



DIVERSITAS

Introduction

DIVERSITAS, under the auspices of ICSU and UNESCO, delivers policy relevant scientific knowledge on biodiversity, to promote the conservation and sustainable use of biodiversity. The study of the interactions between climate change and biodiversity represents a high priority throughout the DIVERSITAS projects ranging from studying rapid evolution of species in the face of climate change to improving the representation of biodiversity in earth system models that are used to project future climate.

DIVERSITAS along with a wide range of other partners has embarked on several initiatives to improve the observations, experiments and models in order to detect, understand and model *climate change impacts on biodiversity* as well as the *feedbacks of biodiversity change on climate and global biogeochemical cycles*.

Science highlights

Observing climate change impacts on biodiversity and ecosystem services

Substantial progress was made during 2010 in developing the implementation plan for a new global biodiversity observing system (GEO BON), released at CBD-SBSTTA 14 in May 2010. GEO BON represents the implementation of the biodiversity component of GEOSS, the Global Earth Observing System of Systems. DIVERSITAS is one of the co-leads of GEO BON. One of the goals of GEO BON is to detect footprints of climate change impacts on biodiversity and ecosystem services, including carbon storage. Scientific projects are on-going in DIVERSITAS to address some of the knowledge gaps, such as ecosystem services monitoring, to set up this observation system.

Modelling the interactions between biodiversity and climate change:

DIVERSITAS in collaboration with a variety of partners including the IGBP, is facilitating the development of improved regional and global vegetation models through the use of new global plant trait databases ("TRY" and "TraitNet" initiatives) and via a network of researchers working on better representations of migration, mortality and disturbance regimes ("Biome Boundary Shift" = BBS initiative). Recent work has led to substantial improvements of the representation of biodiversity in regional and global models.

Assessing future changes

DIVERSITAS, along with the UNEP-WCMC, released at CBD-SBSTTA 14 (Nairobi, May 2010) a synthesis of biodiversity scenarios for the 21st century for the Global Biodiversity Outlook 3 (GBO3) of the Convention on Biological Diversity. This synthesis is a novel assessment of global biodiversity scenarios which focuses on multi-model comparisons and confrontations of model scenarios with observations. This report identifies climate change along with land use change as the main future drivers of biodiversity loss (e.g. species extinctions) and changes in the distribution of species, functional groups and biomes, but this assessment also illustrates the large uncertainties that are associated with these projections.

Toward an IPCC-like mechanism for biodiversity and ecosystem services

SBSTA 33 delegates should be aware of efforts to establish an "IPCC-like mechanism for biodiversity and ecosystem services", called *IPBES (Intergovernmental Platform for Biodiversity and Ecosystem Services)*. The 3rd and final intergovernmental and multistakeholder negotiation on IPBES (7-11 June 2010, Busan, Republic of Korea), approved the establishment of this mechanism. This mechanism is currently being submitted for approval to the UN General Assembly for a possible launch later in 2010, the International Year of Biodiversity. DIVERSITAS has played a key role in moving this initiative forward and in engaging and representing the

scientific community in this process. This new assessment process, if established, will be of great relevance to the work of UNFCCC and its SBSTA.

Gaps

A variety of projects (e.g. GBO3, BBS) have identified a number of areas where research on the interactions between biodiversity and climate change are urgently needed including: greater use of multi-model analyses of climate change impacts on biodiversity, substantial increases in benchmarking of models with observations, improvements in understanding the links between biodiversity and ecosystem carbon storage at regional scales, etc.

Issues of high relevance to the UNFCCC process

Biodiversity "tipping-points"

The GBO3 Biodiversity Scenarios synthesis highlights a wide range of biodiversity "tipping-points" that may occur in the 21st century. Many of these are partially or entirely driven by climate change or rising CO₂ concentrations and involve strong feedbacks between biodiversity and climate at large regional scales. Some of these tipping points are reasonably well known in the climate change community (e.g., widespread dieback of the Amazonian forest, massive degradation of coral reefs), but others are less known (e.g., interactive effects of climate change and socio-economic drivers on desertification and deforestation in West Africa, interactive effects of overfishing and climate change on marine fisheries). In addition, the impacts of climate-driven "tipping-points" on biodiversity are often less well studied than the impacts on biogeochemical cycles, even though the impacts on ecosystem services via biodiversity are often large.

Research for adaptation

Adaptive management strategies for biodiversity in the face of climate change

Among many initiatives, DIVERSITAS co-sponsored a session on "Biodiversity: Enhancement of Resilience or Facilitating Transformation?" at the IARU International Scientific Congress on Climate Change in March 2009, Copenhagen, Denmark. The follow up objectives are to examine different adaptive management strategies for biodiversity in the face of climate change and also to examine how climate change mitigation and adaptation goals might be in conflict with or complementary to protection of biodiversity. DIVERSITAS is also, through networking and international workshops, facilitating research on the capacity of species to adapt to climate change through "rapid evolutionary" processes and to link this adaptive capacity to models of ecosystem function.

Key publications

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