

## Project information

### Project title

Winter disturbance and nitrogen pollution: Unraveling the mechanisms behind ecosystem response to combined effects of climate and pollution (WINNIT)

### Year

2013/2014

### Project leader

Jarle W. Bjerke, NINA

### Participants

- Project leader: Dr. Jarle W. Bjerke, NINA
- Current project participants from Fram Centre institutions: Dr. Stef Bokhorst, NINA; Dr. Hans Tømmervik, NINA; Dr. Laura Jaakola, University of Tromsø & Bioforsk Nord; Dr. Matthias Zielke, Bioforsk Nord; Dr. Marit Jørgensen, Bioforsk Nord.

Other participants: scientists from Vrije Universiteit Amsterdam and University of Sheffield

### Flagship

Terrestrial, Theme: Vegetation state change and herbivore management

### Funding Source

NRC, Fram Centre,

### Summary of Results

The project started 1 April 2013. During the first nearly eight months of the project, we have been occupied with preparing and establishing the winter warming experiments that are the core part of the project, and that will run during all three winters of the project period. A planning meeting with all project partners was held in May. During the meeting the partners agreed on details for experimental designs and progress plan. During the growing season of 2013 we analyzed the selected field sites to know the condition and composition prior to experimentation. Soil samples were also taken, and these are being analyzed for microfaunal diversity by Stef Bokhorst during his first of three overseas visits to Vrije Universiteit Amsterdam. Bokhorst started on this visit 1 September and will be there until 31 December. Simultaneously, in Tromsø, partners from Bioforsk, NINA and University of Tromsø are nursing the plants, bryophytes and lichens that will be used in freezing tolerance experiments at the Phytotron. These experiments will be initiated in January 2014. We will make video reports from these simulations, similar to the one made previously in this project; see under chapter 6 below.

Below are our outreach activities listed. Many of these are on general winter climate change issues, and are therefore shared with the “sister” project, EWWA (see separate report).

### For the Management

Increasing the understanding how on-going and future global change affects and will affect ecosystems and society is one of the major tasks for the scientific community of today. In this context, WINNIT will be an important contributor by supplying new information on how northern lands will be affected by the combined effects of pollution and climate change, and what the future may look like. Such results should be used by public management bodies in their efforts to make realistic action plans for adaptation to future changes.

### Published Results/Planned Publications

1. International journals (includes those reported last year; project partners in **bold**)

None so far.

1. Popularized reports and newspaper feature stories (project partner in **bold**)

Bevanger K., Hofgaard A., Finstad A. G., Eide N. E., Ødegaard F., **Bjerke J. W.** 2013. Naturen og klimaet. Newspaper feature story. *Adresseavisa*, 2.11.2013, p. 23, part 2. Also published online: <http://www.adressa.no/meninger/kronikker/article8526933.ece>

### Communicated Results

- Presentations on news websites, conferences and to stakeholders, organizations, etc.
1. Forskning.no 6.5.2013: Ekstremvær stresser naturen i nord. Video report made by Bioforsk’s public outreach expert Jon Schärer in co-operation with interviewees Marit Jørgensen (Bioforsk) and Jarle W. Bjerke (NINA). <http://www.forskning.no/artikler/2013/mai/355715>
  2. NINA 6.5.2013: Ekstremvær stresser naturen i nord. Video report made by Bioforsk’s public outreach expert Jon Schärer in co-operation with interviewees Marit Jørgensen (Bioforsk) and Jarle W. Bjerke

(NINA). <http://www.nina.no/Aktuelt/Artikkel/tabid/945/ArticleId/2134/Ekstremvaer-stresser-naturen-i-nord.aspx>

3. Bioforsk 6.5.2013: Ekstremvær stresser naturen i nord. Video report made by Bioforsk's public outreach expert Jon Schärer in co-operation with interviewees Marit Jørgensen (Bioforsk) and Jarle W. Bjerke (NINA). [http://www.bioforsk.no/ikbViewer/page/forside/nyhet?p\\_document\\_id=103256&p\\_dimension\\_id=15074](http://www.bioforsk.no/ikbViewer/page/forside/nyhet?p_document_id=103256&p_dimension_id=15074)
  4. Fram Centre 6.5.2013. Ekstremvær stresser naturen i nord. Video report made by Bioforsk's public outreach expert Jon Schärer in co-operation with interviewees Marit Jørgensen (Bioforsk) and Jarle W. Bjerke (NINA). <http://www.framsenteret.no/ekstremvaer-stresser-naturen-i-nord.5207065-141503.html>
  5. Vimeo.com 6.5.2013: Ekstremvær stresser naturen i nord. Video report made by Bioforsk's public outreach expert Jon Schärer in co-operation with interviewees Marit Jørgensen (Bioforsk) and Jarle W. Bjerke (NINA). <http://vimeo.com/65256340>
  6. Bjerke J.W. 2013. Endret vinterklima i nordområdene. Klimascenario 2100 - blir vi berørt av klimaendringer i nord? Hva gjør vi for å møte utfordringene? Seminar by Northern Network on Climate Change in co-operation with the Fram Centre. Tromsø, 3 September 2013.
  7. Jørgensen M. 2013. Klimaendringene – konsekvenser for landbruk i nord. Klimascenario 2100 - blir vi berørt av klimaendringer i nord? Hva gjør vi for å møte utfordringene? Seminar by Northern Network on Climate Change in co-operation with the Fram Centre. Tromsø, 3 September 2013.
  8. Bjerke J.W. 2013. Pågående og mulige framtidige samarbeidsprosjekter på klima og økologi med Bioforsk. Årsmøte for fagområde for grovfôr og kulturlandskap, Bioforsk. Holt, Tromsø, 16 September 2013. Talk.
  9. Bjerke J.W. 2013. Vinteren er fortsatt lengre enn sommeren. Official opening ceremony for the new NINA house, Trondheim, 29 October. Causerie.
  10. Bokhorst S. & Bjerke J.W. 2013. Extreme winter warming events on sub-Arctic vegetation and ecosystem carbon balance. Project information and student internship advert at Vrije Universiteit's website. <http://www.falw.vu.nl/nl/onderzoek/ecological-sciences/internships-at-the-institute/animal-ecology/extreme-winter-warming-events-sub-arctic-vegetation-ecosystem-carbon-balance.asp>
- Media features (for newspaper feature stories and video reports written by project partners, see above)
  - NRK.no 6.5. 2013: Dyrelivet og vegetasjonen i nord stresses. Journalist: Jan Riise Pedersen. [http://160.68.205.250/nyheter/distrikt/troms\\_og\\_finnmark/1.11015016](http://160.68.205.250/nyheter/distrikt/troms_og_finnmark/1.11015016)
  - NRK P1 Nordpå 14.5.2013: Ekstremvær stresser naturen i nord. Live radio interview with Jarle W. Bjerke. Reporter: Egil Jens Pettersen. 6 minutes long. Available at <http://radio.nrk.no/serie/distriktsprogram-troms-og-finnmark/dktr02004713/14-05-2013> (from ca. 43:15).

#### Interdisciplinary Cooperation

WINNIT is strongly focussed on the application of growth chamber and field experiments to learn about the biological responses to the combined effects of changing winter climate. Its strong biological focus makes it less inter-disciplinary than its "sister" project EWWA. WINNIT has partners from various fields of biological sciences, including ecophysiology, microbiology, biochemistry, ecosystems ecology, pollution biology, animal ecology, soil biology, earth observation and global change biology. These partners are used to work with biologists from other fields and other countries, and this cooperation runs smoothly so far.

For setting the WINNIT results in a wider perspective it will be useful to interact with scientists from other disciplines. This, will, however, come later in the project when results will become available, and this type of interdisciplinary cooperation has thus not been in focus so far.

#### Budget in accordance to results

WINNIT is partly the result of Fram Centre funding from previous years (2011-2012). Thus, it is a good example of how Fram Centre funding contributes to boost the development of new project ideas with new partner constellations.

The Fram Centre funding has made it possible for the Fram Centre personnel to allocate more working hours to the project. This was very convenient as the initial period was more time-consuming than expected due to challenges with finding a suitable site near Tromsø for the field experiment. When a site was found and an agreement with the landlord was made, it took much time to organize the process of

installing power supply to the field site. This meant much correspondence with Troms Kraft and entrepreneurs. Thus, the extra time available has secured that the stated tasks have been undertaken satisfactorily – despite more time used on preparations – and that the milestones have been achieved on schedule, while simultaneously we have had time for public outreach activity. As our lists above show, we have cooperated with the project EWWA in our public outreach. In the coming years it is likely that we will do more project-specific outreach, when WINNIT starts to produce own data which would be of interest for the wider public.

The multiple driver concept emphasized in WINNIT is also the main theme of another recently funded project. The title of this project is “*Ecosystem stress from the combined effects of winter climate change and air pollution - how do the impacts differ between biomes*”. It is financed by the Poland-Norway grant and will run from December 2013 to November 2016. Its acronym is WICLAP, and the Norwegian co-ordinator is Jarle W. Bjerke, who is also project leader of WINNIT. While we in WINNIT will have focus on boreal and sub-Arctic ecosystems, we will in WICLAP have focus on Arctic and temperate ecosystems. However, many of the planned simulations will be the same, and it is natural to seek synergies by tight cooperation between these two projects. We can say that WICLAP is a spin-off from EWWA and WINNIT.

NINA’s projects on winter climate and air pollution also led to an invitation from UK universities to become associate international partner in a large doctoral training partnership (DTP) proposal. This partnership network recently received major funding from the Natural Environment Research Council (NERC; <http://www.sheffield.ac.uk/news/nr/funding-will-keep-uk-at-the-forefront-of-environmental-science-research-1.324702>), and it is likely that Bjerke and Tømmervik, and perhaps other NINA scientists, will co-supervise PhD students enrolled at UK universities in the coming years, and these students will then have projects closely related to the themes in WINNIT and WICLAP. NINA’s involvement in this DTP can therefore also be seen as a result of the Fram Centre funding to Bjerke and co-workers since 2011.

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Could results from the project be subject for any commercial utilization

No

Conclusions

WINNIT is still in its infancy, and results production is underway. Thus, it is still premature to indicate future research directions. However, as stated under Chapter 9 above, ideas developed during the WINNIT proposal process also gave rise to another project, WICLAP, which now also has received ample external funding. See under Chapter 9 for more information, and there also see the description of the DTP, to which WINNIT may be linked in the near-future.