DIVERSITAS: An international programme on biodiversity science

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

Essential Biodiversity Variables for Global Earth Observation

GEO BON, the global observing system for biodiversity, represents the implementation of the biodiversity component of GEOSS, the Global Earth Observing System of Systems. One of the goals of GEO BON is to detect footprints of climate change impacts on biodiversity and ecosystem services, including carbon storage.

Following the example of the example of the Essential Climate Variables (ECVs), GEO BON (co-led by DIVERSITAS) has been developing Essential Biodiversity Variables (EBVs). The EBVs are intended to strengthen and standardise observation systems, and can be directly linked to ECVs. Examples of essential variables are the allelic diversity of selected wild and domestic species, the population abundances for groups of species representative of some taxa (e.g. birds) and the three-dimensional structure of habitats. These variables could be modeled globally, combining satellite remote sensing observations with local observations obtained by citizen scientists, and local, national and regional monitoring organizations. Essential biodiversity variables are crucial for the robust calculation of indicators assessing progress towards the Convention on Biological Diversity's 2020 Aichi targets. They can also provide the foundation for developing scenarios of the future of biodiversity under different policy and management options.

Pereira HM et al. 2012. Essential Biodiversity Variables. Science 339:277-278

http://www.earthobservations.org/geobon.shtml

Modelling the interactions between biodiversity and climate change

DIVERSITAS, in collaboration with a variety of partners, is facilitating the development of improved regional and global vegetation models. The global trait database "TRY", after six years of existence, contains 3 million trait records for 750 traits of 1 million individual plants, representing 69,000 plant species. About halve of the data are geo-referenced, providing a global coverage of more than 8000 measurement sites. It has become a centralized source of information to develop earth system models and test ecological and evolutionary hypotheses that involve the use of plant functional traits. In collaboration with the "Biome Boundary Shift" (BBS initiative), this work has led to substantial improvements of the representation of biodiversity in regional and global models.

http://www.try-db.org/TryWeb/Home.php

Assessing future changes in biodiversity and ecosystem services

DIVERSITAS, in collaboration with Université Paris-Sud XI, Universade de Lisboa, the PBL-Netherlands Environmental Assessment Agency, the Fisheries Centre of the University of British Columbia and UNEP-WCMC have been selected by the CBD to prepare the scenario assessment for the upcoming Global Biodiversity Outlook (GBO-4). The work will build on the scenario analyses presented for GBO-3, and will be aimed at informing policy decisions, in particular in regard to progress towards meeting the 2020 Aichi targets. For the GBO-4, a broad approach to scenario assessment will be taken, complementing "storyline" approaches to socio-economic scenarios (e.g., IPCC SRES scenarios, MA scenarios) with other types scenarios and extrapolations of current trends, examining shorter time frames, addressing specific policy targets (CBD "Aichi 2020 Targets", "2050 Vision"), and making links between indicators used in scenarios with those used for status and trends.

Pereira, Leadley et al 2010. Scenarios for Global Biodiversity in the 21st Century. Science 330:1496-1501

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 CO_2 concentrations and involve strong feedbacks between biodiversity and climate at large regional scales. Current work places emphasis on phenomena that may serve as indicators for (imminent) tipping points, options and requirements for monitoring indicators of tipping points, implication of tipping dynamics for management and restoration, and the potential relevant of tipping points for the programme of work of IPBES. The need for a data base of *indicators* for tipping points, applicable to wide range of systems, has been identified.

Leadley et al. 2010. Biodiversity Scenarios: Projections of 21st century change in biodiversity and associated ecosystem services. Secretariat of the Convention on Biological Diversity, Montreal. Technical Series no. 50, 132 pages.

Evolution, in response to climate change, can be very rapid

Climate change renders populations poorly suited for their local environments, which can cause population declines, extirpation, and even extinction. These negative impacts can be staved off if (1) individuals move to more suitable environments, (2) individuals plastically shift their traits to better suit the new conditions, or (3) populations show adaptive genetic evolution. Examples are now known of all of these effects. With regard to the last, adaptive genetic evolution, clear examples have emerged of genetically-based evolutionary change in local populations facing changing environments – changes that appear adaptive and might arrest and reverse population declines, so-called "evolutionary rescue." Many other instances are known where the traits of populations are changing adaptively but the genetic versus plastic contributions have yet to be elucidated.
http://www.biogenesis-diversitas.org/

IPBES: a new assessment mechanism of great relevance to UNFCCC

IPBES, the Intergovernmental Platform for Biodiversity and Ecosystem Services,

SBSTA 33 delegates should be aware of efforts to establish an "IPCC-like mechanism for biodiversity and ecosystem services", was agreed by governments in April 2012**.** The first plenary of IPBES took place in Bonn in 2013. IPBES will select the first set of themes for its reports at its second plenary in December 2013. IPBES will be of great relevance to the work of UNFCCC and its SBSTA.

http://www.ipbes.net/

Contact:

Dr Anne Larigauderie, Executive Director DIVERSITAS: anne@diversitas-international.org

Website: http://www.diversitas-international.org/