

# The 7th Circumpolar Agricultural Conference

Circumpolar Agricultural and Land Use Resources - Prospects and Perspectives for Circumpolar Productions and Industries



The world northernmost sheep farmer at 70.9°N

photo: Oskar Puschmann

## Abstract booklet

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partial financial support for managers willing to maintain rangelands that have considerable carbon storage from past carbon sequestration.

### **Climate change and geometric outbreaks in birch forest in Northern Norway**

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**Author:**

*Snorre B. Hagen*

**Institution:**

Norwegian Institute for Agriculture and Environmental Research, Division of Soil and Environment, Svanhovd, Norway

**Abstract**

In the birch forests of northern Norway, outbreaks of the geometrid moths *Epirrita autumnata* and *Operophtera brumata* are a major natural source of forest death. In the period 2002-2009, northern Norway experienced the perhaps most severe geometrid outbreak in modern history, which has led to extensive forest death, in particular in Finnmark county. Several lines of evidence suggest that there may be a close link between climate change and increased forest damage by geometrid moths in northern Norway in recent years. This talk summarizes the recent literature on this topic and presents potential directions of future research.

### **Climate change and large scale grazing systems and its consequences on habitats of Arctic-alpine plants**

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**Author:**

*Lauri Oksanen*

**Institution:**

Department of Natural Sciences, Finnmark University College, Alta, Norway, and Department of Biology, Section of Ecology, University of Turku, Finland

**Abstract:**

Warming climate threatens to eliminate the habitats of arctic-alpine plants and butterflies dependent on these plants by preparing the ground for the invasion of taller and more competitive plants. This process can proceed much faster than the invasion of forests, because the expansion of shrubs, which are already present on the tundra, is enough to make the land unsuitable for small, light loving species. Besides threatening arctic-alpine biodiversity, the expansion of scrublands increases the amount of solar radiation absorbed and converted to heat, and thus speeds up global warming. Shrubby habitats also melt out earlier than the open tundra. Therefore, shrub expansion changes white, reflecting surfaces to absorbing ones prematurely in early June, which also contributes to global warming.

The geography of arctic and subarctic areas aggravates the problems: most of the arctic and northern-alpine tundra lies less than 200 km north of or less than 200 m above the climatic timberline

Fortunately, arctic shrubs have turned out to be sensitive to reindeer grazing, and the same also applies to the birches that form the timberline in north-western Europe, whereas the prostrate arctic-alpine plants are, as a rule, grazing tolerant. Large scale grazing systems, such as the migratory reindeer husbandry of the Sámi and the Norwegian livestock husbandry (sæterdrift) could thus preserve arctic-alpine biodiversity and prevent the vicious circle, where increasing cover of shrubs and trees at high latitudes and altitudes contributes to global warming by increasing the amount of solar radiation converted to heat by the vegetation.

### **The Steigen concept: A regional approach towards an integrated resource management**

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#### **Authors:**

*Christian Uhlig, Ingunn Øvsthus, Celine Rebours, Åsbjørn Karlsen*

#### **Institution:**

Norwegian Institute for Agricultural and Environmental Research, Arctic Agriculture and Land Use Division, Tromsø and Bodø, Norway

#### **Abstract**

In Norway there is an incomplete resource management of side products and residuals from the main primary sectors of agriculture, fish farming and fishery. For example is the theoretically hitherto unused energy content in animal manure estimated to approximately 2,5 TWh per year, while Norwegian fish farming annually emits about 40.000 ton nitrogen and 8400 ton phosphorous into the coastal environments. Furthermore, recycling of nutrients and energy from marine fish waste of approximately 3.2 million ton fish is still at its early stages.

The incomplete resource management results in environmental, economically and social costs. Consequently, an optimisation of national nutrient and energy cycling is required to increase sustainability.

The establishment of individual driven resource optimisation enterprises, e.g. local biogas reactors, are often challenging both logistically and financially, particularly at relatively remote sites. This paper presents an overall conceptual approach to optimize energy and nutrient cycling, due to a cooperatively and integrated resource management system on a regional scale in Steigen, Northern Norway (Figure 1)