023, but as a teaser we can reveal the main finding: predator control actions can be effective not only locally, as shown in several previous studies, but may also be shown effective if assessed at the level of whole populations.

A young European honey buzzard just being equipped with a GPS-tracker, Joensuu 2022 Photo: Patrik Byholm.

Collaborators

- Elham Nourani, Hester Brønnvik, Kamran Safi (Max Planck Institute of Animal Behavior & University of Konstanz, Germany)
- Wouter Vansteelant (Estación Biológica de Doñana, Spain)
- Susanne Åkesson, Sara Raj Pant, Cristina Rueda-Uribe (University of Lund, Sweden)
- Natalie Isaksson (University of Islands and Highlands, Scotland)
- Martin Beal (ISPA – Instituto Universitário, Portugal)
- Ulrik Lötberg (BirdLife Sweden, Sweden)
- Torsten Stjernberg, Heikki Lokki (University of Helsinki)
- Antti Below (Finnish Forestry Service)

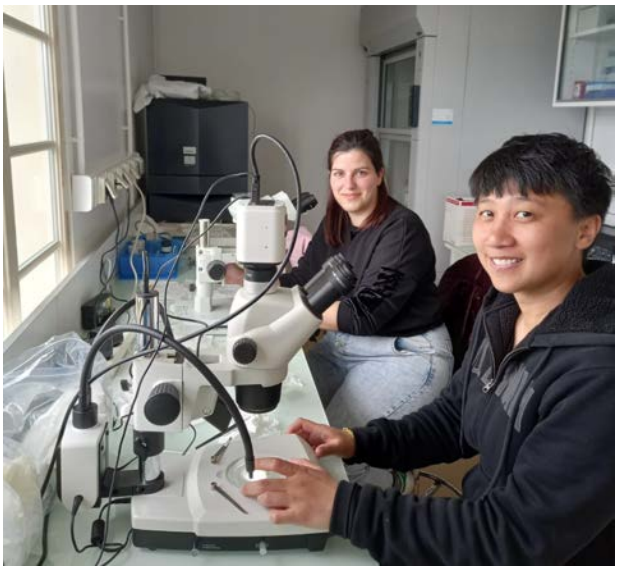
Under 2022 publicerade vi tre vetenskapliga artiklar: i två av dessa undersökte i hur vind och atmosfäriska fenomen i allmänhet inverkar på erfarna och oerfarna flyttfåglars migration under deras färder mellan Finland och Afrika. I motsats till rådande teori och våra förväntningar, dvs. att erfarna individer mera effektivt skulle kunna utnyttja vind än oerfarna, fann vi inga skillnader mellan de båda grupperna. I den tredje artikeln undersökte vi förhållandet mellan skräntärneföräldrar och deras avkomma under deras flyttfärder. Studien visade att det i första hand är fäderna som leder ungarna till övervintringsområdet medan mödrarna sällan är involverade i guidningen. Orsakerna till denna arbetsfördelning är oklar, men klart är att strategin avgörande både för unga tärnors överlevnad och att hjälpa unga tärnor att lära sig rutten under kommande år. I en fjärde undersökning utredde vi effektiviteten av rovdjurskontroll i Östersjöns skräntärnskolonier: material från 1990-2021 i 81 kolonier visade att åtgärder för att tillbakahålla rovdjur kan gagna hela sjöfågelpopulationer.

PATRIK BYHOLM

Climate change and plankton eco-physiology

Jonna Engström-Öst, Kay Feliciano, Nonni Linman, Jinzhu Su, Ella von Weissenberg

The main interest of our research group is to increase the understanding of ecological and eco-physiological responses to climate change in the marine pelagic environment. We use long-term data and work in field and lab using comparative approaches.



Kay and Andriana are checking out the plankton of Tau lagoon.

We participated in a mesocosm experiment *Effects of consecutive heat waves on the resistance, resilience and recovery of marine plankton communities (Heat Waves)* at Sète Marine Station (University of Montpellier), funded by Aquacosm Transnational Access. We studied copepod ecology and eco-physiological responses to heatwaves and elevating temperature in the Tau lagoon, off downtown Sète. The field experiment was conducted in mesocosms by the field station in May 2022. The enclosures were filled with water from the highly oligotrophic Tau lagoon and heatwave simulation was performed twice. Kay Feliciano (Novia) worked as an intern at the station during the whole experiment.

Ella von Weissenberg and co-authors published two papers in 2022, one in *Ecology and Evolution* and another in *Frontiers in Marine Science* on warming and salinity effects on plankton reproduction and stress levels, with data collected in the field and in a laboratory setting. The main aim was to investigate how elevated temperature and decreasing salinity affect common copepods that are important prey for fish larvae in the

Local boat at Tau lagoon.

JONNA ENGSTRÖM-ÖST

coastal zone. The papers are a collaboration between Novia and University of Turku.

Hur påverkas plankton av en förändrad miljö? Kan djurplankton anpassa sig till klimatförändringen? Vi forskar i hur klimatförändringen samt övergödningen i våra kustområden påverkar Östersjö-plankton. Vi jobbar främst med djurplankton och undersöker deras eko-fysiologi, re-produktionsframgång, stressnivåer samt fettsyresammansättning. Projektet var år 2022 finansierat av Svenska kulturfonden, Walter och Andrée de Nottbecks stiftelse, Societas Pro Fauna et Flora Fennica, Onni Talaan säätiö och Waldemar von Frenckells stiftelse, och Aquacosm Transnational Access.

Collaborators

- Almén Anna-Karin and Scheinin Matias (Havsmanualen)
- Anttila Katja & Mottola Giovanna (University of Turku)
- Bednaršek Nina (Southern California Water Research Project, USA)
- Feely, Richard A. (National Atmospheric and Oceanic Administration, USA)
- Hattich-Pansch Christian (Åbo Akademi University)
- Långvik Otto (Novia)
- Lehtiniemi Maiju and Forsblom Louise (Finnish Environment Institute)
- Lewandowska Aleksandra and Hall Clio (University of Helsinki)
- Mostajir Behzad and Vidussi-Mostajir Fransesca (University of Montpellier, France)
- Vuori Kristiina (University of Turku)
- Zervoudaki Soultana (Hellenic Centre for Marine Research, Greece)

Sète Marine Station at University of Montpellier.

JONNA ENGSTRÖM-ÖST

Climate change and plankton communities

Kay Feliciano and Jonna Engström-Öst

The aim with Kay Feliciano's BSc thesis is to study warming and salinity effects on the brackish-water plankton communities. Kay is doing microscopy to study species abundance and lab analysis to measure biomarkers.

Last September 2022, we joined an indoor mesocosm experiment *"Impact of salinity and temperature on marine plankton communities"* funded by the Aquacosm-Plus Transnational Access in Tvärminne Zoological Station (TZS). The focus was analysing changes in plankton communities in two different temperatures and six salinity level scenarios. The experiment involved both freshwater and brackish water communities obtained from Gennarbyviken reservoir and from the bay in front of TZS. The experiment was run for a total of five weeks until October 2022.

In line with this, we have collected biomarker samples to analyze the oxidative stress of zooplanktons when exposed to environmental changes particularly temperature and salinity. The samples taken will be analysed at University of Turku in spring 2023. Kay Feliciano will also be conducting her BSc thesis investigating changes in zooplankton community driven by climate change. The methods will involve microscopy work from the water samples collected, identifying plankton species, and observing differences in their abundance and composition from the different environmental scenarios. The hypothesis is that plankton ecology changes along with climate-driven variations in temperature and salinity, which will have consequences in marine food-web, and eventually impacting ecosystem services. Microscopy will start in January 2023 and she will be submitting her final thesis in June of the same year.

Hur påverkar stigande temperatur och salthaltsförändring planktonsamhället i kustzonen? Det undersöker Kay Feliciano i sin kandidatavhandling på data som hon samlade in i ett experiment på Tvärminne zoologiska station under hösten 2022.

Collaborators

- Lewandowska Aleksandra and Hall Clio (University of Helsinki)

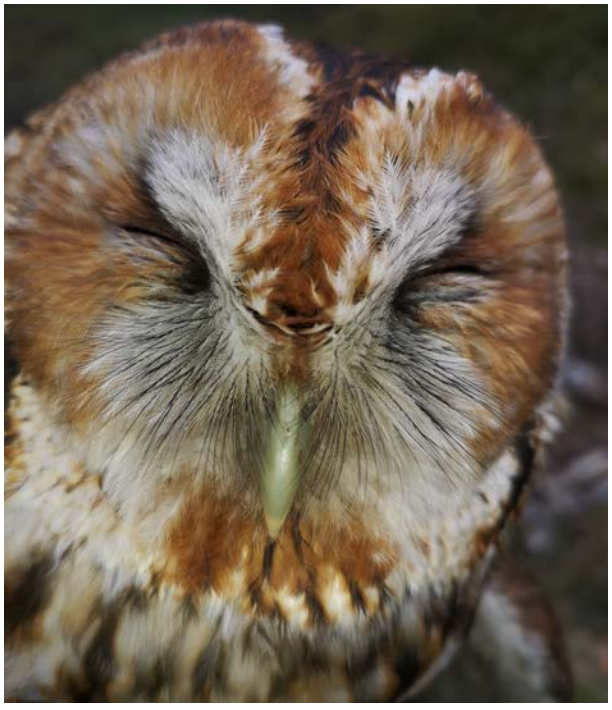
Functional ecology and applications

Patrik Karell, Chiara Morosinotto, Arianna Passarotto, Katja Koskenpato, Ruslan Gunko, Charlotte Perrault, Gian Luigi Bucciolini, Giuseppe Orlando, Miguel Pires Pinto, Ferran Mora Bitria

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, biodiversity and land use in an inter-disciplinary framework. We collect and use individual-based field data from natural populations, and we use experimental set ups, citizen science data approaches, and surveys in our research. During 2022 our main financers were the Academy of Finland and the Swedish Cultural Foundation, as well as a bunch of personal working grants for post doc projects and PhD projects (Kone foundation, University of Seville, Wihuri foundation, Societas pro Fauna et Flora Fennica).

Highlights of the year

In 2022 our research group continued with activities in both Finland and Sweden, with a main focus on studies of the evolutionary ecology of tawny owls. We have done behavioural experiments in the field, collected data in both Finland and Sweden, and of course analysed and published our findings. Most importantly we produced two PhDs this year: Katja defended her thesis in May at the University of Helsinki and Ruslan defended his PhD thesis in December at the University of Turku. Gian Luigi started the collection of data for the new Svenska kulturfonden funded Pan-European project where we collaborate with several tawny owl researchers in different parts of Europe and began his PhD studies based on this project at the University of Turku. Arianna conducted her behavioural experiments on noise and light pollution in our owl aviaries at Lund University, collected data in the field, analysed and finalized papers in our post doc project funded by Svenska kulturfonden. Charlotte finalized her field experiments on protective coloration under climate change in Vassböle, Ingå and submitted her first paper for her PhD thesis based on work in the aviary in Lund. Giuseppe continued in our group and analysed and submitted a paper on long term data from the tawny owl population in västra Nyland, and continues his work with our research team as a PhD student at the University of Glasgow. Our research group also increased in size as Miguel and Ferran began their MSc thesis work at Lund University in our research group. Chiara analysed and completed many of our massive pile of data from ecophysiological experimental studies we have developed and executed during my five-year Academy of Finland fellowship and



PATRIK KARELL

her post doc at Novia and in Lund. The Academy of Finland project finished in the end of August 2022.

The Tawny owl project: Charlotte run the last part of her mobbing experiments in Ingå where she aims to understand the mobbing effects on tawny owls in different seasons. Gian Luigi continued to collect data for his PhD project on large scale life history variation in tawny owls including coordination of field work in Finland, Sweden, Italy and Slovenia. Chiara got our long awaited energetics experiment, which was one of the main aims in the Academy of Finland project, analysed with interesting results emerging, and further analyses on ecophysiology of the tawny owl colour morphs analysed and written. The aviary work within the project came to an end with the release of the owls in spring as a highlight, where the released owl individuals were named after Ukranian cities. We did not bring in any new owls to the aviary this year,

In our research we study the role of camouflage in the life of the two (grey and brown) colour morphs of the tawny owl. In the picture a grey tawny owl. Picture by Charlotte Perrault.

Gian Luigi in the field in Västra Götaland to collect data from trail cameras in tawny owl nest boxes.

but the work in the aviary opened up lots of new avenues in research that certainly will be done within this infrastructure in the near future.

In May Katja defended her PhD thesis at the University of Helsinki about colour polymorphusm as a proxy for adaptations to climate change. The thesis deals with a variety of approaches to study the evolutionary ecology of colour variation: microscopic feather structures, camouflage experiments using an online game for lay people, prey choice based on pellet remains in tawny owl nests, and the use of tawny owl museum skins from European natural history museums to study distributions of colour polymorphism. Professor Oliver Krueger from the University of Bielefeld, Germany served as opponent.

Giuseppe helped with field work in the Swedish tawny owl monitoring scheme we are participating in, and together with Arianna they introduced Miguel and Ferran

PATRIK KARELL

to practical owl ecology in the field. Giuseppe then won a fully funded doctorate position in Scotland on urbanisation effects on owls, which means he will continue the collaboration with our research group for the coming four years. Simultaneously in spring we conducted field work also in Finland (with Gian Luigi, me, Chiara and Jon Brommer) where we added another year to the unique more than 40 year long data series of tawny owl breeding biology. Altogether the data we have collected on tawny owls allow us to test predictions about mechanisms for coping with variable climatic conditions and stressful environments. We presented our research in various conferences across Europe.

The LES project: Ruslan was able to publish three papers belonging to his PhD, which constitute the main part of his PhD in spring and in the beginning of December he defended his PhD at the University of Turku. Associate professor Tim Daw from the Stockholm Resilience Center at Stockholm University served as opponent. The topic in the thesis is highly topical. The first chapter deals with the usefulness of citizen science to assess water quality variation. The results show that the water quality assessment by the public corresponds well with assessment using scientific sampling methods. The second chapter presents an analysis of the links between environmental quality and life quality, and the third paper is based on surveys on the impacts of COVID19 on people-nature relationships and life quality. Ruslan presented this third chapter at the Sustainability conference at the University of Helsinki. Ruslan's fourth chapter connects these three studies on the link between the environmental quality and life quality with economical benefits that can be achieved through keeping the natural environment in good shape.

Collaborators

- Staffan Bensch, Jan-Åke Nilsson, Maja Tarka (Lund University, Sweden)
- Davide Dominioni (University of Glasgow, UK)
- Al Vrezec (University of Ljubljana, Slovenia)
- Jon E. Brommer, Miguel Soares, Timo Vuorisalo, Laura Tuominen and Daniele Baroni (University of Turku)
- Aleksi Lehikoinen (University of Helsinki)
- Matias Scheinin (Department of Environmental Protection, Hanko)
- Lauri Rapeli (Åbo Akademi University)
- Heikki Helanterä (University of Oulu)

Funktionell ekologi och dess tillämpningar

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? Hur påverkas djurs adaptiva beteenden och egenskaper av att människan förändrar deras livsmiljöer och vilka är konsekvenserna? Vi strävar även till att tillämpa data och resultat från dessa projekt med samhällsekonomiskt relevanta frågeställningar där vi kopplar ihop ekologiska data med kvantitativa enkätundersökningar. I hur stor utsträckning kan man avverka skog utan att utarma biodiversiteten och ekosystemtjänster 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 kustvattnen?

Energy transition and energy security: more important than before?

Farid Karimi

Farid Karimi is a senior researcher and lecturer at the Faculty of Bioeconomy. His main research interests are in the social sciences, with a particular focus on issues related to the energy transition, energy security and energy politics in the Baltic Sea Region. The highlight of his work in 2022 was his successful application winning a competitive Horizon Europe project grant as a consortium member. He also actively shared his analysis and views with the general public through participating in panels, seminars and writing articles, for instance, in Euronews.

The year 2022 was quite a success achieving most of the goals I set for my second year at Novia. The highlight of the year was the successful project application for the competitive Horizon Europe grant as a consortium member. Sintef (Norway) is the coordinator of the project *Zero Emission Network to facilitate CCUS uptake in industrial clusters (CCUS ZEN)*. The project started in September 2022 and will continue for 36 months. The consortium includes several partners from all regions of Europe. Novia UAS is involved in three Work Packages (WP), and I am a task leader in WP2 (Mapping non-technical issues) of the project. From Novia, Ulrika Dahlberg is my collaborator in this project. CCUS ZEN will explore the potential for enabling Carbon Capture Utilisation and Storage (CCUS) value chain deployment in two regions with lower maturity levels for CCUS compared to the current development in the North Sea region: the Baltic Sea Region and the Mediterranean Sea region. Full-scale CCUS projects are vital in meeting the Paris Agreement's objectives and timely mitigation of climate change.

My edited volume, 'Energy Transition in the Baltic Sea Region: Understanding Stakeholder Engagement and Community Acceptance' (Routledge) was published in 2022. The book is Open Access (OA), co-edited by Prof Michael Rodi. The book analyses the potential for active stakeholder engagement in the energy transition of the Baltic Sea region. This book shed light on the bottom-up and grass-roots activities for an energy transition in the Baltic Sea region. We have chapters covering different countries, different technologies, and different experiences. The book is also not only focused on experiences from the energy sector. For example, there is a chapter about the housing sector in Finland.

In June 2022, we organised an international seminar-cum-book launch at Campus Raseborg, with the collaboration of the Interdisciplinary Centre for Baltic Sea Region Research (IFZO) of the University of Greifswald, Germany. We have high-level participants from several countries, such as Poland, the Netherlands, Denmark and Slovakia, in the two-day seminar. The

FARID KARIMI

keynote speakers of the seminars included Mr Thomas Blomqvist, Minister of Nordic Cooperation and Equality of Finland, Dr Örjan Andersson, President of Novia UAS and Prof Matúš Mišík of Comenius University in Bratislava. During this seminar, three work groups have been established in order to streamline activities in three areas for applying for international grants and common publications.

When it comes to dissemination, outreach activities and internationalisation, I have been active in several areas. I have been invited to a few seminars and conferences as a speaker or chair; for instance, the BUP Symposium 2022 by the Baltic University Programme (BUP) (co-chair, online), Baltic Carbon Forum 2022 (invited speaker, Kaunas, on CCUS) and The Energy Trilemma in the Baltic Sea Region (BSR) Workshop by IFZO in Greifswald (presenter, on the pipeline politics in the BSR). Furthermore, I was invited to be a member of a PhD assessment committee at the Technical University of Denmark (DTU) and chairperson of an assessment committee for recruiting a senior researcher at the Danish Institute for International Studies (DIIS).

In the aftermath of the Russian invasion of Ukraine, I was invited to an initiative 'Ilmasto, energia ja turvallisuus' to form a forum for common research and studies on energy security in Finland and the BSR. The group was initiated by Prof Paula Kivimaa (SYKE) and includes me, Prof Veli-Pekka Tynkkynen (University of Helsinki), Emma Hakala (FIIA) and two PhD candidates of Paula and Veli-Pekka: Sakari Höysniemi and Maria Sivonen.

In 2022, I have increased my collaboration with the Baltic University Programme (BUP). I was selected as the scientific coordinator of the Energy Systems theme of BUP. Also, I participated in the first Master Thesis Training of BUP as one of the supervisors working with two students from Uppsala University and Lund University.

Towards the end of the year, I was awarded a fellowship from the Academy of International Affairs of the state of North Rhine-Westphalia to spend a sabbatical in 2023 in Bonn, Germany, in order to work on my future manuscript 'Ex-post analysis of the EU energy politics in the Baltic Sea Region: was it all about energy transition?'

Finally, I have been a reviewer of a few articles and a book proposal for the journal *Energy Research & Social Science* (Elsevier), *Open Research Europe*, and *Routledge*, as well as joining the editorial board of the journal of *Advances in Carbon Capture Utilization and Storage* (Extrica).

Collaborators

- Michael Rodi (University of Greifswald and IKEM, Germany)
- Izabela Surwillo (Danish Institute for International Studies, Denmark)
- Xiaoli Larsén (Technical University of Denmark, Denmark)
- Maria Rolim (Centre for Studies in Law and Business, Brazil)

Farid är samhällsvetare. Hans huvudsakliga forskningsintressen ligger inom samhällsvetenskaperna, med särskild inriktning på frågor om energiomställningen, energisäkerhet och energipolitik i Östersjöregionen. Höjdpunkten i hans arbete under 2022 var att han som konsortiemedlem lyckades vinna ett konkurrenskraftigt projektbidrag från Horizon Europe. Dessutom publicerade han en bok och ordnade ett internationellt seminarium i Ekenäs. Han var också aktiv i etableringen av det internationella nätverket, vilket ledde till ett officiellt samarbete mellan Yrkeshögskolan Novia och Institute of Climate Protection, Energy and Mobility (IKEM) i Tyskland. Han delade också aktivt med sig av sina analyser och åsikter genom att delta i paneler, seminarier och skriva artiklar, till exempel i Euronews.

Seizing bioeconomy opportunities in sustainable food developments

Ashkan Pakseresht

I am researching sustainable consumption and a bio-based economy. My contribution to the Novia Bioeconomy Research Team (NBRT) involves business research and economics with application to food, agriculture, and natural resources. Examples of specific research interests include examining the role of bioeconomy in the transition towards a sustainable food system, social acceptance of novel food technologies, and business models in sustainable circular economies. My Main activities in 2022 included networking, teaching, publication (in the form of journal publications and blogposts), and writing two new manuscripts.

Project #1: *"Consumer attitude towards insect-based animal feed".*

Insects, as an important source of protein, has the potential to increase feed safety and contribute to the circular economy. Consumers' acceptance plays a great role in the effective informed policy design as well as commercial development of insects as animal feed. The aim of this project is to examine consumers' attitude towards rearing insects as animal feed.

During summer 2022, we have conduct a survey and collected a total of 129 responses on consumer evaluation of insect-based animal feed. The first part of the questionnaire examines respondents' general attitude towards rearing insects as substitutes for conventional protein sources (e.g., soy and fishmeal). Then participants' risk-benefit attitudes are evaluated. We also have examined the effect of providing information regarding insect-based meals environmental advantages, particularly its potential in contributing to the circular economy, on the consumers acceptance. So far, one systematic review is developed on the factors affecting consumers acceptance of insects feed technology. In addition, we aim to produce two papers based on the survey data collected in 2022.

Manuscript #1: *"Consumers' acceptance of food derived from insect-based animal feed, A systematic review".* The manuscript is still under development and will be submitted to a journal for peer evaluations during spring 2023.

In recent years, the use of insects as animal feed has gained extensive attention from farmers, policy makers, the scientific community. Like any other novel technology, successful market commercialisation of this new feed technology requires public acceptance. Despite its importance, our knowledge regarding consumers attitude towards food derived from animal fed with

insects is still limited. We have conducted a systematic review to identify important factors affecting consumer acceptance of insects as feed. Our results indicated that influential factors can be summarised in two broad categories of individual characteristics (such as attitude, environmental and animal welfare concerns, personality traits, and emotions) and characteristics of the technology (such as knowledge about technology, perceived risk and benefits, availability, labelling, and price).

Project #2: *"Is blockchain a key to the circular economy in the agri-food sector".*

The agriculture sector is immense, and it has to overcome numerous challenges that impact the sustainability of the industry. Recently the concept of Circular Economy (CE) has gained interest to address challenges in the agri-food industry. The circular economy strives to keep resources, goods, and outputs in circulation for as long as possible by keeping their value within the loop. Proponents of the digitalisation of agriculture and food systems advocate that Blockchain technology accelerates a shift toward a circular economy and revolutionizes the food supply chain. The aim of this project is to examine how blockchain contributes to the sustainable food production and the transition towards circular economy. So far two papers are published in journals *Sustainability* and *Sustainable Production and Consumption*. I have also conducted a systematic review which is submitted and currently is under peer-evaluation. In addition, I have developed number of blogposts that are available at the Novalia FUI-bloggen.

Manuscript #2: The systematic review maps blockchain characteristics in agri-food domain. Our result indicated the essential blockchain characteristics for agri-food sector such as transparency, immutability, redundancy, versatility, automation, and remittance. Among these features, immutability and automation have a salient role in the current implementation, particularly in food traceability. However, the application of blockchain in the agri-food sector is not without controversies.

Collaborators

- Karin Hakelis and Aleksandar Vidakovic (Swedish University of Agricultural Sciences, Sweden)
- Sina Ahmadi and Vilma Xhakollari (University of Bologna, Italy)
- Ali Yavari (Swinburne University of Technology, Australia)

Ashkan forskar om hållbar konsumtion och en biobaserad ekonomi. Hans bidrag till Novia Bioeconomy Research Team (NBRT) involverar företagsforskning och ekonomi med tillämpning på livsmedel, jordbruk och naturresurser. Exempel på specifika forskningsintressen inkluderar att undersöka bioekonomins roll i en övergång till ett hållbart livsmedelssystem, social acceptans av nya livsmedelsteknologier och affärs-modeller i hållbara cirkulära ekonomier. Ashkan forskar just nu om konsumenternas acceptans av labbodlad mat och insekter som mat/foder. Han undersöker också cirkulära affärsmodeller inom jordbruks- och livsmedelssektorn.

Glyphosate residues in water bodies and their effect on the growth of cyanobacteria

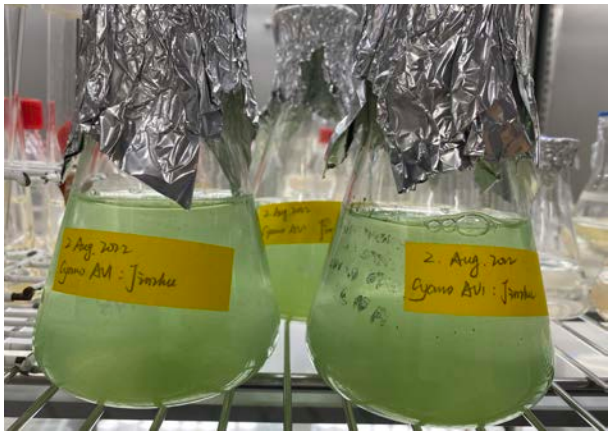
Jinzhu Su, Jonna Engström-Öst

Jinzhu Su is doing a one-year PhD exchange from Fujian Normal University in China to Novia. She conducts field work, experiments, and prepares a manuscript on the collected data. Jinzhu has also taken part in a course, a workshop and conference.

Jinzhu is sampling River Raseborgs å at the ruins.

Glyphosate based herbicides (RoundUp) are among the most widespread agricultural supplies. Finland actually ranks seventh in the use of glyphosate out of 32 European countries. The use of glyphosate adds phosphorus to agricultural landscapes, influencing the accumulation and cycling of phosphorus in nearby surface waters. Therefore, we investigated residual glyphosate concentrations in the water environment. We selected three waterbodies: River Svartån, River Raseborgs å, and a wetland stream in Västankvarn farm. Sampling was conducted in spring, summer and autumn 2022.

Glyphosate is composed of phosphorus, an indispensable element for cyanobacterial activities. To determine the tolerance of cyanobacteria to glyphosate, we also investigated the effect of glyphosate on the growth of *Nodularia spumigena* by a microcosm experiment. *N. spumigena* is the main toxic cyanobacteria in the Baltic Sea. We are also planning experiments looking into glyphosate effects on phytoplankton biodiversity using metabarcoding, and on zooplankton health and well-being.



Toxic cyanobacteria *Nodularia spumigena* AV1 in lab.

Glyfosat (RoundUp) används regelbundet i finländskt jordbruk. Glyfosat innehåller fosfor och kan gynna toxiska algblomningar i kustvattnen. Jinzhu Su som är på utbyte från Fujian Normal University provtar glyfosat i fält samt utför experiment på Tvärminne zoologiska station. Resultaten torde bli klara 2023.

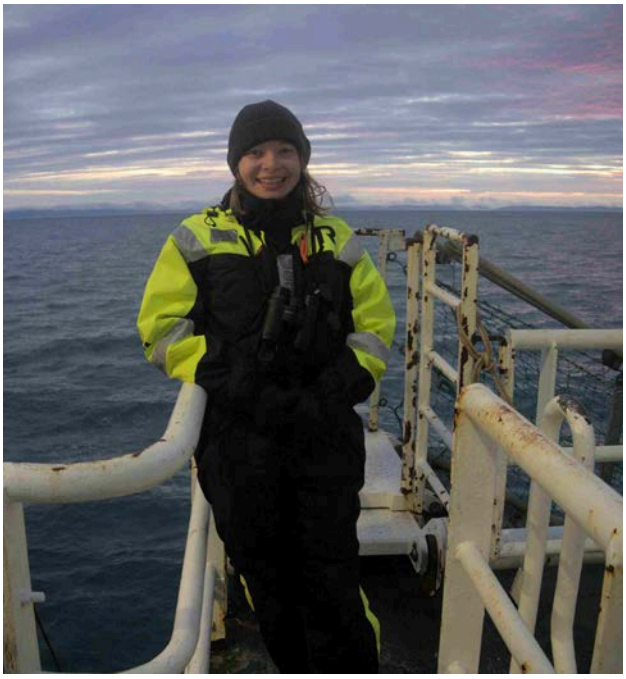
Collaborators

- Matilda Kråkström (University of Turku)
- Kaarina Sivonen (University of Helsinki)
- Yuping Su, Balaji Prasath (Fujian Normal University, China)

Energy content and biomarker responses of krill in Svalbard

Ella von Weissenberg

I study the effects of climate change on oxidative status and reproductive output in marine zooplankton, and I am being funded by Onni Talas Foundation and Svenska kulturfonden.



Ella onboard R/V Helmer Hanssen

I participated in a course *Arctic Marine Zooplankton* at the University Centre in Svalbard in September 2022 as part of my PhD studies. The main objective of this 6-week course was to gain knowledge of Arctic marine ecosystems, zooplankton taxonomy, and field methods. The highlight of the course was a 10-day scientific cruise aboard R/V *Helmer Hanssen*, sampling in several fjords along the coastal areas of Svalbard. I participated in several student research projects linked to zooplankton: species identification and abundance of meso- and macrozooplankton, fish stomach content analysis, and image analysis of a large copepod *Calanus* spp. lipid content. We also learned to use laser optical plankton counter for analysing the size spectra and trophic indices of plankton communities. During the course, I was amazed by the diversity of zooplankton in the Arctic Ocean. Firstly, everything is large in the Arctic: the majority of the zooplankton biomass is formed by *Calanus* spp., lipid-rich copepods so large that they are individually preyed by some seabirds. Secondly, there are species groups that do not exist in the Baltic Sea, such as krill, comb jellyfish and larvae of sea stars and sea urchins.

In addition to participating in the course activities, I collected krill samples for my own research. I am working in collaboration with Katja Anttila's team (University of Turku) to study how water mass properties and other environmental factors affect the physiological condition of krill in the high-Arctic waters. We intend to measure a number of biomarkers

Longyearbyen

from the krill collected from several Arctic fjords. Krill are expatriates in the Arctic, which means that they are boreal species advected by Atlantic water currents. Climate change is affecting the speed, temperature, and intensity of Atlantic water currents, which, in turn, may enhance the survival of boreal krill species as they migrate throughout the Arctic.

During my visit in Svalbard, I was happy to experience the beautiful landscapes and wildlife in the high-Arctic: glaciers, mountains, polar bears, walruses, dolphins, and sea birds. This work was funded by Waldemar von Frenckells stiftelse.

The famous polar bear traffic sign

Jag deltog i en kurs om Arktiska marina djurplankton på Svalbard under hösten 2022 för att insamla data om krill. Proverna mäts för energiinnehåll och biomarkörer, i samarbete med Åbo universitet. Jag är intresserad av hur de Atlantiska och Arktiska vattenmassornas temperatur och salthalt påverkar krillens eko-fysiologi. Studien slutförs under 2023

Collaborators

- Anttila Katja and team (University of Turku)
- Käkelä Reijo and team (University of Helsinki)
- Malin Daase, Janne Søreide (University Centre in Svalbard)

Krill: *Thysanoessa inermis*

ELLA VON WEISSENBERG

LES: Life quality in Raseborg

Ruslan Gunko, Patrik Karell, Lauri Rapeli, Matias Scheinin, Timo Vuorisalo

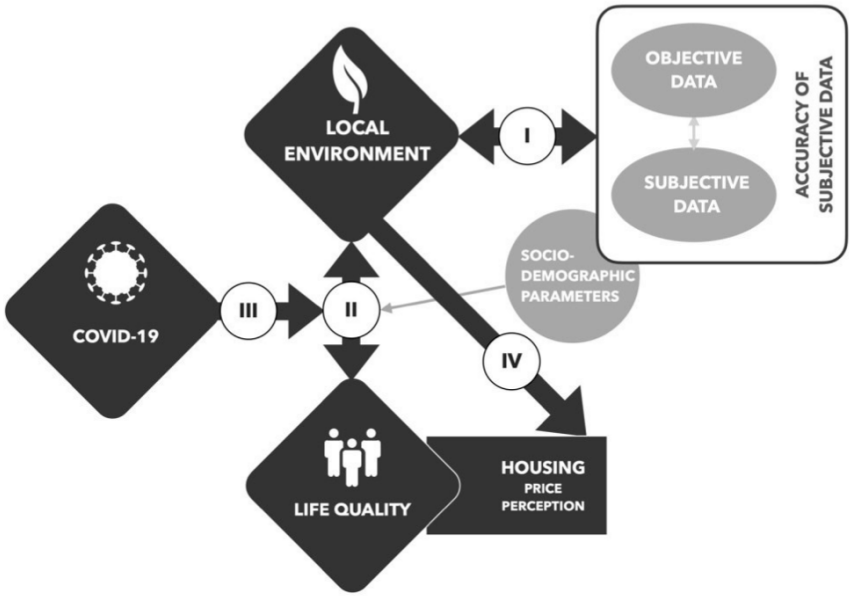
RESEARCH PROJECT

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 University. LES is an inter-disciplinary 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.

In 2022 we achieved the main goal - we successfully finished the project. The results of the LES are divided in four parts and overall presented in three scientific articles, one manuscript (in preparation) and PhD thesis.

LES aimed to combine objectively measured environmental quality with subjective evaluation of the environment, life quality and COVID-19 impact from the community members. The methods of the project were applied in the coastal community Raasepori. For this municipality, the state of coastal waters has a crucial value and varies in different parts of Raasepori. Due to that respondents of questionnaires were asked to evaluate the state of coastal waters in the immediate vicinity, and it was used as a proxy of environmental conditions.

The first results of the thesis showed that over 70% of the respondents assessed water quality in the right direction and almost 60% were correct in their estimates. It suggests that the role of community members could be changed from observers to actors, which would strengthen environmental democracy on a local level. At the same time, the findings indicated the significant role of people's environmental perceptions for their life quality. Respondents felt more satisfied with their life quality if they think that environmental conditions in their surroundings are in a good state. However, this effect disappeared for people with serious income issues, which convince us that the



A schematic overview of the project broken down into parts.

RUSLAN GUNKO

effect has psychological characteristics.

Another important finding is that local nature can buffer the adverse impacts of global stress such as COVID-19. The results demonstrated that despite the general negative impact of the pandemic on life quality of people in Raasepori, respondents who believe that the surrounding nature is in a good condition reported even higher satisfaction with their life in comparison with pre-pandemic times. Moreover, the pandemic triggered changes in the people-nature relationship. Respondents, who reported a stronger personal negative impact of the pandemic stated that they changed their behavior towards being more environmentally friendly (spending more time in nature, buying more nature-friendly products, less use of the car, etc.). It is a potential sign for policymakers and politicians that nature can mitigate global stress consequences and that people demand "green changes" on a local level.

Lastly, the results of LES demonstrated that individuals could benefit economically from a high-quality environment. The analysis of the house and cottages sale ads in open source Oikotie showed that people responsible for the initial evaluation of the property value (owner and real-estate agent) consider the state of coastal waters in the published price. It provides a new insight in how community members can extract economic benefits without serious pressure on the local environment.

The overall results of LES were presented and successfully defended on PhD defence at the University of Turku in the end of 2022. The Associate Professor Tim Daw from the Stockholm Resilience Center served as an opponent.

Project leader Ruslan Gunko after the successful PhD defence with the opponent Tim Daw and the supervisor Patrik Karell

LES var ett fyraårigt tvärvetenskapligt doktorandprojekt som utförs vid Yrkeshögskolan Novia och Åbo universitet. Projektet kopplar ihop detaljerade mätningar av vattenkvalitet och avrinningsdata I Raseborg med enkätundersökningar av ortsbefolkningen för att förstå betydelsen och uppfattningen av miljöns tillstånd för välbefinnande på ett lokalt plan.

Affiliations

- Lauri Rapeli (Åbo Akademi University)
- Matias Scheinin (Department of Environmental Protection, Hanko)
- Timo Vuorisalo (University of Turku)

RUSLAN GUNKO

Lantbruk 2.0 – sustainable agriculture in Uusimaa

Ulrika Dahlberg and
Markus Backman

In 2022 the project Lantbruk 2.0 (eng. Agriculture 2.0) continued its focus on education and information. In all course material, as well as published text and film material, sustainable and diverse agriculture has been the core. Production methods that diversify the agricultural landscapes, but don't endanger existing food production have been highlighted, in terms of natural fibers, vegetable production, natural pastures etc. The project is funded by The Swedish Cultural Foundation in Finland (Svenska kulturfonden).

During the spring semester, Market Gardening courses at Open UAS were completed. The courses were planned and administrated by Lantbruk 2.0, together with vegetable farmer and author Jonas Ringqvist from Sweden.

The project realized two natural fibers seminars and launched one course module about production and processing of natural fibers (15 credits) at Open UAS. The course is a new concept, combining production, processing, sales and marketing fiber crops and wool in the Nordic context. The main crops that are studied are flax, hemp, nettle, and wetland crops, such as reed and cattail. The first course started in October 2022 with 9 students. The courses will be evaluated and developed and will hopefully attract more students in the future. The interest in natural fibers, and especially domestic sheep wool, is going up drastically, both in small scale industry and among consumers. During the pandemic, many started knitting woolen sweaters. In addition to textiles, natural fibers can be used in construction, in paper, and in biocomposites to replace plastic, to mention a few things. To take advantage of side streams is also important for profitability and for the environment. The side streams from fiber crops can be used for e.g., bedding for animals and growing media in vegetable production and wool not suitable for textiles can become fertilizer or cover material for gardens.

Lantbruk 2.0 also worked with material from the previous project Matregion Nyland – Ruokamaakunta Uusimaa, which was financed by Finlandssvenska Jordfonden and the European agricultural fund for rural development. The material about natural pastures, heritage grains, apples and early potatoes was presented in four digital storymaps.

Markus Backman recordning material for a film clip, with organic farmer Nina Långstedt

ULRIKA DAHLBERG

Also, two film clips, one about using ferment in organic farming and one about Community Supported Agriculture as a means of teaching at Livia vocational institute. Links to all project materials with open access (in Swedish) can be found on the project webpage: https://www.novia.fi/lantbruk-2-0

The project has a steering group consisting of representants from agricultural organisations for Swedish speakers and farmers. The steering group gathered two times in 2022 to discuss project activities and share information. Ulrika Dahlberg has been working as project leader the whole year, and Markus Backman worked as a part time project specialist until the 15th of August.

Projektets verksamhet har även under det tredje verksamhetsåret kretsat kring utbildning och informationsspridning. Under våren 2022 slutfördes Market gardening-grönsaksodlingskurserna vid Öppna Yrkeshögskolan. Lantbruk 2.0 har planerat och förverkligat kurserna tillsammans med grönsaksodlare och författare Jonas Ringqvist från Bossgårdens grönsaker i Sverige. Projektet genomförde två seminarier om naturfibrer samt planerade och startade upp kursmodulen Produktion och förädling av naturfiber (15 sp) vid Öppna Yrkeshögskolan på hösten. Även filmklipp, artiklar och digitala storymaps har publicerats. Projektet Finansieras av Henrik Nysténs fond inom Svenska kulturfonden.

Tulevaisuuden maanviljelijät – Farmers of the future

Heidi Barman-Geust

Project Tulevaisuuden maanviljelijät (Farmers of the Future) develops agricultural education as a collaboration between nine educational institutions to promote sustainable food production and modern pedagogical methods. The project was led by Häme University of Applied Sciences and was funded by the Ministry of Agriculture and Forestry in Finland.

The The aim of the project was to promote sustainable food production and educate farmers for the future. There are numerous factors that challenge food production. Education is a critical agent in addressing these issues. The focus in this project was to increase knowledge and boost skills about the following themes: recycling of nutrients, sustainable energy solutions, circular economy, and mitigation of and adaption to climate change. The project produced new teaching material in the form of films, podcasts, articles, and fact cards. The project also carried out two practical trials at the Västankvarn teaching farm in Ingå. A demo trial with flax and monitoring of water quality in the wetlands at Västankvarn. These practical trials also resulted in material that can be used in teaching. The material is collected on the project's website and can be used freely.

Students Kay Feliciano and Anna Nyberg taking water samples together with PhD-student Jinzhu Su at Västankvarn farm.

Project partners

- Häme University of Applied Sciences
- JAMK University of Applied Sciences
- Oulu University of Applied Sciences
- Savonia University of Applied Sciences
- Seinäjoki University of Applied Sciences
- Ahlmanin koulun säätiö
- Hämeen ammatti-instituutti
- Jokilaaksojen koulutuskuntayhtymä

Projektet Tulevaisuuden maanviljelijät (Framtidens jordbrukare) var ett samarbetsprojekt mellan nio olika läroanstalter med utbildning inom lantbruksnäringarna. Målsättningen var att främja en hållbar matproduktion och att utbilda jordbrukare för framtiden, genom att öka kunskaperna och färdigheterna kring återvinning av näringsämnen, hållbara energilösningar, cirkulär ekonomi och begränsning av och anpassning till klimatförändringar. Projektet tog fram nytt undervisningsmaterial kring dessa teman i form av filmer, podcasts, artiklar och faktakort. Materialet finns samlat på projektets webbsida och kan användas fritt. Projektet finansierades av Jord- och skogsbruksministeriet och pågick under åren 2021–2022.

Lill-Nägels Agroforestry Pilotprojekt

Joshua Finch

The project at Lill-Nägels in Kirkkonummi, Finland, began in earnest in late June 2022. The project has a variety of aims: restore a degraded agricultural site's soil fertility by supporting ecological processes; utilize successional agroforestry methods to more quickly close the ROI gap commonly associated with agroforestry systems; market products from said system directly to consumers; as well as disseminate information about the project to a wide audience.

The 8000 square meter field which Rikard Korkman has bestowed for the project has very good solar exposure for our high latitude and is regularly shaped enough to allow the more than 400 meters of agroforestry rows to follow a straightforward layout. Keeping the usage pattern of the site simple is essential considering the project is going to host a very wide variety of plants: 10+ species from at least four plant families will be found in each linear meter of tree beds.

Our primary goals for the physical portion of our sixth-month pilot project were:

- establish the mainframe silvoarable design of the site
- begin biological remediation
- plant the first cash crop & tree seeds in autumn

The implementation of the field system was smooth as we had spent the project application period designing the general outline. Unfortunately for us, the site went into severe drought conditions almost as soon as the funding was approved. The drought lasted all summer and only broke once the growing season came to an end. Without rain, or an irrigation system, the biology shut down: there was no growth for the entire summer. On the positive side, the design of our system includes garlic for our first target cash crop, which is planted in the autumn, so although we missed out on the diverse cover crop's ability to begin remediating the soil over the summer, our garlic crop was not directly hampered by the drought.

Precision-implementation of tree lines lays the groundwork for successful cultivation

In addition, a significant amount of effort has been made towards establishing written and visual materials to provide the conceptual background for the project and inform the details of the design. One of the highlights of the year was a three day workshop in Denmark I was able to attend with one of the pioneers of successional agroforestry, Ernst Götsch. This was one of his first working visits to northern Europe and my report on the subject, Successional Agroforestry Trip to Denmark, October 2022, published in Novia's Serie R: Rapporter, has been well received by a global audience of temperate climate successional agroforesters.

By year's end, we had made good progress on all of the goals that we had control over. In a brief few months our project has progressed from an empty field to one in which highly accurate tree lines have been prepared, maintained, and sown with their first cash crop along with thousands of support woody species. We have growing interest from the community as well as internationally in our project.

Before the end of 2022, the project was extended until the end of 2023 with the generous support from Uusimaa's Centre for Economic Development, Transport and the Environment, Stiftelsen Finlandssvenska Jordfonden, and Novia UAS. We are working to increase networking between regional agroforestry projects and extend the reach of these concepts to a broader audience.

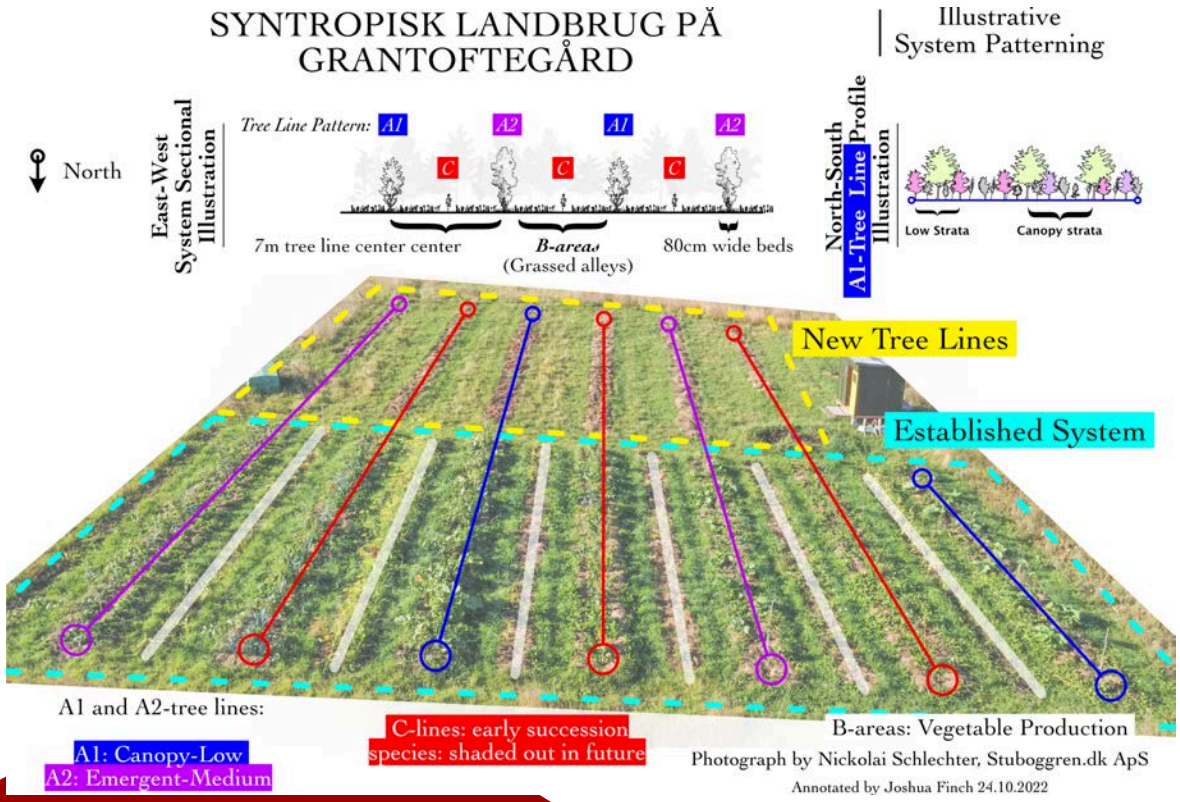


Illustration from the 'Successional Agroforestry Trip to Denmark, October 2022' article

Lill-Nägels Agroforestry pilotprojektet genomför skogsjordbruk som bygger på ekologisk succession (*eng. successional agroforestry*) för att förbättra degraderad jordbruksmark. Detta görs främst genom att applicera och förvalta biologisk mångfald i växtligheten. Målet för projektet är att producera produkter av hög kvalitet från den första växtsäsongen, och sälja dem genom andelsjordbruk. Processen dokumenteras och delas med allmänheten. Projektet finansierades av Stiftelsen Finlandssvenska Jordfonden och Yrkeshögskolan Novia under tidsperioden 6.2022-12.2022. Ny finansiering för tiden 1.2023-12.2023 har beviljats av NTM-centralen i Nyland. Projektet leds av Joshua Finch, som hämtar med sig omfattande praktisk kunskap om att tillämpa agroekologiska principer i odlingen.

Project partners

- Rikard Korkman (Farmer)
- Stiftelsen Finlandssvenska Jordfonden
- Uusimaa's Centre for Economic Development, Transport and the Environment (2023)
- Luomuliitto
- Baltic Sea Action Group
- Stanislav Jaš

JOSHUA FINCH

Red-throated Divers and offshore windfarms

Stefan Heinänen

In the project DIVERLOG we are studying the potential impact of habitat loss on Red-throated Divers wintering in the North Sea. We know, based on previous studies, that divers are sensitive to anthropogenic disturbance and are therefore displaced from offshore wind farms. However, we still have little understanding of potential impacts on their behavior and fitness if they are displaced from their preferred foraging habitats.

In DIVERLOG we tag Red-throated Divers with GPS-GSM transmitters, and we can consequently follow and analyze their movements and foraging behavior in fine resolution, both in space and time. You can have a look at the data and bird movements on the project web page: https://www.divertracking.com/en/tracking-map/

The project is carried out in collaboration with colleagues from Bioconsult SH (Germany), Justus Liebig University of Giessen (Germany), Ornitela (Lithuania), Julius Morkunas (Lituania) and Novia University of Applied Sciences. The project is funded by the German Federal Maritime and Hydrographic Agency (BSH).

I projektet DIVERLOG studerar vi hur havsvindparker påverkar smålommars rörelsemönster och födosök. Lommarna märks med GPS-GSM sändare i Nordsjön och vi kan sedan följa med och analysera fåglarnas rörelsemönster. Det är möjligt för envar att följa de märkta fåglarna via websidan https://www.divertracking.com/en/tracking-map/

Projektet utförs i samarbete med kolleger från Tyskland och Litauen och finansieras av BSH.

STEFAN HEINÄNEN

GeoICT4e - geospatial tools and methods for sustainability and employability

Romi Rancken

Since August 2020 a consortium consisting of Novia UAS, University of Turku and Turku UAS, participates in a project that aims at strengthening the geospatial skills for students in Tanzanian universities. The project received funding from HEI ICI, a programme financed by the Ministry of Foreign Affairs and administered by the Finnish National Agency for Education.

The 4 year project, named GeoICT4e, aims at improving entrepreneurial skills for university students in five Tanzanian universities, skills related to geospatial sciences (GIS) and to sustainability in a broad sense.

University of Turku has previously implemented two similar HEI ICI projects in Tanzania, then aiming at developing the infrastructure at the universities such as GIS labs, as well as training the university staff in geospatial matters. The current project takes a step closer to the society as it builds on a learning method that we call MCL, Multi-Competence Learning, and is implemented through so called challenge campaigns, where students solve multi-faceted problems in a real-world setting.

The project looks at the world through a sustainability lens, and consists of several themes, the most important being climate change and its implications, geospatial technologies and ICT, innovation and entrepreneurship and natural resources management. As Novia's input is channeled through the Faculty of Bioeconomy, our main focus is on natural resources management and sustainable coastal management issues, but we will also take part in development and testing of the MCL method and other activities during the project.

Due to covid-19 some face-to-face activities were postponed, but 2022 was instead very active. A workshop for planning the first

ROMI RANCKEN

Planning MCL campaigns in Zanzibar, Tanzania, in November 2022.

challenge campaigns, was held in Moshi in March. In May a delegation of both young professionals, project coordinators and high-level university representatives visited Finland for a workshop, and the young professionals also visited the Novia Campus in Ekenäs for a day-long excursion.

The first 8-week MCL campaigns were conducted in July to September in all five Tanzanian universities. The Finnish partners visited Tanzania during the campaigns, both monitoring the process and giving support where needed. A Novia team visited four out of five universities during the campaigns. The campaigns were evaluated during a workshop in Zanzibar in November, and at the same time, plans for the next round of campaigns, due in 2023, were set up.

The development of the short online courses, "mini-MOOCs" continued during 2022, especially courses directly related to the MCL campaigns. During 2023 a more "nano-MOOCs" or "nuggets" approach will be tested, as the longer courses have taken a long time to build.

Ministry for Foreign Affairs of Finland

FINNISH NATIONAL AGENCY FOR EDUCATION

UNIVERSITY OF TURKU

TURKU AMK
TURKU UNIVERSITY OF APPLIED SCIENCES

HEKIMA NI UHURU

ARDHI UNIVERSITY
Weledi na Ustawi

SOKOINE UNIVERSITY OF AGRICULTURE
1984
ARDHI NI HAZINA

SUZA
STATE UNIVERSITY OF ZANZIBAR

Moshi Co-operative University
MoCU
2014

Projektet GeoICT4e strävar efter att förbättra entreprenöriellt kunnande hos studerande inom branscherna för GIS och hållbar utveckling vid fem universitet i Tanzania.

Universitetssektorn i Tanzania växer i snabb takt och miljoner utexaminerade förväntas komma in i arbetslivet under de kommande åren. Tidigare generationer har kunnat förlita sig på en karriär som tjänsteman inom offentliga sektorn, men nu behöver studerande utveckla färdigheter som gör dem attraktiva på arbetsmarknaden.

Hållbar utveckling, klimatförändringen och dess konsekvenser genomsyrar projektet. Teman som lyftas fram är bland annat geospatial teknik och ICT, innovation och entreprenörskap samt förvaltning av naturresurser.

ROMI RANCKEN

Bondenyttan

Paul Riesinger

Projektet Bondenyttan påbörjades våren 2018 vid agrologutbildningen på Yrkeshögskolan Novia i Raseborg. Arbetet finansieras av Finlandssvenska Jordfonden. Ansvarig för Bondenyttan är AFD Paul Riesinger, lektor i växtodling vid YH Novia.

Utbildning vägleder in i framtiden

Vår personlighet formas genom konkreta möten med verkligheten. Genom utbildning kan vi skapa den kompetens som hjälper oss att bygga vår livsväg och att vara samhället till nytta. Utbildning behöver således omfatta allmänbildning, social kompetens och fackkunskap. Bondenyttan skapar en plattform för möten, där kunskap och erfarenheter delas mellan lantbrukare, agrologutbildningen, rådgivningen och forskare.

Verkligheten är komplex, och så fort som vi löser ett problem dyker det upp nya utmaningar. Det ökade informationsflödet innebär att vi har allt svårare att skilja mellan ogrundade påståenden och faktabaserad kunskap. För att vara en oegennyttig tjänare behöver utbildning utgå från beprövad teori, samt kunskap om praktiska tillämpningar. Den aktuella kunskapsfronten nås genom trovärdiga undersökningar.

Inom Bondenyttan undersöks skördebegränsande faktorer på gårdsnivå, på Västankvarn försöksgård, genom litteraturstudier och med hjälp av experter. Undersökningarna planeras och utförs i samarbete mellan den projektansvarige, lantbrukare och agrologstuderande. Bondenyttan medger ett deltagardrivet och variationsrikt

Agrologstuderande undersöker lusernens rotsystem i ett blockförsök på Västankvarn.

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utbildningskoncept, där arbetet utgår från lantbrukets praktiska frågor. Samarbetsparterna tillägnar sig kunskap, samtidigt som de inspireras av det gemensamma arbetet.
Lärdomarna från undersökningarna och försöken görs tillgängligt genom fältstigar, studiebesök, seminarier, föredrag och publikationer. Bondenyttan utgör en del av ett redan befintligt naturbruksskluster. Vid sidan om kunskapsnyttan och den pedagogiska nyttan resulterar samarbetet i positiva sociala effekter. Lantbrukare och agrologstuderande bekräftas i sin yrkesroll.

Aktiviteterna 2022:
1. Förutsättningar för odling av lusern (Mårten Holmberg, Gösbacka):
provtagningar och publicering.
2. Sort- och odlingstekniska försök med lusern (Västankvarn försöksgård): provtagningar.
3. Förekomsten av ärtrotröta i Nyland, Åboland och Österbotten: föredrag, publikationer och utbildningsmaterial.
4. Växtföljdsbaserad modell för kolbalanser: utbildningsmaterial.
5. Bedömningen av jordhälsan på Lill-Breds med agrologstuderande.
6. Artiklar om jordbrukets roll och lantbruksutbildningen.

Bondenyttan contributes to sustainable agricultural practices and participatory learning, bringing together farmers, students, teachers, extension services and research. The methods to achieve these goals comprehend farm studies, field trials, literature studies and personal communication. Ongoing activities comprehend the designs of ten on-farm field trials (BSc projects), ongoing field trials with lucerne, publications (occurrence of pea root rot, carbon balances), and the development of a work package for the investigation of soil health. Bondenyttan contributes to the development of agricultural practices, mobilises the resources at hand for agricultural education and endorses the social self-esteem of farmers.

STIFTELSEN
FINLANDSSVENSKA
JORDFONDEN

PAUL RIESINGER

Publications

Barrero A, Gómez-Catasús J, Bustillo-de la Rosa D, Traba J, Zurdo J & Reverter M (2022) First documented case of Tawny Pipit Anthus campestris nest parasitism by common cuckoo Cuculus canorus in Spanish steppes. Rivista Italiana di Ornitologia, 92(2), 49-52.

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Barman-Geust H (2022) Framtidens jordbrukare. - Bioekonomi - bloggen.

Barman-Geust H (2022) Att prova på och utvecklas tillsammans. - Bioekonomi - bloggen.

Barman-Geust H (2022) Nya sätt och nya verktyg. - Bioekonomi - bloggen.

Barman-Geust H (2022) Uppmuntra till försökskulturtänk. - Bioekonomi - bloggen.

Barman-Geust H (2022) Att integrera projektresultat i undervisningen. - Bioekonomi - bloggen.

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Björkström-Jung D (2022) Pandemin får stora konsekvenser för framtidens arbetsliv - om vi inte förstår vad som händer. – Opolehti, 2: 26-27.

Bäckman V (2022) Framtiden ser ljus ut för biokol. – Seria A: Artiklar 1.

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Dahlberg U (2022) Ny kurshelhet blickar framåt med traditionella naturfibrer. - Bioekonomi - bloggen.

Dahlberg U (2022) Renässans för inhemsk fårull. - Bioekonomi - bloggen.

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Holm C & Dahlberg U (2022) Nypotatisen är en nyländsk storfavorit. - Hufvudstadsbladet 3.1.2022.

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Holm C & Dahlberg U (2022) Allt fler har upptäckt de gamla sädesslagen. - Hufvudstadsbladet 17.1.2022.

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Karimi F (2022) Socio-political development of CC(U)S in the Baltic Sea region. – Extrica (Baltic Carbon Forum).

Morosinotto C (2022) Allarme evaso! - Focus junior 216.

Pakseresht A (2022) Digitalization and Blockchain applications in renewable energy sector. - FUI-bloggen.

Pakseresht A (2022) FAO's stepwise approach to monitoring the sustainable bioeconomy. - FUI-bloggen.

Pakseresht A (2022) Digitalization and Consumers' Trust in Renewable Energy. - FUI-bloggen.

Riesinger P (2022) Livet, arbetet och utbildningen. - Landsbygdens folk 28.1.2022: 16,

Riesinger P (2022) Veteskördar på 10 ton är möjliga i Österbotten. - Landsbygdens folk 11.2.2021: 18.

Riesinger P (2022) Fem dagar i Nyland och Österbotten. - Landsbygdens folk 8.4.2022: 18-19.

Riesinger P (2022) Hur fungerar lusern som komponent i klövergräsvallar? - Landsbygdens folk 22.4.2022: 24-25.

Riesinger P (2022) Herneenlakasteen vakavia tuhoja mutta ei härkäpavun juurilahon esiintymistä? – Kasvinsuojelulehti, 1: 21-29.

Riesinger P (2022) Ärtrotröta, en markburen patogen. – Serie L, Läromedel 1.

Riesinger P (2022) Kolbalans. En mätare för markens bördighet och naturbrukets klimatpåverkan. – Serie L, Läromedel 2.

Newspaper columns

Kauranen K. Naturfattig närskog?. Västra Nyland, 22.2.2022.

Dahlberg U. Comeback för inhemsk naturfiber? Västra Nyland, 29.3.2022.

Dahlberg U. Sju sorters lin för framtidens jordbrukare. Västra Nyland, 12.7.2022.

Pakseresht A. Konsumenter tveksamma. Västra Nyland, 3.5.2022.

Karimi F. Lokal försörjning - från vetenskap till energi och mat. Västra Nyland, 2.12.2022.

Sandberg-Kilpi E. Måsen, kråkan och sparven. Västra Nyland, 16.8.2022.

Scientific presentations

Engström-Öst J. Responses by zooplankton to climate change in the marine environment. BIOZOO Ecological Applications of Biomarkers in Zooplankton, Hellenic Centre for Marine Research, Greece, 31.10.2022.

Engström-Öst J. Plankton in the Baltic Sea - How does climate change affect plankton in our marine environment? FUI day – Open doors, 13.12.2022. Poster presentation.

Feliciano K & Nyberg A. Future of the farmers. Wetlands and flax. Novia Research Seminar, YH Novia, Campus Raseborg, Ekenäs 29.9.2022.

Gunko R. Striving with global stress on a local level. Has the COVID-19 pandemic changed the relationship between people and nature? Sustainability conference, HELSUS, University of Helsinki, Finland, 18.5.2022

Karell P. Invited speaker at the Annual Congress of the Society for Experimental Biology, Montpellier, France. July 2022.

Karell P. Oral presentation at Thermal Biology symposium, Lund University, Lund, Sweden. November 2022.

Karell P. Invited speaker in UTU research seminar, University of Turku, Turku, Finland. November 2022.

Karimi F & Surwillo I. Pipeline politics in the time of war: Nord stream projects and the convergence of energy security dilemmas in the Baltic Sea Region. IFZO Energy Trilemma Workshop. Greifswald, Germany, Oct. 2022.

Morosinotto C. Invited speaker in seminar at ISPRA, Ozzano dell' Emilia, Bologna, Italy. January 2022.

Morosinotto C. Invited speaker in seminar at Museum of Natural History, Madrid, Spain. April 2022.

Morosinotto C. Invited speaker in seminar at University of Padova, Padova, Italy. September 2022.

Passarotto A. Oral presentation at the congress of the International Society for Behavioral Ecology, Stockholm, Sweden. July 2022.

Perrault C. Oral presentation at the congress of the International Society for Behavioral Ecology, Stockholm, Sweden. July 2022.

Perrault C. Poster at the Congress of the European Society for Evolutionary Biology, Prague, Czech Republic, August 2022.

Media appearances

Farid Karimi
War in Ukraine and energy dependency: What Europe needs to do to wean itself off Russian gas. Euronews.
https://www.euronews.com/next/2022/03/08/war-in-ukraine-and-energy-dependency-what-europe-needs-to-do-to-wean-itself-off-russian-ga

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 2022

Patrik Byholm

- Geographic Information Systems
- Supervising MSc- and BSc-thesis projects

Jonna Engström-Öst

- Coastal Ecology I and II: field work, lectures, and lab assignments
- Research Methodology: lectures and assignments
- Sustainable Coastal Management: workshops and lectures
- Monitoring of Aquatic Bodies I and II: field visits, lectures, workshops
- Water and Sewage Management
- Supervising PhD, MSc- and BSc-thesis projects

Ashkan Pakseresht

- Management systems

Stefan Heinänen

- Fisheries resource management
- Environmental impact assessment
- Waste management
- Maritime spatial planning
- Statistics
- Supervising MSc- and BSc-thesis projects

Farid Karimi

- Bioeconomy Innovation
- Environmental Outreach
- Participatory processes and conflict management

Ruslan Gunko

- GIS Project
- Supervising BSc-thesis project

Novia Raseborg R&D, Personnel 2022

Senior researchers

Engström-Öst, Jonna
Karell, Patrik
Farid, Karimi
Pakseresht, Ashkan

Researchers

Balotari, Fabio
Byholm, Patrik
Gunko, Ruslan
Morosinotto, Chiara
Passarotto, Arianna

PhD Students

von Weissenberg, Ella
Jinzhu Su

Project personell

Backman, Markus
Barman-Geust, Heidi
Bucciolini, Gian Luigi
Dahlberg, Ulrika
Englund, Gunnel
Feliciano, Katrina
Heinänen, Stefan
Karell, Gun
Nyberg, Anna
Rancken, Romi
Riesinger, Paul

Other personell

Fred, Marianne (Head of RDI Bioeconomy)
Gustafsson, Pia (RDI Assistant)
Malkamäki, Ammi (RDI Assistant)
Liinamaa, Johanna (Head of RDI Novia)
Långvik Otto (RDI Coordinator)
Sandberg-Kilpi, Eva (Dean)

The Novia Bioeconomy Research Team

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