

PPS Arctic

Natural science activities within Benefits/Russia

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Status of included projects

NATURAL AND SOCIAL SCIENCE RESEARCH COOPERATION IN NORTHERN RUSSIA AND NORWAY FOR MUTUAL BENEFITS ACROSS NATIONAL AND SCIENTIFIC BORDERS (BENEFITS)

Participating institutions:

- **Norwegian Institute for Nature Research (NINA):** Annika Hofgaard, leader
- **Moscow State University (MSU):** Faculty of Geography , Olga Tutubalina, group coordinator
- **Russian Academy of Science:**
- **Institute of the Industrial Ecology of the North (INEP),** Kola Science Centre: Ludmila Isaeva , group coordinator
- **Centre for Problems of Forest Ecology and Productivity (CEPF),** Natalia Lukina , group coordinator
- **Institute of Geography (IGRAS),** Tatiana Vlasova , group coordinator

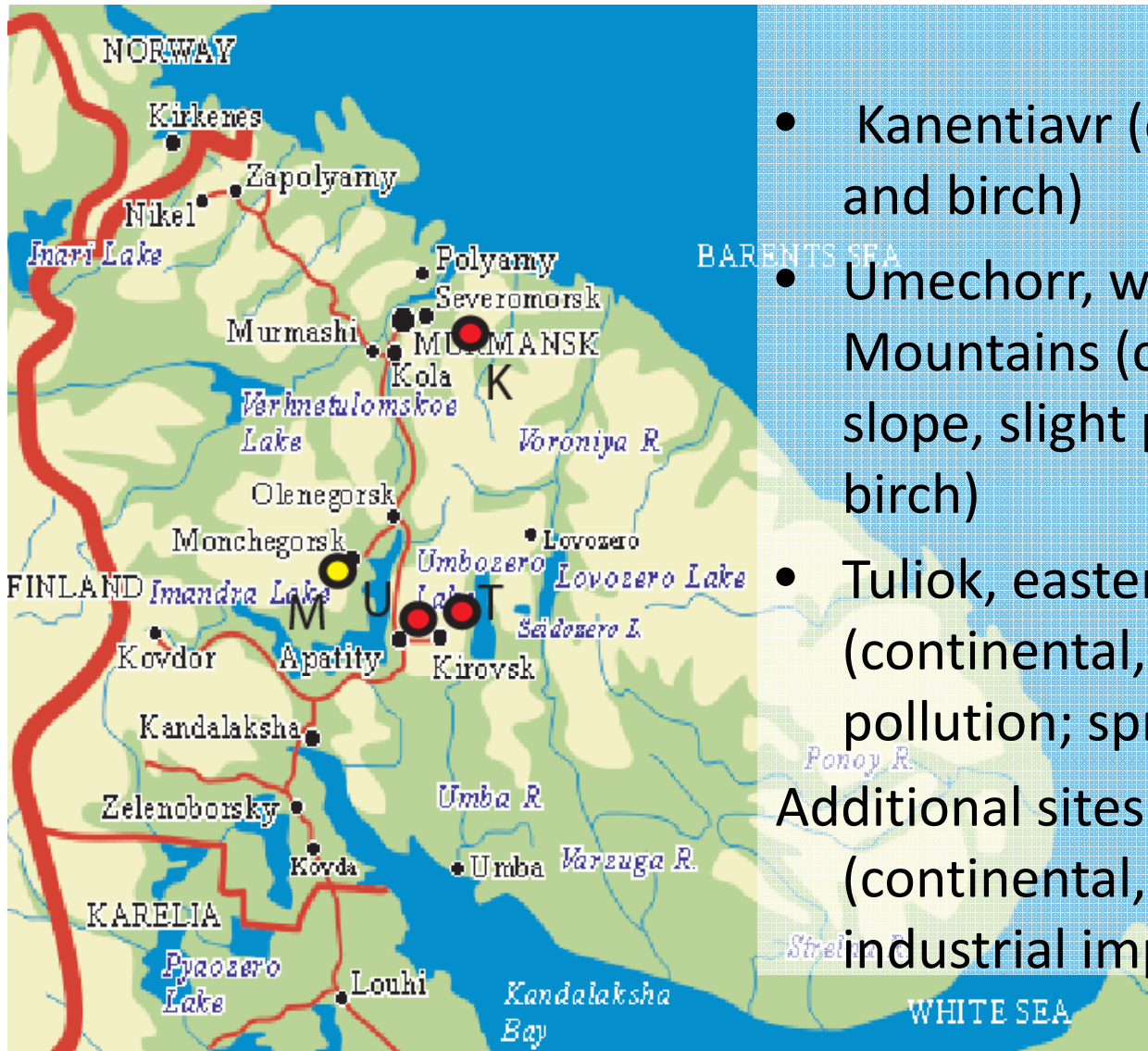
- Through the main PPS Arctic project we are working together with the team of **Scott Polar Research Institute**, the University of Cambridge, coordinated by Dr Gareth Rees

Funding situation

- BENEFITS: funded by the Research Council of Norway; started in 2008, finishes in 2010
- Additional support provided by participating institutions

Active sites

Three main sites have been studied by all teams in 2008 in Kola Peninsula, Russia:



- Kanentiavr (oceanic, plain; spruce and birch)
 - Umechorr, western Khibiny Mountains (continental, west facing slope, slight pollution; pine and birch)
 - Tuliok, eastern Khibiny Mountains (continental, north facing slope, no pollution; spruce and birch)
- Additional sites include Monchegorsk (continental, various slopes, strong industrial impact)

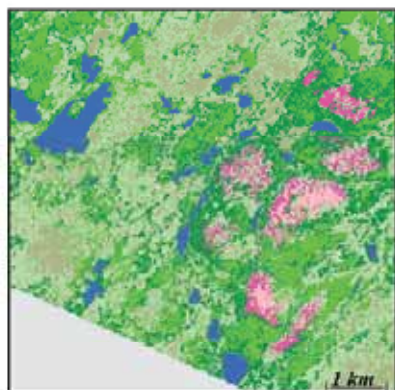
Theme representation (for natural science teams)

- Theme I Characterisation of and monitoring tool development for the transition from forest covered regions to tundra
- Theme II Vegetation dynamics and growth responses to environmental changes and stressors

MSU team

- geobotanical descriptions
- geomorphological descriptions
- vegetation profiling and line mapping
- geochemical analyses for pollutants
- field interpretation of satellite imagery
- ground spectroradiometry
- remote sensing-based ecotone structure analysis and change detection analysis for natural environments
- ground- and remote-sensing based change detection analysis in severely impacted environments

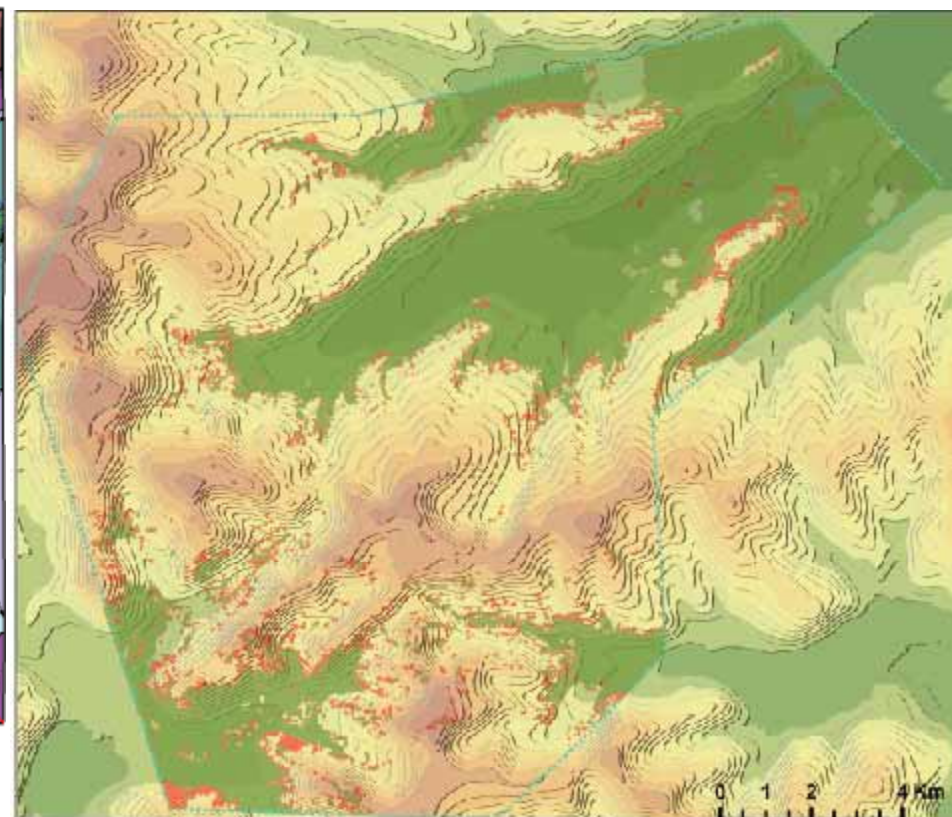
Changes of vegetation in a test site



- Changes:**
- - Birch forests instead of forest-tundra
 - - forest-tundra instead of lichen tundra
- No changes:**
- - Birch forests
 - - forest-tundra
 - - Dwarf shrub-lichen tundra
 - - lakes



Map of changes in distribution of vegetation is compiled as a result of overlay of classified images of 8 August 1961 and of 30 July 2004



Legend

- Contour of study area
- Area of trees with height $\geq 3\text{m}$ at distances $\leq 30\text{m}$
- Area of single trees with height $\geq 2\text{m}$



CEPF and INEP teams

- Soil sampling for assessment of nutritional status at 3 sites: Tuliok, Um'echorr, Kanentjavr
- Large-scale mapping (1:20) of vegetation cover at the same 3 sites for identification of the main tesseras
- Chemical analysis of soil samples from at INEP (pH, total acidity, exchangeable acidity, exchangeable Al and H, total C and N, bio-available Ca, Mg, K, Na, P, S, Al, Fe, Mn, Zn, Ni, Cu), total composition of soil samples, mechanical composition of fine fractions (less than 2 mm).
- Production of vegetation maps, calculation of micro-groups area.
- Paper sent to Russian Journal of Forest Science "Soil fertility as a basis for interrelations between vegetation and soil cover".



лес			
№	микроруппировка	проценты площади	цвет
1	зеленомошно-кустарничиковая	36,45	
2	елово-зеленомошно-кустарничиковая	15,24	
3	травяно-зеленомошно-кустарничиковая	9,195	
4	березово-зеленомошно-кустарничиковая	6,874	
5	елово-травяно-зеленомошно-кустарничиковая	6,2	
6	елово-зеленомошно-кустарничиково-плауновая	4,105	
7	березово-травяно-зеленомошно-кустарничиковая	3,819	
8	зеленомошно-кустарничиково-плауновая	3,135	
9	можжевельно-зеленомошно-кустарничиковая	2,8	
10	елово-зеленомошно-плауновая	1,848	
11	елово-мертво-покровное пространство	1,361	
12	кустарничиково-зеленомошная	1,239	
13	елово-бруснично-зеленомошная	0,976	
14	березово-зеленомошно-плауновая	0,973	
15	елово-кустарничиково-зеленомошная	0,819	
16	березово-кустарничиково-зеленомошная	0,745	
17	стволы деревьев	0,602	
18	кустарничиковая	0,577	
19	зеленомошно-вороничная	0,521	
20	елово-воронично-зеленомошная	0,479	
21	зеленомошно-кустарничиково-лишайниковая	0,432	
22	березово-зеленомошно-кустарничиково-плауновая	0,382	
23	зеленомошно-плауновая	0,266	
24	елово-зеленомошная	0,21	
25	можжевельно-зеленомошная	0,153	
26	березово-воронично-зеленомошная	0,131	
27	березово-зеленомошно-вороничная	0,122	
28	елово-зеленомошно-вороничная	0,097	
29	лишайниковая	0,079	
30	можжевельно-зеленомошно-вороничная	0,077	
31	елово-кустарничиковая	0,052	
32	березово-зеленомошная	0,041	



CEPF and INEP teams (contd.)

- Creation of an Excel database for all field plots to record biodiversity and structure of plant cover

CEPF, INEP and MSU teams have contributed to two papers submitted to Applied Vegetation Journal ; several more papers are planned for this year

Teams and student involvement

- NINA team: 1 postdoc (GIS and remote sensing), 1 PhD student, 2 Master students (ecology)
- MSU team: 1 postdoc (ecology) , 1 PhD student (remote sensing) ; 1 Master student (ecology); 4 undergraduate students (geomorphology, ecology and geochemistry, remote sensing)
- INEP team: 1 postdoc (dendroclimatology), 1 undergraduate student (botany and ecology)
- CEPF team: 1 PhD student (geobotany)

Students have been involved in the joint international fieldwork in Kola Peninsula 2008 and in further data analysis

February 2009: visit from MSU to NINA (Anna Mikheeva) to write up joint results

Thoughts for the future

- Summer 2009: revisit of the field sites to conduct focussed detailed mapping (1:100) and investigation at several test plots, in order to develop mapping of micro-mosaic structure of plant cover through integrating field data and high resolution images; collect logged climate data, georeference imagery etc; soil sampling in Tuliok, Um'echorr, Vud'yvchorr (to add some samples for statistics)
- Chemical analysis of soil and plant samples of 2008-2009
- Developing and writing up joint studies according to work plans, uniting geobotanic and ecological data on the treeline ecotone, results of geochemical analysis (soil and plants, nutritional status and pollution) and remote sensing to study the current state and dynamics of the ecosystems
- Student visits