

## Vegetation Response to Climate Change and Air Pollution – Unifying Research and Evidence from the Northern and Southern Hemispheres

Report from the biennial conference of RG 7.01.00 “Impacts of Air Pollution and Climate Change on Forest Ecosystems”, in Ilhéus, Bahia, Brazil, September 1-6, 2013. (<http://www.iufro2013.ufop.br/>)

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Highly diverse woody-plant ecosystems of the southern hemisphere are subject to extreme anthropogenic pressure from rapid population growth and associated land-use changes and industrialization. Consequences of ecosystem fragmentation and loss are poorly understood as functionalities of most of the residual ecosystems await clarification. Combined effects of changes in land-use, climate and air pollution on forests are complex. The inclusion of a socio-economic dimension is essential for a better understanding of changes at the ecosystem and landscape scales. Globally-integrated research networks are needed to find generalities in ecosystem functions required for effective mitigation of impacts of multiple stressors.

The mission of the 26th biennial conference of the IUFRO Research Group 7.01.00 was to stimulate trans-hemispheric research collaboration with special emphasis on ecosystems of the southern hemisphere. For the first time our scientific community met in the southern hemisphere emphasizing the importance of research activities and needs in Latin America, specifically in Brazil, for IUFRO and global forestry.

### On the agenda

At the opening session, invited speakers from Brazil and South Africa focused on responses of tropical and subtropical ecosystems to climate change and air pollution. They emphasized that impacts of ozone, nitrogen deposition, and heavy metals on natural and human-modified ecosystems in Brazil and Latin America should be studied in a context of rapid population growth, landscape fragmentation and socio-economic aspects and limitations.

Increasing occurrence of wildland fires caused by changing climate, and their potential impacts on air quality, forest resources and release of carbon dioxide, was emphasized as one of the most important future threats in the southern hemisphere.

Throughout the conference various aspects of impacts of air pollution, atmospheric deposition and climate change on forests were discussed. They included evaluation of forest health; mechanisms of vegetation responses to stresses; genetic changes; confidence of using response models; and hydro-ecological changes. Importance of early warning systems (indicators), and innovative approaches such as use of functional groups in describing similarities in responses of ecosystems in southern and northern hemispheres to environmental stressors was emphasized.



The need for establishing a global network of “super sites” for understanding complex impacts of abiotic and biotic factors on forests was discussed and encouraged. There is also a need for well-coordinated national and international efforts to address these issues and in this context IUFRO’s role is of a very high importance.

### Looking into the future

Exchange of expertise and methodological innovations will initiate global scientific networking to explore consistency in forest ecosystem responses to climate change and air pollution across the hemispheres. Potential risks to health, biodiversity and sustainability of natural and cultivated forests in South America will be determined. Such assessments will provide a basis for fostering mitigation concepts of anthropogenic stress impacts focusing on forests and other woody-plant ecosystems (e.g., in Brazil, on Amazonian and Atlantic rain forests or cerrado vegetation). This is of crucial importance since, at a global level, these ecosystems have the highest potential to sequester increasing CO<sub>2</sub> concentrations and counteract climate warming and extending droughts.

*The conference was attended by 85 participants from 23 countries; 42 papers and 34 posters were presented. Sponsors: Post-Graduate Program in Ecology of Tropical Biomes, Federal University of Ouro Preto, Brazil; Gorceix Foundation, Brazil; Brazilian Council for Scientific and Technological Development (Ministry of Science and Technology); Coordination for the Improvement of Higher Education Personnel, Brazil (Ministry of Education).*

*Photo: Cocoa plantation in the Atlantic Forest of the Executive Plan for Cocoa Plantation (CEPLAC)  
(By Andrzej Bytnerowicz)*