5th IRSAE Summer School 2014 – preliminary program

Methods to evaluate the effects of climate change on ecosystems and populations

IRSAE International Research School in Applied Ecology

4. – 8. August
Telemark University College, Department of Environmental and Health Studies, Norway

Dear all!

It is our pleasure to invite you to the 5th conference/workshop in Applied Ecology as part of the International Research School in Applied Ecology (IRSAE). The dates and location are set to **4. – 8. August 2014** at Telemark University College (TUC), Department of Environmental and Health Studies in Bø, Norway. We would like to invite PhD-candidates of the IRSAE partner institutions to participate, and academic staff members are also welcome to join. Below you will find a preliminary program for the summer school, an introduction of the main contributors, as well as some practical information. **The registration deadline has been extended to May 30.**

Introduction and aim

One of the most important factors affecting the biosphere is the climate. It has the potential to be a driving force in the evolution and distribution of species, but also whole biological communities and ecosystems. Though generally a very dynamic and selective force, climate since the last ice-age has been comparatively stable, thereby giving species an opportunity to adapt to the environment they inhabit. This stability, however, is undergoing change. During the last 130 years the global surface temperature has increased by 0.85^{o}C, which in turn has led to major changes in the climate worldwide. These changes are now occurring at a speed 20-30 times faster than similar changes in the past, and they are most likely to affect organisms in ways we do not yet fully understand. As a result, more and more scientists are initiating projects to unravel the potential effects of climate change on "the living world". But how should one proceed? Climatology is to most ecologists an "alien discipline" with its own academic language, methods and statistical analyses. In addition, the plethora of climate data that exists in different databases worldwide makes it difficult, and often confusing, to know where to start looking for relevant data that can be used in ecological research. To combat these obstacles and difficulties IRSAE and TUC are holding this workshop seminar entitled "*Methods to evaluate the effects of climate change on ecosystems and populations"* including a hands-on training course in *"Managing, Visualizing and Analyzing Climatic and Ecological Data in R: The Statistical Programming Environment"*.

The main goal is to provide the candidates with knowledge on how to:

a) locate, extract and identify relevant climate data useful to ecological research
b) interpret the significance and meaning of extracted data
c) apply these data to specific ecological problems, and to evaluate their biological and ecological significance

Each day will start with introductory lectures given by the topic organiser and/or an invited expert speaker, followed by the participants working in groups with practical tasks related to the lectures. There will also be sessions with presentations by the PhD-candidates (including a poster session).

Preliminary program

Day 1 - Monday

Professor Inger Hanssen-Bauer (Norwegian Meteorological Institute, TUC)

General lecture: "Presentation on the projected global climate change during the 21st century according to the latest working group 1 IPCC report"

The following workshop will focus on local climate analyses. It will include examples of downloading climate indicators and local climate data from free data sources, as well as the combination of different climate datasets, and performing simple statistical analyses.

Day 2 - Tuesday

Dr. Jonathan Lenoir (Jules Verne University of Picardie), Dr. Christina Buesching and Dr. Chris Newman (University of Oxford)

General lecture: "Climate and Ecology"

Introductory lecture: "Data management and visualization in R: the spatial case of climatic and ecological data"

Group work: Using the "rgdal", "raster" and "rgbif" R-packages, each group will import and handle its climatic (e.g., WorldClim) and ecological (e.g., GBIF) data to tackle a specific research problem (tentative projects will be sent out later).

Day 3 - Wednesday

Dr. Jonathan Lenoir, Dr. Christina Buesching and Dr. Chris Newman

Introductory lecture: "Data analysis in R: linking species distribution data to climatic data"

Group work: Using the "ade4", "hypervolume", "dismo", "maxent, or "PresenceAbsence" R-packages, each group will analyze its climatic and ecological data to tackle a specific research problem (tentative projects will be sent out later).

Day 4 - Thursday

Excursion all day

Banquet dinner at night

Day 5 - Friday

Professor Inger Hanssen-Bauer, Dr. Jonathan Lenoir, Dr. Christina Buesching and Dr. Chris Newman.

Summary and group work presentations

Familiarity with statistics and R software are desirable but not mandatory for enrolling in the workshop. We will work in TUC's computer labs. For those who bring their own laptops, please make sure you have R installed before you arrive.

A list of tentative research questions for the group work will be sent out after the registration deadline. We also encourage the participants to bring their own data to the workshop.

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<tr><th></th><th>Sunday 3</th><th>Monday</th><th>Tuesday</th><th>Wednesday</th><th>Thursday</th><th>Friday</th></tr>
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10:00 - 10:45</td><td>Workshop</td><td>Workshop</td><td>Workshop</td><td rowspan="3">Excursion</td><td>Summary</td></tr>
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12:00 - 13:00</td><td>Workshop</td><td>Workshop</td><td>Workshop</td><td>Summary</td></tr>
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17:00 - 18:00</td><td>Workshop</td><td>Workshop</td><td>Workshop</td></tr>
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20:00 - 21:00</td><td></td><td>Academic speed dating</td><td>Poster session</td><td>Steering board meeting</td><td>Banquet dinner</td></tr>
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Main contributors in the workshop

Professor Inger Hanssen-Bauer

I'm head of the Norwegian Centre for Climate Services (NCCS) and hold a 20% position as Professor in Climate at TUC. I have been active within climate research for about 30 years. My research interests cover boundary layer and local climates, analyses of long-term series of climate observations, and connections between large-scale and local climate patterns, including statistical downscaling of climate projections. I was contributing author to the IPCC reports from 2001 and 2007 as well as to the Arctic Climate Impact Assessment from 2004. During later years my focus has been on providing relevant climate information (on past, present and future climate) for application in climate impact studies as well as for climate adaptation purposes.

List of selected publications:

Hanssen-Bauer, I, Achberger, C, Benestad, R, Cheng, D & Førland, EJ (2005) Statistical downscaling of climate scenarios over Scandinavia: A review. *Climate Research,* 29, 255-268.

Hanssen-Bauer, I (2007) Climate variation in the European sector of the Arctic: Observations and scenarios. In: J.B. Ørbæk et al. (Eds.) Arctic-Alpine Ecosystems and People in a Changing Environment. Springer-Verlag., ISBN: 3-540-48512-0

Tyler, NJC and 16 others, including **Hanssen-Bauer, I** (2007) Saami reindeer pastoralism under climate change: applying a generalised framework for vulnerability studies to a sub-Arctic social-ecological system. *Global Envir. Change*, 16 (4), doi:10.1016/j.gloenvcha.2006.06.001

Benestad, RE, Førland, EJ & **Hanssen-Bauer, I (**2007) An evaluation of statistical models for downscaling precipitation and their ability to capture long-term trends *Int. J. Clim*, 27: 649- 665, DOI: 10.1002/joc.1421

Benestad, R E, **Hanssen-Bauer, I** & Chen, D (2008) "Empirical-Statistical Downscaling", World Scientific Publishers, ISBN 978-981-281-912-3

Førland, EJ, Benestad, RE, **Hanssen-Bauer, I**, Haugen, JE & Engen-Skaugen, T (2011) Temperature and precipitation development at Svalbard 1900-2100, Advances in Meteorology Vol 2011, ID 893790, doi:10.1155/2011/893790 (www.hindawi.com/journals/amet/aip/893790/)

Førland, EJ, Steen Jakobsen, JK, Denstadli, JM, Lohmann, M, **Hanssen-Bauer, I,** Hygen, HO & Tømmervik, H (2012) Cool weather tourism under global warming: Comparing Arctic summer tourists' weather preferences with regional climate statistics and projections, In press, *Tourism Management* (http://ees.elsevier.com/jtma/)

Vikhamar-Schuler, D**, Hanssen-Bauer I**, Schuler TV, Mathiesen SD and Lehning M (2013) Multilayer snow models as a tool to assess grazing conditions for reindeer under changing climate, *Annals of Glaciology,* 54 (62), doi: 10.3189/2013AoG62A306

Uleberg, E, **Hanssen-Bauer, I**, van Oort, B & Dalmannsdottir, S (2013) Impact of climate change on agriculture in Northern Norway and potential strategies for adaptation. Climatic Change doi 10.1007/s10584-013-0983-1

Dr. Jonathan Lenoir

I'm an Associate Professor in Biostatistics in the Plant Biodiversity Lab at Jules Verne University of Picardie, France. I'm broadly interested in the ecological dynamics associated with spatial and temporal global changes, with particular emphasis on the biotic responses to contemporary climate change. My research interests range from broad-scale patterns of biodiversity and long-term changes in species distribution to finer-scale and shorter-term changes in community composition. My skills cover the fields of ecoinformatics, forest sciences, macroecology, plant ecology and statistics. I'm currently working on the importance of fine-scale climatic conditions to provide microrefugia for plants under contemporary climate change.

List of selected publications:

Lenoir J., Gégout J.C., Marquet P.A., de Ruffray P., Brisse H. (2008). A significant upward shift in plant species optimum elevation during the 20th century. *Science*, 320, 1768-1771

Lenoir J., Gégout J.C., Guisan A., Vittoz P., Wohlgemuth T., Zimmermann N.E., Dullinger S., Pauli H., Willner W., Svenning J.C. (2010). Going against the flow: potential mechanisms for the unexpected downward range shifts of some mountain plant species despite a warming climate. *Ecography*, 33: 295-303

Lenoir J., Gégout J.C., Guisan A., Vittoz P., Wohlgemuth T., Zimmermann N.E., Dullinger S., Pauli H., Willner W., Grytnes J.A., Virtanen R., Svenning J.C. (2010). Cross-Scale Analysis of the Region Effect on Vascular Plant Species Diversity in Southern and Northern European Mountain Ranges. *PLoS ONE*, 5: e15734

Lenoir J., Virtanen R., Oksanen J., Oksanen L., Luoto M., Grytnes J.A., Svenning J.C. (2012). Dispersal ability links to cross-scale species diversity patterns across the Eurasian Arctic tundra. *Global Ecology and Biogeography*, 21: 851-860

Lenoir J., Graae B.J., Aarrestad P.A., Alsos I.G., Armbruster W.S., Austrheim G., Bergendorff C., Birks H.J.B., Bråthen K.A., Brunet J., Bruun H.H., Dahlberg C.J., Decocq G., Diekmann M., Dynesius M., Ejrnæs R., Grytnes J.A., Hylander K., Klanderud K., Luoto M., Milbau A., Moora M., Nygaard B., Odland A., Ravolainen V.T., Reinhardt S., Sandvik S.M., Schei F.H., Speed J.D.M., Tveraabak L.U., Vandvik V., Velle L.G., Virtanen R., Zobel M., Svenning J.C. (2013). Local temperatures inferred from plant communities suggest strong spatial buffering of climate warming across Northern Europe. *Global Change Biology*, 19: 1470-1481

Dr. Christina Buesching and Dr. Chris Newman

We are both Senior Research Associates with the Wildlife Conservation Research Unit at Oxford University. Christina is a behavioral ecologist whose research centers around the questions of why animals behave the way they do, how animals modify their behavior to accommodate changing environmental conditions, and how animals communicate their behavioral intentions to others. As the study of climatic effects animal populations usually requires medium- to long-term monitoring, another research interest of mine is the costs and benefits of Citizen Science as a tool of collecting long-term data sets. Chris is at heart a natural historian, and I take a 'broad-view' in my research. Much of modern biology is highly specialised, and forces a narrow focus, but I prefer the benefits of a polymathic approach, incorporating insights from population dynamics, animal behaviour, physiology, evolutionary

genetics, parasitology, and environmental interactions. The effects of climate change on population dynamics remain one of our foremost academic interests.

List of selected publications:

Macdonald, D.W. & **Newman, C.** (2002) Badger (*Meles meles*) population dynamics in Oxfordshire, UK, Numbers, Density and Cohort life histories, and a possible role of climate change in population growth. *Journal of Zoology* 256: 121-138.

Root, T.L., Liverman, D. & **Newman, C.** (2007). Managing biodiversity in the light of climate change: current biological effects and future impacts. In: Key Topics in Conservation Biology. D.W. Macdonald, ed. Blackwells Scientific Publishing, Oxford, UK

Macdonald, D.W., **Newman, C.,** Nouvellet, P.M. & **Buesching, C.D.** (2009). An analysis of Eurasian badger (*Meles meles*) population dynamics: Implications for regulatory mechanisms. *Journal of Mammalogy*, 90: 1392-1403.

Macdonald, D.W., **Newman, C., Buesching, C.D.** & Nouvellet, P. (2010). Are badgers '*Under The Weather*'? Direct and indirect impacts of climate variation on European badger (*Meles meles*) population dynamics. *Global Change Biology*, 16: 2913–2922

Kaneko,Y., **Newman, C., Buesching, C.D.** & Macdonald, D.W. (2010) Variations in badger (*Meles meles*) sett microclimate: Differential cub survival between main and subsidiary setts, with implications for artificial sett construction. *International Journal of Ecology.* Article ID 859586

Zhou, Y.B., **Newman, C., Buesching, C.D.,** Zalewski, A., Kaneko, Y., Macdonald, D.W. & Xie, Z.Q. (2011) Biogeographical patterns in the diet of genus *Martes* across the Holarctic region: factors affecting trophic diversity. *Journal of Biogeography* 38: 137-147

Campbell, R. D., Nouvellet, P., **Newman, C.,** Macdonald, D. W. & Rosell, F. (2012). The influence of mean climate trends and climate variance on beaver survival and recruitment dynamics. *Global Change Biology*, 18: 2730–2742.

Campbell, R. D., **Newman, C.,** Macdonald, D. W. & Rosell, F. (2013). Proximate weather patterns and spring green-up phenology effect Eurasian beaver (*Castor fiber*) body mass and reproductive success: the implications of climate change and topography. *Global Change Biology*, 19: 1311–1324.

Zhou, Y-B., **Newman, C.,** Chen, J., Xie, Z-Q. & Macdonald, D.W. (2013). An anomalous and extreme weather event disrupts an obligate seed dispersal mutualism: Snow in a sub-tropical forest ecosystem. *Global Change Biology*, 19: 2867-2877.

Nouvellet, P., **Newman, C., Buesching, C. D.,** & Macdonald, D. W. (2013). A Multi-Metric Approach to Investigate the Effects of Weather Conditions on the Demographic of a Terrestrial Mammal, the European Badger (Meles meles). *PloS one*, *8*(7), e68116.

Newman, C. & Macdonald, D.W. (2013). The Implications of climate change for terrestrial UK Mammals. Terrestrial biodiversity Climate change impacts report card Technical paper. Living with environmental change partnership. *http://www.lwec.org.uk/sites/default/files/Mammals.pdf*

Buesching, C. D., Newman, C., & Macdonald, D. W. (2014). How dear are deer volunteers: the efficiency of monitoring deer using teams of volunteers to conduct pellet group counts. *Oryx*, 1-9.

Silvertown, J., **Buesching, C. D.,** Jacobson, S. K., & Rebelo, T. (2013). Citizen science and nature conservation. *Key Topics in Conservation Biology 2*, 127-142.

Buesching, C. D., Newman, C., Jones, J. T., & Macdonald, D. W. (2011). Testing the effects of deer grazing on two woodland rodents, bankvoles and woodmice. *Basic and Applied Ecology*, *12*, 207-214.

Practical information

ECTS credits: 2, a diploma will be issued by TUC

Time: 4 – 8 August (arrival 3 August), the workshop starts at 09:00 on Monday 4

Course site: Telemark University College, Department of Environmental and Health Studies, Gullbringvegen 36, Bø in Telemark, Norway, http://www.hit.no/eng.

Price (including participation, accommodation and food Sunday – Friday):

- Students associated with an IRSAE-member institution: free, travel costs will be refunded
- Research staff associated with an IRSAE-member institution: free, travel costs not covered
- Participants not associated with an IRSAE-member institution: 3000 NOK, travel costs not covered

Accommodation: Accommodation will be provided in student housing close to the course site, and is included in the summer school price.

Excursion: On Thursday, the whole day is reserved for an excursion to the Norwegian Wild Reindeer Centre South (www.villrein.no) and, if the weather permits, Telemarks highest mountain Gaustatoppen (www.gaustabanen.no). There is a cable car all the way to the top, so you will not have to walk!

How to get to Bø:

From Oslo Airport: It is easy to get from the airport to Bø by train (you must change train in Oslo) or bus (change in Oslo and Notodden). It takes approximately 3 hours to get from the airport to Bø.

From Sandefjord Airport Torp: The bus goes directly to Bø from the airport. The trip takes 2.5 hours.

The train and bus station in Bø is situated a 5 minutes' walk from the campus. We can also arrange for people to be picked up at the station.

Registration:

- The IRSAE conference and summer school is open to PhD-candidates and researchers in ecology and nature management with first priority to those associated with IRSAE member institutions.
- Deadline for registration: 30 May 2014.
- To register fill in the "REGISTRATION IRSAE 2014" document and return it to helga.v.tinnesand@hit.no. The registration form is available at: http://irsae.no/event/ .

Course organizers:

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Helga Veronica Tinnesand, PhD-coordinator
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If you have any questions please send us an e-mail.

We hope to see many of you in August!