Theme I – Agriculture and forests

Parallel session C – Tuesday 11th March 11:00-12:30

ID Nº: [160]

Title: **HOW TO BRIDGE THE GAP BETWEEN CLIMATE MODELLERS AND FOREST OWNERS – OR WHICH FOREST TREES WILL SURVIVE TODAY AND HAVE MAXIMUM GROWTH IN THE FUTURE?**

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In several countries in northern Europe forestry is a key sector where adaptation to a future climate is already today a concrete but difficult issue because of the long rotation period of the trees, typically 60 to 120 years. In essence, the young tree seedlings planted today will have to survive under present-day conditions and show optimal growth in a future climate.

Skogforsk (Forest Research Institute of Sweden) runs a comprehensive web-based operational decision support tool for the Swedish forestry sector. The tool is extensively used as an operational management tool by the sector, from small-scale forest owners to the largest companies. One component of this tool is the "Planter's Choice" which provide hands-on decision support as to which seed sources (seed orchards and provenances) to select.

There are only a few occasions when active management decisions are made, and one of the most important ones is decision on what 'crop', i.e. tree species and seed sources to plant. While selection of species is largely determined by stand characteristics and expectation on demand and future economic value, selection of seed orchard and provenance is very much related to optimising growth under the specific climatic conditions of the site.

The Planter's Choice is currently being updated with new and much larger Swedish and Finnish field data on the growth of different seed sources of Scots pine (*Pinus sylvestris* L.), as well as new and more detailed gridded climate data. Based on this a new generation of growth functions have been developed.

As the tool is routinely used in operational decisions throughout the forestry sector a fundamental requirement is that it has to be trusted and meet the users' expectations. Thus, knowledge sharing between the contributing institutions has been a fundamental aspect of this collaborative effort.

A very innovative aspect is that the new climate datasets and the resulting growth functions now allow us to add climate change scenarios into this operational system. The basis for this is that the new present-day climate database allows us to calibrate the climate scenarios. This means that the tailored climate indices used in the growth functions are consistent in time from the present into the future. Once fully operational, most forest plantation operations as well as the seedling production at plant nurseries will be aided by this tool.

This means that the stakes are very high – in 50 years' time a substantial proportion of the forests will be climate adapted according to this tool.

Here we provide a brief background of the Planter's Choice tool, productions functions for different pine seed sources, the climate data, and then discuss in more detail how climate scenario robustness/uncertainly is communicated through the use of an ensemble of climate scenarios, and aspects of science-user interaction, as well as how the information can be presented to the end user.

Presenter

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Conference on European Climate Change Adaptation
Research and Practice

ID Nº: [226]

Title: **SCENARIO BUILDING FOR THE FOREST SECTOR FOR ADAPTATION OF POLICY MEASURES IN THE CONTEXT OF CLIMATE CHANGE AND GREENHOUSE GAS REPORTING**

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With Climate Change (CC) affecting the future development of forested areas, not only carbon stocks in production forests, but also the availability for the forest industry and thus on Harvested Wood Products (HWP) will be influenced. Because HWP contribute considerably to CC mitigation, it is of crucial importance to anticipate and adapt to possible impacts of climate change. Especially concise and informative advice for policy-makers analysing possible options to meet greenhouse gas monitoring commitments and facilitating CC adaptation and mitigation measures is a key factor to be considered.
To envisage the abovementioned issues, a coupled dynamic simulation model covering the whole forest sector in Austria, from forest resources up to the semi-finished product level was developed. One sub-model is based on forest biomass development and economic factors (both exogenous) while the second sub-model utilises wood quantities from the first sub-model for carbon stock and flow simulations. Several scenarios were developed in a "what-if" approach to examine the possibilities and give advice for policy adaptation. The following scenarios were considered:

1. Reference Scenario: Current framework conditions are still in operation with the National Renewable Energy Action Plane 2010 (NREAP) being put into practice. There are no further interventions for wood-for-energy policies after 2020
2. Wood for energy: The NREAP is elaborated further with increased use of wood for energy. Nutrients will be recirculated and thinning increased
3. Cascade use: Innovative wood utilisation in building and new technologies (e.g. bio-refineries) is facilitated. The use of waste wood is optimised. Promotion of wood for energy is being discontinued after 2020
4. Forest protection: Utilisation of wood is restricted further; an increased area of forests will be protected (e.g. natural forest and biosphere reserves). Building up carbon stocks through forest management will be promoted financially and politically.

The model utilises third party simulations for forest resources under expected future conditions as exogenous inputs and endogenously simulates the development of HWP carbon stock in four different scenarios.
In the context of forest and HWP carbon simulations, adaptation and mitigation measures are strongly interconnected, since the availability of forest resources is connected to possibilities to increase the share of long-lived HWP on the one side and HWP utilisation (including imports and exports) that will have a considerable impact on forest resources on the other. Austria can be taken as a model region to examine the strong link between Europe´s forest-based sector and its forests.
The overall goal of this project is to facilitate policy adaptation strategies through scenario building for the whole forest sector.

Presenter

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Conference on European Climate Change Adaptation
Research and Practice

ID Nº: [170]

Title: **EXPANSION AND ADAPTATION IN THE PINE PROCESSIONARY MOTH**

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Climate change has visibly affected insect species among which several herbivorous pests. Direct impacts, resulting from alterations of the environmental conditions mainly affects dispersal, reproduction, development and mortality, while indirect ones result from altered plant nutritional quality, resistance and community interactions.

The pine processionary moth (PPM) is the most important defoliator of pines and other conifers in the Mediterranean. Additionally, the larvae pose a serious public health threat due to allergies caused by their urticating hairs. This defoliator reproduces in the summer, and the larvae feed on pine needles throughout the winter. When larval development is completed, the larvae descend, bury and pupate. A pupal diapause occurs and adults emerge in the following summer. As a consequence of climate change, the PPM has been expanding in latitude and altitude in Europe, spreading to new areas. In Portugal, a population having a shifted phenology (summer population) is undergoing a process of allochronic speciation which constitutes a unique study case. This population reproduces in the spring, and undergoes a faster larval development during the summer. In October the larvae bury in the soil and overwinter as pupae. Research shows that the summer population has adapted to the ecological niche it occupies and is successfully expanding. Larval tolerance to heat is higher in the summer population, and egg size, fecundity and egg batch coverage are significantly different from those of the winter populations. Genetic studies have shown that this population is separated and reproductively isolated from its sympatric winter population, due to a distinct reproductive phenology. Developing in a different season, several ecological aspects might pose an advantage for the summer population, namely a higher quality of the needles consumed by the larvae, an asynchrony with the cycles of the specific natural enemies like parasitoids and more favourable temperatures for egg and larval development.

Since its discovery, in 1997, the summer population expanded about 50 km both northwards and southwards of its original core area, and is currently extending over 100 km of the littoral of Portugal. Climate data indicate that the high summer temperatures could be a key limiting factor for its expansion, yet adaptation is ongoing and this population can further expand, provided hosts are present.

The summer population poses a serious pest management challenge. Usually trees are defoliated during the winter and recover in the following spring, which causes growth reduction but not tree death. Should the summer population expand, trees will suffer two defoliation periods per year, which can cause significant growth losses, if not tree death. Modelling the expansion and studying the ecology and adaptation of the summer population is of crucial importance for the definition of pest management strategies to stop, or slow the spread of this pest.

Presenter

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Conference on European Climate Change Adaptation
Research and Practice

ID Nº: [147]

Title: **CLIMATE CHANGE AND FORESTRY IN RHINELAND-PALATINATE (SOUTHWEST-GERMANY). FROM THE ASSESSMENT OF REGIONAL IMPACTS TO THE DEVELOPMENT OF REGIONAL ADAPTATION STRATEGIES**

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Rhineland-Palatinate is German federal state plenty of characteristic forest landscapes and where forestry plays important economical as social roles. To assess effects, risks and chances of climate change on Rhineland-Palatinate was the aim of the project *KlimLandRP* ("Climate and Landscape Change in Rhineland-Palatinate"). Based on different IPCC-Emission scenarios, different regional climate projections, and two time stages (until 2050 and until 2100), insights about the expected regional impacts of climate change on the Rhineland-Palatinate woodland could be acquired. In general, the methodical approach consists of an empirical and a deductive analysis of the climatic suitability of the main tree species under changing stand conditions, through a GIS-based analysis of Rhineland-Palatinate's forested areas. More specifically, the method is made up of the integration of several approaches (self-developed or published). Used approaches are e.g. bio-climatic envelopes for the main tree species under different climate parameter combinations, climatic suitability mapping for the main tree species, climate sensitive forest growth simulation of the most relevant forest types and forest landscapes and a water budget simulation for typical forest sites. The results are *per se* indications about the potential regional vulnerability of tree species and constitute the basis for the silvicultural planning on the regional scale.

Together with the outline of future climate projections and elucidation on the issue complexity, results are presented on the first line on an web-based *Climate Information System* to general public as well as for scientific intends. In cooperation with the EU-Interreg IVB project ForeStClim and with the Forestry Administration of Rhineland-Palatinate acquired insights are being incorporated on a multicriteria decision support system. This system should sustain the participative process with the local / regional stakeholders. On this way decision making on climate change adaptation are aimed to be academically as well as social founded.

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