DENVI

Doctoral programme in interdisciplinary environmental sciences

ABSTRACT BOOK

3rd ANNUAL DENVI MEETING 2018

UNIVERSITY OF HELSINKI

DENVI - DOCTORAL PROGRAMME IN INTERDISCIPLINARY ENVIRONMENTAL SCIENCES

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ABSTRACT BOOK

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Annual Meeting Information

3rd Annual DENVI meeting will take place on 28th of May 2018, at the Kumpula Campus of University of Helsinki (rooms CK111 and CK112, Exactum-building, Gustaf Hällströmin katu 2 B). The annual DENVI meeting gathers together DENVI students, supervisors, and other university personnel, and gives students the opportunity to present their work, get feedback, and meet internationally renowned researchers in DENVI's fields of science.

The Keynote Speaker of DENVI annual meeting 2018 is **Professor Tiit Tammaru** from University of Tartu, Estonia. 19 DENVI students will give an oral presentation and 5 have prepared posters based on their research. Furthermore, the program includes social activities culminating in sauna and dinner at Saunamesta (Elimäenkatu 9A).

About DENVI

DENVI doctoral programme in interdisciplinary environmental sciences started in January 2014 and is coordinated by Helsinki University Centre for Environment, HENVI. DENVI belongs to Doctoral School in Environmental, Food and Biological Sciences (YEB) and is funded by University of Helsinki. The central themes of DENVI are environmental change and sustainable development as well as climate change, land use, and Baltic Sea and its catchment area. The program gathers together the essential fields of natural and social sciences, law and humanities that are needed to study the complexity of environmental change and pathways to sustainable development. DENVI aims to study environmental change from biological processes to environmental governance – seeking solutions for a more sustainable future. DENVI considers environment broadly from natural habitats to built environments.

KEYNOTE SPEAKER

PROFESSOR TIIT TAMMARU

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University of Tartu, Estonia.

Keynote: Understanding Vicious Circles of Segregation

Tiit Tammaru is a Professor of Urban and Population Geography and a Chair of Human Geography at the Department of Geography, University of Tartu. His main fields of research include socioeconomic and ethnic segregation, urban and neighbourhood change, migration, residential mobility, and housing. He is especially interested in understanding the interplay between income inequality, urban poverty and spatial segregation of ethnic and socioeconomic groups. He is the lead editor of the book "Socioeconomic Segregation in European Capital Cities" (Routledge, 2016, http://segregationeurope.tudelft.nl/) and "Estonian Human Development Report 2016/2017. Estonia at the Age of Migration" (https://inimareng.ee/en/).

DENVI STUDENTS' ABSTRACTS IN THE ORDER OF THE PROGRAMME (ORAL PRESENTATIONS)

Kerli Müürisepp

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Ethnic differences in activity spaces as a characteristic of segregation: A study based on mobile phone usage in Tallinn, Estonia

Deepening socio-spatial divisions in cities are challenging policy-makers to improve urban and integration policies. At the same time, research on ethnic segregation has mainly focused on residential separation of ethnic groups, which constitutes just one part of individuals' spatial behaviour. I aim to provide a more comprehensive evaluation of segregation by focusing on individuals' entire activity spaces. Particularly, my objective is to reveal how ethnicity influences individuals' spatial behaviour by comparing Estonian- and Russian-speakers living in Tallinn. I apply call detail records of mobile phones to investigate volumes and variability of activity locations and activity spaces. The results show that significant ethnic differences in the number of activity locations, geographical distribution of the locations, and overall spatial extent of activity spaces exist. Moreover, these differences tend to deepen as the studied time period is extended (day, month, year).

Gonzalo Cortés Capano

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Landowners´ preferences, motivations and needs to inform voluntary private land conservation policy in a conservation priority area

The success of voluntary private land conservation (VPLC) policies greatly depends on landowners' willingness and capabilities to implement sustainable management. Although many strategies and incentives have been developed worldwide to promote VPLC, their success is generally context-dependent. Following a co-production approach, we conducted semi-structured interviews with traditional cattle ranching landowners in a priority area for biodiversity and ecosystem services in Uruguay. Our aim was to understand landowners' relationship with nature, their preferences, motivations and needs in order to identify appropriate strategies and incentives to promote effective and equitable VPLC. The results revealed landowners strong sense of place and their voluntary support to biodiversity conservation linked to sustainable production. This was the first study to address landowners perspectives on VPLC in Uruguay and the results will inform policy making at the local and national level.

Maisa Nevalainen

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Towards quantitative oil spill risk assessment in the Arctic marine areas

Risk of an Arctic oil spill has become a global matter of concern as the climate change induced opening of the shipping routes increases the Arctic maritime traffic thus increasing the risk of an oil spill. Hence, there is a growing need to understand the impacts of oil spills on these unique and sensitive areas. So far, quantitative analyses of the likely environmental impacts of such accidents are mostly lacking, and our understanding of the uncertainties related to both accidents and their consequences is poor. We tackle this challenge by introducing a probabilistic framework to quantitatively analyse ecological impacts of Arctic oil spills. We demonstrate our approach using the Kara Sea region as an example. Our approach helps to identify the most important risk factors and can be used as a template for more detailed risk assessments.

Kelsey LaMere

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Determining the Effects of Climate Change on Baltic Salmon: Insights from Participatory Modelling

When scientific knowledge of environmental phenomena is limited, including them in modelling efforts poses an undeniable challenge. Participatory modelling, however, offers solutions in situations when understanding is limited by reaching beyond the academic knowledge base and published literature. To begin to shed light on our own largely unexplored topic, the effects of climate change on Baltic salmon, we turned to resource stakeholders to develop causal models representing alternative hypotheses about the issue at hand. Individual models in the form of influence diagrams were created for each of the eleven stakeholders who participated. Their insights can be used to determine which abiotic, biotic, salmon-specific, and social variables are most likely to be affected by climate change and the way in which these variables are interrelated. Additionally, they can help to determine the life-stages and habitats where salmon are most likely to be vulnerable to climate change effects.

Tiia Luostarinen

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Improving Arctic sea-ice reconstructions based on microbe-derived proxies

Quantitative reconstructions based on biological and microfossil proxy data are a key approach for reconstructing past environmental change. To understand recent climate change and improve the accuracy of future predictions, it is important to study past variability and the drivers behind it. This knowledge is largely improved by investigating biological remains in geological proxy records. However, more knowledge is needed about the links behind species and their environments. The aim is to develop temporal and mechanistic understanding of sea-ice proxies based on diatom and dinoflagellate cyst assemblages and the sea-ice diatom derived molecular biomarker IP25. Here we present preliminary results of seasonal diatom production based on sediment trap analyses from the Young Sound, NE Greenland. Sediment samples from three years were collected at 1 week to 1 month intervals and investigated to determine seasonal time-windows for diatom production in the water column and ice.

Laura Kaikkonen

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Assessing the impacts of manganese nodule mining on the marine environment

Mineral extraction from the seabed has experienced a recent surge of interest from the mining industry and marine scientists. While technological advances enable mapping new seafloor mineral reserves, the ecological impacts of seabed mining are still poorly known. We use a problem-structuring framework to evaluate the environmental impacts of polymetallic nodule extraction and discuss the implications for environmental risk assessment. Traditionally environmental impact assessments build on an understanding of how ecosystems respond to human induced pressures. However, little previous experience with mining projects has been documented to date. Baseline data on species and habitat characteristic associated with the nodules is severely lacking, compromising the integrity of environmental impact assessments. This requires a more structured approach for estimating the adverse effects to marine ecosystems compared to traditional EIA to ensure transparency of the assessment.

Christoph Fink

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Uncovering Illegal Wildlife Trade on Social Media: Automatic Data Collection, Deep Learning Filters and Identification

Illegal wildlife trade is one of the biggest threats to biodiversity conservation, as many species, including iconic species such as rhinoceros and elephant taxa, are targeted for their meat, trophies and other body parts. A large portion of the illegal market for wildlife trade has moved to social media and the dark web, with recent contributions emphasising the role of social media both in cross-border trade and in local distribution on the destinations' markets. So far, the use of social media data in conservation science has been limited, including manual, labour-intensive, efforts to classify information. Deep learning is a machine-learning approach used for diverse tasks, such as automated image recognition, natural language translation, and speech recognition. It has been applied within conservation science for identifying wild animals in camera-trap images. We propose a framework using deep learning to filter and identify data pertaining illegal wildlife trade from social media platforms. We show how such an approach can be used to identify species and wildlife products – e.g. rhino horn and elephant ivory –, their origins, destinations, routes, and involved actors more efficiently from social media data.

Anita Heim
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Low dietary diversity and poor food environment among the Khwe San people in Namibia

Bwabwata National Park is among the few protected areas in Africa where people are permitted to reside inside the Park. However, the strict regulations on resource use created a challenging food environment for the local indigenous, previously hunter-gatherer, Khwe San people. This continues to be overlooked by regional and national political actors. Due to lack of scientific data to argue the severity of the problem, this study explores the diet quality and the present food sources in the park. To explore the former, I used key informant interviews, 24-hours diet recalls (n=200) and dietary diversity scores; and to examine food sources I undertook stakeholder interviews and ranking exercises. The results show, that the diversity of the present diet is very low (DDS=2.5) and several food groups are not accessible for the residents. The contemporary food environment is fragile and not able to support a satisfactory diet for the Khwe people, which requires urgent attention and action.

Manu Rantanen

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Multiple dwellers as players of rural policy

The presentation deals with the different and changing expectations of multiple dwellers, local communities and municipalities on the personal agency of multiple dwellers in local development. It also presents the different contexts in which multiple dwelling occurs in media publicity in various time periods. The changes of these expectations are studied from the early decades of 20th century to present days based on articles of two Finnish digital newspapers. Contentions in the media are part of the discursive struggle about the position of multiple dwelling in the rural development policy. These discourses factualize in various social practices. The theoretical background of the research is social constructivism. Also the semiotic approach is used.

Tuuli Parviainen

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Oil spill risk governance in the Norwegian Barents Sea: identifying key management measures and knowledge actions

Potential oil spills from natural resources extraction and shipping activities pose a significant threat to the Arctic marine environment and the coastal communities. This presentation will focus on a case study on the Norwegian governments recent decisions to open new areas for offshore resource exploration and exploitation in the Barents Sea. With the use of stakeholder interviews and visual influence diagrams, the aim of the study 1) provide insight into and analyse the different viewpoints, values and perceptions of oil spill risks and the appropriate governance measures, 2) investigate what type of knowledge actions are needed to support effective oil spill risk governance. Finally, the study demonstrates a need for developing proactive oil spill risk governance systems based on deliberative decision-making processes and social learning.

Marja Roslund

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Urbanization and Environmental microbiota

Expanding urbanization is a major factor behind rapidly declining biodiversity. Based on current knowledge, the limited contact with diverse environmental microbiota negatively affects the immune system. Another important factor that affects the immune system is pollutants released by humans, e.g. traffic emissions. Our research group has been investigating how land use modifies the quality and quantity of environmental microbiota and how urban pollution alters the abundance of health-associated bacteria in urban landscaping materials. Our study indicates that in commonly used urban landscaping materials even slight pollution level may alter bacterial communities associated with the human health, and exposure to potentially pathogenic bacteria might even increase in densely built areas. Therefore, we designed safe and diverse plant based materials, in order to modify commensal microbiota and immune system among urban dwellers.

Marja Salo

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Carbon footprint of household consumption in Finland relationships to urban form

Carbon footprint from household consumption, i.e. household consumption expenditure on housing, travel, food, and other goods and services, contribute to substantial share of the global greenhouse gas (GHG) emissions. In order to understand the drivers and patterns of consumption, we study the relationships of various socio-economic and geographical explanatory factors on the size and composition of per capita or household carbon footprint. We combine data from the Household Budget Survey (HBS) provided by Statistics Finland and GHG intensities from the detailed environmentally extended input-output model (ENVIMAT) of the Finnish economy. We calculate carbon footprints for the sample of the HBS by multiplying consumption expenditure with GHG intensities. We study differences in size and composition of footprints among residents in different urban form categories.

Joel Jalkanen

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Locating Large Ecological Networks for Regional Land-use Planning with Spatial Conservation Prioritization

Currently, ecological issues in the Finnish land-use planning practices have focused on small, high-quality sites that harbor abundant and/or rare biodiversity features ("critical" sites for biodiversity preservation). Although intuitive, focusing on small remnants of good-quality sites in land-use planning may neglect the large-scale ecological systems and common diversity, especially in human-dominated and fragmented landscapes. We used a conservation planning software called Zonation to identify large-scale agglomerations of good-quality sites in the Uusimaa region, S-Finland. We focused to not only the priority ranking ("the critical sites") but also the relative density of the biodiversity features ("the overall diversity") as well. That enabled us to identify large well-connected ecological networks that harbor a great portion of the Uusimaa biodiversity. We also used the corridor building tool in Zonation to locate ecological corridors that unite large good-quality areas inside and in-between the networks. The analysis was done for the Regional Council of Uusimaa, and the results will be used in the Uusimaa Regional Plan 2050 initiative.

Vuokko Heikinheimo

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Understanding the use of urban green areas via location-based social media

Location-based social media, and other crowdsourced data, are increasingly used as information sources for understanding nature recreation in different environments. Social media platforms allow people to share their activities and observations online, and this information may tell us where, when and how people use and value green areas. This study explored green area use patterns from different social media, and compared the results with map survey data and sports application data from green areas in Helsinki, Finland. Spatial and temporal patterns of leisure time activities were captured from Instagram, Flickr and Twitter. Sports application data contained more detailed information in space and time, but with limited content. Map survey allowed active citizens to contribute their insights to more in-depth questions. The results confirm that social media provide relevant information about green area use, but the compared data sources mostly differ in their information content. Thus, different crowdsourced data should be used in conjunction with each other in order fill in gaps and biases in actively and passively contributed data.

Maria Ojanen

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The role of research and science in decision making on REDD+ national policies

Since 2007, efforts to design and implement a mechanism to reduce emissions from deforestation and forest degradation (REDD+) are ongoing in tropical forest countries. To realize the required transformational policy change for establishing REDD+, a number of national and international research organizations aim to inform the policy processes by providing evidence, guidance and tools for effective, efficient and equitable REDD+. However, policymaking is a complex process influenced by a multitude of factors and actors. In this context, scientists and researchers are in a continuous situation of competition with other actors. This questions the level of influence of experts and scientific information to the policy process. By using policy netwok analysis, I present results from an ongoing project that looks at the role of research organizations involved in REDD+ policy arenas in 2 countries, Brazil and Indonesia.

Mohammad Mozumder

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Small-Scale Hilsa Shad (Tenualosa ilisha) Fishery of Bangladesh: Status, challenges, and Potentials

Hilsa shad (Tenualosa ilisha) is the national fish of Bangladesh and has nutritional, economical, and cultural significance. However, hilsa fishery has been facing different challenges both from ecological and social contexts that deserve unpacking to understand the existing situation and formulate the recommendations. Both primary and secondary data were used in this study. Use of illegal nets, harvesting of juveniles and broodstock, improper fishing regulations, management measures and environmental changes are the critical issues for the hilsa catch. To enhance the social-ecological resilience of the hilsa fishery respondents urged to use of local ecological knowledge in the management plan, developing fisheries policies, provide diversified income-generating activities during the crisis period and sharing responsibilities to manage the hilsa fishery as a form of co-management.

Aina Brias

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Does Education make a difference in Biodiversity Conservation? Systematic review of case studies of Education Programs implemented in Protected Areas

Biodiversity is lost at unprecedented rates, while Protected Areas (PA) remain the most important strategy for biodiversity conservation at a global scale. In many cases, education has been promoted as an important strategy for conservation, increasing knowledge and changing attitudes. However, many education programmes are being implemented without strong evidence of their effectiveness, specially referring to the long-term impacts. To enhance the understanding of this topic, a systematic literature review has been conducted to provide an exhaustive state-of-art of the role of education programmes implemented in PA as a biodiversity conservation strategy. Concretely, to: 1. Define relevant characteristics of the education programs; 2. Outline the evaluation methods and outcomes; 3. Identify the role of local communities and local environmental knowledge. [Work in progress]

Emilia Luoma

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Towards a sustainable small port - perspectives of boaters and port actors

A study concerning the sustainable development of small ports in the Eastern Gulf of Finland is presented. Eight Finnish stakeholders (boaters and port actors) were chosen to study how stakeholders communicate and think about the concept of sustainability and its materialization in the small port planning and development. It was compared whether the definition of sustainability, or thoughts concerning the sustainable development differ from boaters to port actors. In the science, the concept of sustainable development, is often seen to consist of three aspects: environmental, economic and social. According to the interviews, stakeholders agree that sustainable development has three aspects, but they often emphasize one of them. This study helps to understand how stakeholders view the concept of sustainability and what aspects they see involve into it in the context of development of small ports. In addition, this study presents one method of analyse the thinking of the stakeholders.

Jenni Simkin

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Natural Resources Institute Finland LUKE

How does forest management influence people's perceptions of the restorative value of forests?

Even a short visit to a nature environment has been found to have positive effects on psychological well-being. As the world's population becomes increasingly urbanised and detached from the natural world, understanding the potential health benefits of accessing natural areas – such as forest – is increasingly important. However, it is still unclear whether forest has similar restorative effect despite its quality factors such as forest management. We investigated whether peoples´ perceived psychological restorativeness varies in four differently managed forests. A total of sixty-six volunteers made one short-term visits to each forest at the end of their workday. Participants' perceptions of restorativeness were measured after each visit. Preliminary results reveal that people felt less restored in young forest compared to all other three forests. The most restorative forests were the old-growth forest and the mature commercial forest. It seems that forest management has an influence to the perceived restoration and the effects should be taken into account when managing the forests close to residential areas.

POSTER PRESENTATIONS

Alexandra Jurgilevich

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Dynamics of climate change vulnerability and exposure in urban areas

Future vulnerability and exposure to climate risks are still lacking conceptual understanding and methodological development. To include the dynamics of vulnerability and exposure into future-oriented climate risk assessments we account for the following three issues: identification of key drivers of future socio-economic development and land use change, use of socio-economic scenarios to account for a multitude of interacting drivers and dynamic processes, and use of mapping tools to reflect spatial changes in vulnerability and exposure indicators. In this study, we developed a qualitative participatory methodology that addresses these three issues. The methodology has been tested at the case of Helsinki analyzing the dynamics of vulnerability and exposure up to 2050. The poster will present the maps obtained in the workshop with the City of Helsinki and discuss the benefits and limitations of the approach and propose options for future research.

Janina Käyhkö

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Gaming in climate change adaptation research and science communication introducing The Maladaptation Game

Food production in Nordic countries is assumed to be both threatened by and benefitting from the influence of climate change. Adaptation to the changing conditions is happening at farm level, whereas adaptation policies are not yet widely established. We stress that the risk of maladaptation, i.e. unintended negative outcomes of adaptation measures, need to be further scrutinized along with adaptation policy development. To approach this complex phenomenon, we assessed adaptation decision-making and maladaptation with novel methodology of integrating visualization, participatory methods and serious gaming. We developed a web-based single player game and held gaming sessions with agricultural stakeholder groups. The key findings show that research based serious gaming can be helpful tool in communicating about complex concepts such as maladaptation and

assist on adaptation decision-making by opening new perspectives on the opportunities and challenges related to adaptation measures

Sanna Piilo

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Recent changes in vegetation dynamics and carbon accumulation in high-latitude and permafrost peatlands

At high-latitudes, climate is warming almost twice the rate of the global average. The subarctic area is especially sensitive to warming and permafrost peatlands are already thawing. Peatland carbon dynamics will be altered via changes in, for example, vegetation and hydrology. These changes with complex feedbacks pose large uncertainties for the future carbon dynamics. So far, there are only scarce observations of high-latitude peatland vegetation response to recent warming. This research aims to identify climate-induced changes in high-latitude peatland vegetation and consequent influence on carbon dynamics from the past to the future by applying palaeoecological methods. Preliminarily, high spatio-temporal variation between and within the study sites is observed.

Ruhui Wen

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Gene analysis and comparison of glycoside hydrolases found in 135 Staphylococcus aureus whole genomes

S.aureus is a leading cause of biofilm-associated infections with antibiotic resistance. Biofilms are formed by a slime substance containing poly-^{2}-N-acetyl-glucosamine. Many S. aureus enzymes are involved in the cell lysis and detachment from the biofilm structure. Among them, glycoside hydrolases with endo-^{2}-N-acetyl-glucosaminidase specificity may have potential in the treatment of S.aureus infection. Among 135 S.aureus strains, the genomes were screened for genes encoding poly-ß-acetyl glucosamine degrading enzymes. The frequency and distribution of their sequences were evaluated. As a result, autolysin-coding genes occurred in all 135 S. aureus genomes. The locations of the sequences encoding for amidases were similar in most genomes. Some strains even contain the phage-related lytic genes. Moreover, many other genes in S. aureus genomes were suggested to encode enzymes degrading poly-ß-acetyl glucosamine that may be important in the prevention of S. aureus infection.

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Bioremediation of gasoline-contaminated soils and biodegradation preference of gasoline aromatics

Two lab experiments were launched in Greenland (+ 10) and Finland (+ 4) respectively to study natural attenuation and biostimulation of gasoline contaminated soils at low temperatures. Urea, methylene urea, and NPK were used respectively in the Greenland experiment for biostimulation, while only methylene urea was used in the Finland experiment. In the Finland experiment, effects of pseudoreplication and ecological mean on remediation results were also studied. In the Greenland experiment, no natural attenuation was observed; only urea enhanced gasoline degradation by 47%. Besides, naphthalene homologues were degraded more than mono-aromatics. In the Finland experiment, natural attenuation or biostimulation was plot and compound dependent. In conclusion, biostimulation using urea was the most effective in soil gasoline remediation at low temperatures; ecological replication with parallel analysis of each replicate plot is recommended for soil remediation studies.

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