Project information

Keywords
climate change; vegetation resurvey; long-term vegetation change; land-use change;
Project title
KlimaVeg III - Vegetation changes over the past century in subarctic NW Russia
Year
2016
Project leader
Jutta Kapfer
Geographical localization of the research project in decimal degrees (max 5 per project, ex. 70,662°N and 23,707°E)
e.g 69.93, 31.96 (2016); 49.25, 19.94 (2014); 69.05, 19.63 (2014); 71.09, 24.79 (2015)
Participants

KlimaVeg III in 2016:

Jutta Kapfer - Norwegian Institute of Bioeconomy Research

Kari-Anne Bråthen - The Arctic University of Norway

Inna Ryzhkova, Natalia Ikko - Murmansk Arctic State University, Russia

Ksenia Popova - Lomonosov Moscow State University, Russia

Flagship
Terrestrial
Funding Source

Polish-Norwegian Research Programme operated by the National Centre for Research and Development

Summary of Results

KlimaVeg studies the impact of climate change on the composition and distribution of plant communities in different regions. Changes in vegetation are studied using a re-sampling approach, i.e. the repeating of historical, usually plant-sociological studies of high quality. The approach allows to study vegetation changes over several decades and relate these changes to different environmental factors, such as climate change and land-use change.

Result summary from KlimaVeg III in 2016:

After a period of approximately 90 years, the vegetation of Rybachi/Sredny Peninsula, NW subarctic Russia, has been resurveyed in the summer of 2016. Vegetation was investigated using small sampling plots of 1m x 1m size. The plots were relocated as close as possible to their original position and in the same vegetation types as described in the historical study by Kalela (1939). All vascular plant species were recorded and species percent covers were estimated. A total of 250 plots have been resampled.

Historical and recent vegetation data have been digitized, and first analyses have been run. First results show that there have occurred significant changes in the vegetation over the past century. In total for both datasets, 213 species have been counted, 177 of which were observed in the resurvey in 2016. Of 159 tested species, 66 species were found to have changed their occurrence frequency significantly (42 species decreased, 24 species increased). The majority of species that were re-found less often (decrease in frequency) in 2016 were species of graminoids and tall-herbs. Several of these species could be related to wet habitats such as mires. In contrast, dwarf-shrub species were found more often compared with the historical sampling.

To identify the driving forces behind observed changes in vegetation we used species optimum analysis. This analysis tests if the species composition around a focal species has changed directionally along an elevational gradient represented by species indicator values using a weighted averaging approach. Species optimum analysis found that most species have changed species composition for the gradients soil moisture (38), temperature (37), light (34) and nutrients (32). The results indicate both a warmer climate and the cessation of grazing and human land-use in the area to be the most important driving forces of the observed changes in species composition.

Master and PhD-students involved in the project

One PhD candidate (Warsaw University) is involved in the project (to be finished in 2017). Two MSc theses (UiB) have been finalized in 2016 (one graded A, one to be defended by end of november 2016).

Several students were involved in field work in the summers 2014 and 2015.

For the Management

The project shows how changes in land management may influence subarctic vegetation in combination with a warmer climate. Other aspects, e.g. tourism, are also considered in KlimaVeg. The project results are of importance for the management of subarctic and (high-)alpine ecosystems for conservation and land-use.

Published Results/Planned Publications

Published articles:

(1) Kapfer J & Grytnes J-A (2016) Large climate change, large effect? Vegetation changes over the past century in the European High Arctic. Applied Vegetation Science, DOI: 10.1111/avsc.12280

(2) Kapfer J, Hédl R, Jurasinski G, Kopecký M, Schei FH & Grytnes J-A (2016) Resurveying historical vegetation data – opportunities and challenges. Applied Vegetation Science, DOI: 10.1111/avsc.12269

Planned publications:

5 scientific articles are in preparation for international journals with impacts factors.

1 scientific article is submitted to Applied Vegetation Science.

Communicated Results

Kapfer J & Grytnes (2015) Vegetation dynamics or stability in the High Arctic? (talk) 58th Annual Symposium of the International Association for Vegetation Science. Brno, Czech Republic.

Haugum S, Kapfer J, Klanderud K & Grytnes J-A (2015) Does the activity of hikers and grazing animals enhance a range shift of vegetation towards summits? (poster) Perth III: Mountains of our future earth. An international conference in Perth, Scotland.

Fossheim K, Kapfer J, Klanderud K, Odland A & Grytnes J-A (2015) Can changes in snow cover explain the observed shifts in alpine vegetation range limits? (poster) Perth III: Mountains of our future earth. An international conference in Perth, Scotland.

Interdisciplinary Cooperation

KlimaVeg brings together researchers of different scientific disciplines including botany, environmental change research, nature conservation, statistical modelling.

Budget in accordance to results

The Fram Centre funding for research in 2016 enabled to involve researchers and students from UiT and Murmansk Arctic State University. In addition, researcher Ksenia Popova from Lomonosov Moscow State University, Russia, could be involved and financed from the project (field work, planned scientific publication). The amount of field work and hence, project data, was increased. Funding further contributed to increased collaboration on result outreach (scientific publishing) and result communication (international conferences).

Could results from the project be subject for any commercial utilization

No

Conclusions

Additional funding from the Fram Centre in 2016 has enabled the establishment and increase of the international research network and collaboration of KlimaVeg. Additional data sampling from a new study area in the subarctic and one more scientific paper are further valuable contributions to the project.