

Air Pollution and Climate Change – Sides of the Same Coin for Forests

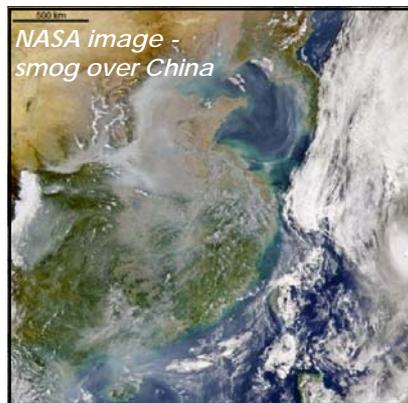
*By Elena Paoletti, Coordinator of IUFRO Research Group 7.01.00 (formerly 7.04.00) -
Air Pollution and Climate Change Impacts on Forest Ecosystems.*

Many air pollutants and greenhouse gases (GHG) have common sources, contribute to radiative balance, interact in the atmosphere, and affect forest ecosystems in an integrated way. There is an increasing awareness of the importance of addressing the linkages between the traditional air pollutants and the greenhouse gases responsible of the ongoing climate change. Addressing these problems simultaneously is an opportunity for capturing synergies and avoiding overlaps between two traditional research lines.

The programs designed to monitor the effects of air pollution and climate change on forests in Europe and North America should be re-oriented to this aim. Analyzing macro and microscopic symptoms can indicate the stress agent or at least its target, and the efficiency of the plant's response.

The secondary pollutant tropospheric ozone (O_3) is particularly relevant for the linkages between climate change and air pollution. Climate change, especially high radiation and temperature, promote increases in tropospheric O_3 concentrations when O_3 precursors are present. The steadily growing background O_3 concentrations affect climate because O_3 is a potent GHG

itself and indirectly influences concentrations of other GHGs such as methane. The plant antioxidative defense system comes into play in both defense against pollutant and protection from natural stress (*e.g.* drought). The concept of O_3 uptake through stomata should therefore be weighted by the plant detoxification capacity. Ozone at relatively low levels offsets the increases in productivity caused by elevated CO_2 . Elevated CO_2 generally decreases the negative aspects of O_3 . Responses are highly variable by species and by clone resulting in changes in community composition. The long-term interactions of CO_2 and O_3 are not all predictable based on single-gas responses. For a realistic assessment of carbon sequestration potential by forests, all natural site factors, including air pollutants, should be considered.



Report on Session 065 (XXII IUFRO World Congress, Brisbane, Australia, 12th Aug, 2005). Peer-reviewed full papers from this session will be published in special issues of the journals Environmental Pollution and Environmental Monitoring and Assessment.

*Contact: E Paoletti, IPP-CNR, Italy
email: e.paoletti@ipp.cnr.it*