



**Challenges of a Changing Earth**  
**Parallel Session: Wednesday 11 June, 13:00-15:30**  
**Global Changes in Biological Diversity**  
**Chair, Diana H. Wall**



This multi-disciplinary session, sponsored by DIVERSITAS, the international program on biodiversity science, takes place during the International Biodiversity Observation Year (IBOY) 2001 – 2002. IBOY is an initiative of DIVERSITAS to stimulate research and education about biodiversity. This session brings together researchers from soil ecology, agronomy, marine biology, phylogenetics, landscape ecology and botany to explore the interactions between biological diversity and global change.

**Background: Biodiversity and Global Change**

The Earth's biodiversity provides goods and services of central importance for ecosystem functioning and society, but is rapidly diminishing. We are in the midst of the sixth mass extinction in Earth's history, but this time the extinctions are largely anthropogenic. Current rates of species loss are 1,000 times the natural extinction rate and are predicted to increase. Within the next few decades two-thirds of bird and mammal species may be on an irreversible path to extinction. Species loss also impacts other drivers of global change, for example, the diversity and composition of species in a forest or soil can affect its ability to absorb atmospheric carbon dioxide. Biodiversity loss is a major global change taking place today.

Understanding, predicting and mitigating global change requires unprecedented collaboration between scientists that study the biological, physical, chemical and social components of ecosystems. Evaluating changes in biological diversity and their consequences for ecosystems and societies is a major scientific challenge of the 21<sup>st</sup> Century.

**Findings to be presented in session *Global Changes in Biological Diversity*.**

Interactions between biodiversity and global change, and the vital role of biodiversity science in developing a holistic, and predictive understanding of global change will be explored. Michael Donoghue from Yale University, USA will examine the role of phylogenetics, not usually considered a global change science, in improving models of global change. Diana Wall of Colorado State University, USA, will describe important feedbacks between effects of global change on soil biodiversity and aboveground systems, demonstrating the need to increase incorporation of belowground responses into overall considerations of global change. The effects of past climate change on speciation patterns and levels of biodiversity in the South African Fynbos and Succulent Karoo will be described by Guy Midgley, from the National Botanical Institute of South Africa. Rodrigo Bustamante of CSIRO Marine Research Australia will describe the challenge of integrating ecological and climate change science to select marine reserves with capacity to support ocean life and fisheries into the future. Scientists will also present new information on the impacts of agricultural practices, on biodiversity. Fred Atieno of ILRI-Kenya will present evidence for detrimental impacts of agriculture on biodiversity from African pastoralist systems, but Jens Dauber and her colleagues from the University of Geissen, Germany, will show that in Europe, decline of some agricultural practices can decrease biodiversity.

## What is happening during the International Biodiversity Observation Year (IBOY) 2001-2002?

International researchers and educators are joining forces to:

- advance a holistic understanding of biodiversity and its links to society
- increase communication of science based information on biodiversity and its importance to the media, public and policy-makers.

At the center of IBOY, over 100 **projects** from over 140 countries are exploring genetic, species or landscape biodiversity and its links to ecosystems and society. IBOY is drawing them together, through meetings, the internet, publications and media activities to:

- network international biodiversity researchers
- advance interdisciplinary biodiversity research
- strengthen linkages between biodiversity research, education and media
- communicate science-based biodiversity information to a broad audience.

## IBOY Projects around the world providing important new information on the Earth's changing biodiversity in 2001 and 2002 include:

*BIOMARE - Implementation and Networking of Large-Scale, Long-Term Marine Biodiversity Research in Europe*, led by Drs. Carlo Heip and Herman Hummel, is developing a network of reference sites and standardized indicators, to understand long-term marine biodiversity patterns across Europe. <http://www.biomareweb.org/>

*The Declining Amphibian Populations Task Force (DAPTF)*, led by Drs. Timothy Halliday and James Hanken, is assessing the extent and cause of recent declines in amphibians, to understand the implications for ecosystem and human health, global change, and to improve amphibian conservation. DAPTF will publish its findings in a CD-ROM database and book. <http://www.open.ac.uk/daptf/>

As part of the IGBP-GCTE program, a study of the *Impacts of Biological Invasions*, coordinated by Drs. Montse Vila, Mark Lonsdale and Pep Canadell, will gather international scientists for a meeting in Barcelona, September 2001, to develop a global assessment of rates, extent and ecological impacts of invasive species. <http://GCTE.org/>

*LITUS*, led by Drs. Magda Vincx and Jan Marcin Weslawski, is assessing the impacts of tourism on the biodiversity and functioning of sandy beaches from the arctic to the tropics, and will develop management protocols for conserving biodiversity under tourism. <http://ocean.iopan.gda.pl/rbdo/mekodb/litus/>

Drs. Terry Done and John Ogden are leading over 100 scientists and volunteers in an assessment of the *Recovery of Coral Reef Biodiversity Following Bleaching* caused by unusually hot weather around the world's tropical oceans in 1998. A report will be published in 2002.

Some land uses, particularly intensive agriculture, threaten biodiversity in soils and the ecosystem services they deliver such as decomposition and maintenance of soil fertility. *MACROFAUNA: An Endangered Resource in a Changing World*, led Dr. Patrick Lavelle, is developing a global database and standardized methods to improve monitoring and management of soil biodiversity for sustainable agriculture. <http://www.bondy.ird.fr/lest/iboy/index.html>

*GLIDE: Global Litter Invertebrate Decomposition Experiment*, led by Drs. David Bignell, Mark Dangerfield and Diana Wall, is linking research sites across the Earth's biomes and land-use types, to survey patterns of soil biodiversity and decomposition. <http://www.nrel.colostate.edu/projects/glide/>

The *Millennium Ecosystem Assessment*, led by Dr. Walter Reid, is the first global attempt to assess the current and future abilities of ecosystems to supply the many goods and services needed by society. <http://www.millenniumassessment.org/>

*BIOTA-Africa*, led by Dr. Norbert Jürgens, is monitoring and analyzing changes in biodiversity across African biomes to provide information to support its sustainable management. <http://www.biota-africa.org>