

Climate Change Indicators and Vulnerability of the Boreal Zone:
Applying Innovative Observation and Modeling Techniques

BACKGROUND

BOREAL FORESTS AND peatlands extend over a circumpolar belt in the Northern Hemisphere and contribute significantly to the world's carbon balance. Climate is changing rapidly in Arctic and subarctic regions, affecting boreal forests and wetlands not only in terms of enhanced growth, but also increased soil and wetland emissions and the occurrence of events such as heat waves, droughts and flooding. In addition, snow conditions and surface albedo are changing as a result of significant feedbacks to the climate system.

These changes may increase a region's vulnerability, degrading ecosystem services related to recreation and forestry, for example. Indicators of climate change provide a tool to understand and quantify the processes and trends related to climate in relation to ecosystems and their vulnerability.



OBJECTIVES

- Collect information, data and expertise that is currently spread over several institutes in order to build a comprehensive platform for analyzing climate change effects on seasonal dynamics of various phenomena
- Create links and add value to existing monitoring mechanisms such as ICOS and EO systems (GMES/Copernicus), and make use of data acquired in previous EU Life+ funded and other projects related to ecosystem monitoring
- Create a new webcam monitoring system in order to facilitate Earth Observation systems by providing a time-series of field observations for calibration and validation as well as to improve the assessment of forest ecosystem services
- Synthesize modeling and observation approaches to identify climate change indicators
- Use climate change indicators together with ancillary models and experimental results to create vulnerability maps of the boreal zone related to climate change scenarios

PLAN AND
ANTICIPATED IMPACT

EU LIFE+ PROJECT MONIMET is implementing a new innovative approach to *in situ* monitoring and mapping of climate change indicators that have an influence on the mitigation potential and vulnerability estimates of boreal forests and peatlands.

The approach is based on a combination of different data sources describing phenology, CO₂ and CH₄ exchange, land cover, snow evolution and albedo. Sources include in situ observations, and Earth Observation and ancillary data that support vulnerability assessments.

JSBACH and PRELES models are applied to describe climate and land surface fluctuations of carbon and water by different boreal ecosystems. The results of the project can be directly used in political decision making as they provide high-resolution information on climate change indicators and vulnerability. The basic environmental benefit of the project is improved knowledge and monitoring tools for the state of the vegetation, region vulnerability and the trend of carbon balances at northern latitudes.

