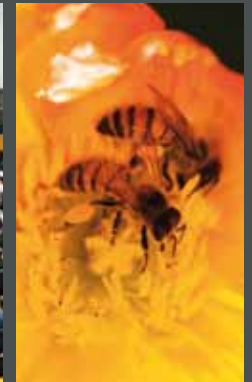


Annual Report 2009-10



Integrating biodiversity science
for human well-being

DIVERSITAS

is an international, non-governmental programme with a dual mission:

to promote an integrative biodiversity science, linking biological, ecological and social disciplines in an effort to produce socially relevant new knowledge; and

to provide the scientific basis for the conservation and sustainable use of biodiversity.

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FOREWORD

From the Chair and the Executive Director

ANNUS INCREDIBILIS

This past year has been, without question, one of enormous activity and achievement in the science and policy realm related to biological diversity. The year, two-thousand and ten, is the UN International Year of Biodiversity. This event has offered the opportunity to bring the results of the intense activity and focus on a number of issues, which have been central to DIVERSITAS, to the international negotiating tables.

1-Getting science and policy on the same wave-length

A long term goal for DIVERSITAS has been the establishment of a process for international assessments on the status of biological diversity and ecosystem services—locally to globally, along with building capacity to perform these assessment as well as horizon scanning on critical emerging issues related to threats to biological diversity and the

services it provides. This initiative (IPBES-International Platform for Biodiversity and Ecosystem Services) was first proposed by DIVERSITAS and supported by an international science conference hosted by the French Government in 2005. Since that time, DIVERSITAS has promoted and joined in global consultations with scientists and the intergovernmental policy community, principally the United Nations Environmental Program, to bring this initiative to reality. This platform would establish a science-independent assessment process that would be supported by governments. The final negotiating session to formally establish this process will take place in June of this year in Busan, Korea, hosted by the Korean Government, and coordinated by the United Nations Environmental Program. By the time you read this, the decision will be made to go forward with the initiative, or not. Regardless, substantial background



work has been done and activities will flow from it that will be crucial to achieving the initial goal.

2-Getting the numbers to establish baselines and track trends in the status of global biological diversity

DIVERSITAS has played a central role in the development of a global observation system for biological diversity, called GEO-BON (Group on Earth Observations-Biodiversity Observation Network). Robert Scholes, the vice-chair of the DIVERSITAS scientific committee is chair of GEO-BON and Anne Larigauderie, our executive director, is on the GEO-BON steering committee. A number of other DIVERSITAS members are on the working groups of this effort, along

with other partner organizations. Through the past year there has been an intense development of the operational plans for this initiative and the proposed plan will be presented at a ministerial meeting of GEO, the Group on Earth Observations, to be held in Beijing in November this year. Approval of the plan is the beginning of the process of gaining financial support for the program and for building the partnerships needed to make this system fully operational.

3-Providing science input into the Convention on Biological Diversity (CBD)

DIVERSITAS has been contributing to the CBD process to attain its objectives. This collaboration has intensified in the run-up to the COP-10. Stimulated by the facilitating activities of Tetsukazu Yahara, the co-chair of the bioGENESIS core project, DIVERSITAS was invited to help organize a pre-CBD-COP-10 science symposium, which occurred in Nagoya, this past March. This event was well-attended by the Japanese science community, as well members of the Environmental Ministry, including the vice-Minister. The principle conclusions of this science workshop will be conveyed to the COP-10 (10th Meeting of the Conference of the Parties of the Convention on Biological Diversity) to be held in Nagoya, Japan this coming October.

The DIVERSITAS community has also made further contributions for a successful CBD COP-10 event. Paul Leadley, co-chair of bioDISCOVERY, was the lead author of the scenarios chapter for the CBD Global Biodiversity Outlook 3. The results of this study were presented, and highlighted, at the SBSTTA 14 of the CBD meeting held in Nairobi in May of this year. Georgina Mace, our Vice Chair, has also contributed to efforts to make the COP-10 a successful turning point in the efforts for protecting biodiversity and the ecosystem services that flow from it, by proposing new targets that are focused and achievable (Mace, *et al.*, 2010).

4-The meeting of the clan

The very successful DIVERSITAS Open Science Conference held this past October 2009 provided a test bed for positioning DIVERSITAS in many of the issues noted above, highlighted by a panel discussion on the IPBES process that included Achim Steiner, Executive Director of UNEP. In addition to the science-policy discussions, there was a great number of sessions showcasing the new results in biodiversity research. These events are always exciting, in particular when powered by the enthusiasm of the many young scientists that were in attendance from around the world. It is in events such as these that international collaborations are fostered that endure through a career. The results of this conference were captured and

highlighted in a special issue of Current Opinion in Environmental Sustainability.

5-Then most of all—producing and promoting new integrated biodiversity science

The core research programs continue to produce new and exciting results and are helping to promote biodiversity science as an integrated field extending from genes to landscapes with links to management and policy. New science plans for bioGENESIS and bioDISCOVERY have just been published bringing together the state of the art in these fields as well as outlining new research needs. During this year there has also been a call from many sources that in order to face the challenges of climate change, superimposed upon the many other dramatic global changes that are occurring, science needs to become even more integrated, more focused and to be inclusive of social sciences. In view of these challenges DIVERSITAS has been engaged in a collaborative process of establishing new overarching goals for the program that will build on our strengths but at the same time, meet the urgent needs for knowledge and solutions that will enable us to provide information to work toward sustainability in the emerging new world conditions.

Harold A. Mooney,
Chair Scientific Committee of DIVERSITAS
Anne Larigauderie,
Executive Director, DIVERSITAS

Second DIVERSITAS Open Science Conference:

“Biodiversity and society: understanding connections, adapting to change”

13-16 October 2009, Cape Town, South Africa

The second DIVERSITAS Open Science Conference attracted an international audience of 700 scientists and policy makers from about 70 countries representing many facets of biodiversity science and policy. 85% participants considered that the conference and the great set of field trips proposed by the local organising committee made for a memorable experience (post-conference survey).

OBJECTIVES

The main objectives of the DIVERSITAS OSC2 were to:

- a) Provide an overview of the latest biodiversity/ecosystem services science



- b) Support the biodiversity science-policy interface
- c) Strengthen and expand DIVERSITAS networks and forge new partnerships.

The conference featured a mix of plenary panel discussions, lectures, symposium, oral and poster sessions, presented by invited speakers, as well as scientists selected from a call for abstracts on the three following themes: strengthening biodiversity

A GREENER CONFERENCE

The following efforts were made:

- ▶ Environmental offset of travel: Support to the Baviaanskloof project
- ▶ Meals prepared with local products
- ▶ Wine from the Sustainable Wine Initiative
- ▶ Conference bags and name tags hand-woven and sewed by South African communities
- ▶ Recycling printing policy

science, supporting the science – policy interface, and focus on African issues.

SOME OUTCOMES

Science-Policy round tables

The science-policy panel discussions on key policy initiatives led to the following papers, published as part of a special issue "Biodiversity, ecosystem services and human well-being" of the new ESSP journal, *Current Opinion in Environmental Sustainability* (May 2010; Larigauderie and Mooney, eds):

- ▶ The Intergovernmental science-policy Platform on Biodiversity and Ecosystem Services: moving a step closer to an IPCC-like mechanism for biodiversity. Larigauderie A, Mooney HA. 2010
- ▶ Biodiversity targets after 2010. Mace GM, Cramer W, Diaz S, Faith DP, Larigauderie A, Le Prestre P, Palmer M, Perrings C, Scholes RJ, Walpole M, Walther BA, Watson JEM, Mooney HA. 2010

- ▶ Scientists: take action for access to biodiversity. Martinez SI, Biber-Klemm S, (on Access and Benefit Sharing). 2010
- ▶ Challenges in framing the economics of ecosystems and biodiversity: the TEEB initiative. Ring I, Hansjürgens B, Elmqvist T, Wittmer H, Sukhdev P. 2010
- ▶ Reconciling biodiversity conservation and food security: scientific challenges for a new agriculture. Brussaard L, Caron P, Campbell B, Lipper L, Mainka S, Rabbinge R, Babin D, Pulleman M. 2010

New ESSP journal launched

The new Earth System Science Partnership (ESSP) journal, *Current Opinion in Environmental Sustainability* (COSUST),

from Elsevier, was launched by the ESSP chair Rik Leemans at the conference.

New projects and initiatives

The Conference provided a forum to present and discuss the latest findings about biodiversity and ecosystem services, and to debate about a number of key policy initiatives for the biodiversity community. Topics included, for example, the emergence of evolutionary adaptation as a relevant discipline for the study of biodiversity and climate change, governance for multiple ecosystem services, or plans to build a global biodiversity observation system. The conference was also used as a platform to air out ideas for a new strategic plan for DIVERSITAS.

MEDIA COVERAGE

300

articles in international press

in 70

languages

in 31

countries



The DIVERSITAS OSC2 Cape Town statement

The 700 scientists and policy makers who attended the DIVERSITAS 2nd Open Science Conference, entitled “Biodiversity and society: Understanding connections, adapting to change”, in Cape Town 14-16 October 2009, adopted the following conference statement:

As we approach the 2010 Year of Biodiversity, the DIVERSITAS second Open Science Conference confirms that the fabric out of which the Earth system is woven is unravelling at an accelerating rate. At the same time, we are discovering ever more about biodiversity and the benefits it provides to people. It is clear that biodiversity loss erodes the integrity of ecosystems and their capacity to adapt in a changing world. It represents a serious risk to human wellbeing and a squandering of current assets and future opportunities.

The biodiversity scientists gathered here commit themselves to finding practical

solutions to this problem. They will do so by: increasing shared knowledge of biodiversity and its functions; helping to develop systems for monitoring the biodiversity of the planet; and being responsive to the knowledge needs of society with clear communication of findings.

The proposed mechanism for the ongoing evaluation and communication of scientific evidence on these issues is an Intergovernmental Platform on Biodiversity and Ecosystem Services (IPBES). We call on governments and non-governmental organisations to join us in establishing IPBES as soon as possible. We urge policy-makers to act swiftly and effectively on the already-established and future findings relating to ways of limiting further biodiversity loss and restoring ecosystem services.

Meeting current and future human needs must make adequate provision for the complex web of life of which people are an integral part. People everywhere must give effect to their shared desire for a biologically-rich and productive planet through their individual decisions and political voices.

DIVERSITAS OSC2 SPONSORS

380 small grants allocated thanks to:

- ▶ Federal Ministry of Education and Research (BMBF)
- ▶ The Swedish International Development Cooperation Agency (SIDA)
- ▶ South African National Research Foundation (SA NRF)
- ▶ European Commission
- ▶ US National Science Foundation (NSF)
- ▶ Research Council of Norway (RCN)
- ▶ Asia-Pacific Network for Global Change Research (APN)
- ▶ German Research Foundation (DFG)
- ▶ UNESCO
- ▶ International Council for Science (ICSU)
- ▶ Bioversity International
- ▶ Swiss National Science Foundation (SNSF)
- ▶ Netherlands Organisations for Scientific Research (NWO)
- ▶ French Foundation for Research on Biodiversity (FRB)
- ▶ Centre de Coopération Internationale en Recherche Agronomique pour le Développement
- ▶ Centre de coopération internationale en recherche agronomique pour le développement (CIRAD)
- ▶ The Royal Netherlands Academy of Arts and Sciences (KNAW)
- ▶ US National Academy of Sciences
- ▶ The Academy of Sciences for the Developing World (TWAS)
- ▶ Elsevier
- ▶ Science Magazine (AAAS)

CONFERENCE NUMBERS

700
participants

70
countries represented

40%
from developing
countries

30%
early-career scientists
(<32)

Contributing to 2010, the International Year of Biodiversity

In order to be successful, the science-policy interface for biodiversity and ecosystem services at the international level needs four complementary components:

- 1) Research
- 2) Observation
- 3) Assessment
- 4) Policy

2010 represents a key year for two of these mechanisms, observations (GEO BON) and assessment (IPBES), which are currently in the process of being established. As part of its contribution to the International Year of Biodiversity, DIVERSITAS has adopted the 3 following priorities to make a scientific contribution to the science-policy interface for biodiversity and ecosystem services:

1-Observation: Contributing to the implementation of a global biodiversity observing system: the GEO BON initiative

2010 is an important year for GEO BON,

which just released on 22 May 2010, its first implementation plan, toward a global observing system for biodiversity and ecosystem services. DIVERSITAS has been one of the major forces behind GEO BON so far, and will continue to contribute to GEO BON, by focusing on several key scientific contributions. [See this report page 28.](#)

2-Assessments: the IPBES consultation, and the Global Biodiversity Outlook-3 (GBO-3) of the CBD

DIVERSITAS has been leading the scientific community in efforts to build an “IPCC-like mechanism for biodiversity and ecosystem services”, called IPBES, which might culminate with its launch in 2010. [See this report page 26.](#)

DIVERSITAS has been co-leading the study on biodiversity scenarios for the 21st century, as part of the periodic assessment mechanism of the CBD, called the Global Biodiversity Outlook. [See this report page 27.](#)



3-Policy: Contributing to discussions on biodiversity targets beyond 2010

One of the key features of 2010 will be for all CBD stakeholders to reflect on the 2010 biodiversity targets adopted in the Earth Summit in 1992, and advanced substantially in 2002 when governments committed to work towards an international goal to reduce the rate of biodiversity loss by 2010. Available data, from the GBO-3 in particular, will conclude that these targets have largely been missed, and COP10 will negotiate new targets, beyond 2010.

DIVERSITAS has contributed to the discussions on the 2010 and 2020 targets by its work on GBO-3, but also by holding consultative meetings and scientific workshops, under the leadership of Georgina Mace, and producing position papers on targets beyond 2010. [See this report page 30.](#)

CORE PROJECTS

Implementing the framework for integrated biodiversity science



DIVERSITAS Core Projects cover four important aspects of biodiversity science:

- ▶ **bioGENESIS** aims to facilitate the development of new strategies and tools for documenting biodiversity, to understand the dynamics of diversification, and to make use of evolutionary biology to understand anthropogenic impacts
- ▶ **bioDISCOVERY** focuses on developing a scientific framework to investigate the current extent of biodiversity, monitor its changes and predict its future changes
- ▶ **ecoSERVICES** explores the link between biodiversity and the ecosystem functions and services that support human well-being and seeks to determine human responses to changes in ecosystem services
- ▶ **bioSUSTAINABILITY** concerns itself with the science-policy interface, looking for ways to support the conservation and sustainable use of biological resources

Individually, these Core Projects assemble the expertise required—from both natural and social disciplines—to address specific aspects of biodiversity science. Collectively, they ensure the continued development of a truly international and integrated approach.

International Project Offices coordinate DIVERSITAS Science Plans

DIVERSITAS Core Projects and cross-cutting networks are coordinated by International Project Offices (IPOs). IPOs represent an important mean of strengthening DIVERSITAS' presence throughout the world and building links to existing research institutes and programmes.



CO-CHAIRS AND PROGRAMME OFFICERS CONTACT

CO-CHAIRS AND PROGRAMME OFFICERS	CONTACT
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1. Ending mandate in December 2009

2. Starting mandate in January 2010

bioGENESIS

Providing an evolutionary framework for biodiversity science

Co-Chairs: **D Faith**, Australian Museum, Australia and **T Yahara**, Kyushu University, Japan

www.diversitas-international.org

The primary aim of bioGENESIS is to increase and coordinate the involvement of evolutionary biologists in biodiversity science to contribute to improve human well-being.

The bioGENESIS science plan, published in 2009, is articulated around the following Foci:

- Focus 1** New strategies and tools for documenting biodiversity
- Focus 2** The causes and consequences of diversification
- Focus 3** Evolution, biodiversity, and human-well-being

The most important product for 2009 was the publication of the bioGENESIS Science Plan, along with an overview paper (and “call to arms”) for the journal *Evolution* (Andrew *et al.* 2010). In 2009–10, bioGENESIS continued its policy of sponsoring workshops and symposia to draw attention to its scientific agenda in circles where it has previously been poorly known.

GEO Biodiversity Observation Network (GEO BON)

D Faith and T Yahara co-chair the Working Group “Genetic/Phylogenetic Diversity” of GEO BON and lead the development of this section of the GEO BON implementation plan, launched on International Day of Biodiversity 2010 (22 May 2010). This group is developing short-term deliverables such as using niche based models using generalized dissimilarity modelling (GDM) based on data available via GBIF as a “Biodiversity Lens approach” to further understand and interpret observational data.

Eco-evolutionary approaches to climate change

To address this challenge, bioGENESIS and bioDISCOVERY organized a joined workshop on “*Eco-evolutionary approaches to understanding and predicting the response of species and ecosystems to climate change*” in Paris, France, August 2009. The workshop aimed at **1)** creating an international network of scientists working on bridging the gaps between evolutionary, molecular and functional ecology with

the specific goal of contributing to the development or improvement of models that account for both evolutionary and functional processes; and **2)** providing training for young scientists interested in the new and rapidly expanding field of eco-evolutionary research. This activity will be pursued in 2010.

Capacity building

bioGENESIS co-organised, with the Universidad Nacional Autónoma de México, a student training courses “Latin-American workshop on phylogenetics and molecular evolution” (22 June–3 July 2009, Guernavaca, Mexico; lead: S Magallon).

Science-policy interface

bioGENESIS is a member of the Coordination Mechanism for the Global Taxonomy Initiative (**GTI**) of the CBD.

People

Dr Makiko MIMURA joined DIVERSITAS as the Science Officer for bioGENESIS (Kyushu office, Japan) in January 2010, thanks to funding from the Global Centers of Excellence Program (COE, Japan).

bioDISCOVERY

Assessing, monitoring and predicting biodiversity change

Co-Chairs: **P Leadley**, University of Paris-Orsay, France,
N Ash, IUCN, Gland, Switzerland (until end 2009) and
N Jürgens, University of Hamburg, Germany (until end 2009)

www.diversitas-international.org

The bioDISCOVERY science plan is articulated around the following Foci:

- Focus 1** Strengthening biodiversity assessment
- Focus 2** Improving observation and understanding biodiversity change
- Focus 3** Improving biodiversity projections

A synthesis of global biodiversity scenarios for the CBD

DIVERSITAS, in partnership with UNEP-WCMC, was mandated by the Secretariat of the Convention on Biological Diversity (CBD) to coordinate a synthesis of scenarios of biodiversity change over the 21st century, as part of the Global Biodiversity Outlook-3 (GBO-3). bioDISCOVERY (Paul Leadley) led this effort on behalf of DIVERSITAS. Both GBO-3 report and detailed analyses of the scenarios were released at CBD-SBSTTA 14 in May 2010 (Nairobi, Kenya) at a press conference and presented in plenary and at two side events. [See page 27.](#)

Improving the representation of biodiversity in vegetation modelling

In 2009, the TRY (*Refining plant functional classifications for earth system modelling*) and BBS (*Advanced prediction of Biome Boundary Shifts in regional and global dynamic vegetation models*) initiatives joined forces to improve modelling of biodiversity complexity to contribute to understanding how vegetation and ecosystems respond to global change.

The joint workshop, held in October 2009 in Cape Town, South Africa, focussed on **1) Improving regional and global models of vegetation dynamics and ecosystem function** and **2) Expanding and developing applications for the TRY global plant functional trait database**. The plant trait database is being used in a first phase for developing and parameterizing regional and global vegetation models, and its use will be expanded later to other areas of ecology and biogeography. A document detailing the TRY *Intellectual Property Guidelines* was prepared and is available on www.try-db.org

Ecoevolutionary approaches to climate change

To address this challenge, bioDISCOVERY and bioGENESIS organised a joint workshop on “Eco-evolutionary approaches to understanding and predicting the response of species and ecosystems to climate change” in Paris, France, August 2009. The workshop aimed at **1) creating an international network of scientists working on bridging the gaps between evolutionary, molecular and functional ecology with the specific goal of contributing to the development or improvement of models that account for both evolutionary and functional processes; and 2) providing training for young scientists interested in the new and rapidly expanding field of eco-evolutionary research.**

People

Dr Cornelia KRUG joined DIVERSITAS as the Science Officer for bioDISCOVERY in March 2010, thanks to funding from the Centre National de la Recherche Scientifique (CNRS, France).

ecoSERVICES

Linking biodiversity to ecosystem functioning and services

Co-Chairs: **C Perrings**, Arizona State University, USA and **S Naeem**, Columbia University, USA

www.ecoservices.asu.edu

The ecoSERVICES science plan is articulated around the following Foci:

- Focus 1** Biodiversity and ecosystem functioning
- Focus 2** Linking ecosystem functioning to the provision of services
- Focus 3** Human responses to changes in ecosystem services

Focus 1 activities are primarily supported through the NSF-funded research coordination network, **Traitnet** (PI: S. Naeem). Focus 2 and 3 activities are primarily supported through the NSF-funded research coordination network The Biodiversity and Ecosystem Services Training Network, **BESTNet** (PI: C Perrings). BESTNet focuses on the interactions between biodiversity, ecosystem functioning, and the production of ecosystem services.

Scientific meetings

In November 2009 (Montpellier, France), TraitNet, and CNRS, France, organized a meeting to discuss, design and develop a 'Functional Trait Ontology' for ecologists.

The trait ontology will play a key role in TraitNet's technological approach, and will facilitate discovery of 'marked-up' trait data using semantic technologies.

In 2009, a workshop led by R. Dirzo, "Biodiversity Information and Community-Based Use of Natural Resources" (11-18 June 2009, Mexico City, and Oaxaca, Mexico), offered two different but complementary experiences in Mexico. It exposed participants to the challenges and opportunities of interacting with researchers and students from other cultures, and analyzed the ways in which academic institutions and rural, indigenous institutions are undertaking the challenge of sustainably managing their biological resources. The two experiences were CONABIO and UNAM in Mexico City, and the indian communities of Iztlan and Santa Cruz Tepetotla, near the city of Oaxaca.

Symposium on the science and policy for managing the living world two centuries after Darwin "21st century ecosystems: Systemic risk and the public good" (11-

12 February 2009, National Academy of Sciences, Washington DC).

Symposium at the DIVERSITAS OSC2 (13-16 October 2009, Cape Town, S-Africa): Globalization and invasive species: national responses, international options (C Perrings and D Richardson).

Science-policy activities

ecoSERVICES has a memorandum of understanding with UNEP under which it provides information on the science relevant to the governance of biodiversity and ecosystem services at the international level. The results are summarized in a series of policy papers covering, to date:

- ▶ Payments for ecosystem services
- ▶ Trade and invasive species
- ▶ Applications of the precautionary principle to the management of ecosystem services at the international level
- ▶ Governance structures and the supply of international environmental public goods.

bioSUSTAINABILITY

Science for the conservation and sustainable use of biodiversity

Co-Chairs: **T Elmqvist**, Stockholm Resilience Centre, Sweden and **S Polasky**, University of Minnesota, USA

www.diversitas-international.org

Governance and management of ecosystem

A science-policy workshop "Governance and Management of Ecosystem Services in Africa under Scenarios of Change" (May 2009, Nairobi, Kenya) was co-organized with the Stockholm Resilience Centre, the Beijer International Institute of Ecological Economics, the Tropical Biology Association, and WWF-Sweden. The purpose of the workshop was to highlight that ecosystem services are probably of greater importance to human well-being in Sub-Saharan Africa than elsewhere because of the large fraction of rural poor whose livelihoods depend directly on their surrounding ecosystems. Yet fewer existing institutions ensure the conservation of ecosystems on which the provision of services depends. Challenges for governance of ecosystem services range from lack of local institutions to prevent the overexploitation of resources to an almost total lack of governance institutions in some war-torn parts of Africa. This workshop addressed the challenge of designing governance

institutions to achieve sustainable provision of ecosystem services and poverty alleviation and scientific papers are in preparation.

Additional activities

Additional activities during 2009-10 included:

- ▶ The Economics of Ecosystems and Biodiversity (TEEB). Both S Polasky and T Elmqvist are involved as authors and contributors to the scientific volume of the TEEB project and T Elmqvist is leading Chapter 2 "Biodiversity, ecosystems and ecosystem services", which will present the evidence base for links between biodiversity-ecosystem functions-ecosystem services and valuation and economic effects of loss of biodiversity at scales from local to global. The volume is scheduled to be officially launched at COP10 in Nagoya.
- ▶ bioSUSTAINABILITY and ecoSERVICES are co-leading a DIVERSITAS-UNEP project on "Targets and Indicators – an

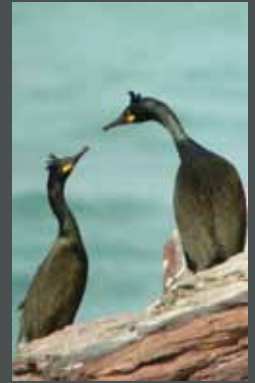
ecosystem service lens". The outputs of this project will be presented at COP10 in Nagoya.

- ▶ A Proposal to the EUFP7 call "Integrated management of water and natural resources in Africa" with the following title *Biodiversity, Ecosystem Services and Trade-offs (BEST): building capacity for managing African natural resources in an uncertain future* was submitted.

People

Thomas BERGENDORFF joined DIVERSITAS as the Science Officer for bioSUSTAINABILITY in March 2010, thanks to funding from the Stockholm Resilience Centre at Stockholm University (Sweden).

CROSS-CUTTING NETWORKS



Tackling topical issues in an integrated way

DIVERSITAS has identified five topics that merit investigation on all four levels represented by its Core Projects. These include mountain, freshwater and agricultural ecosystems, the problem of invasive species, and links between biodiversity and infectious diseases.

The Global Mountain Biodiversity Assessment (GMBA) and the Global Invasive Species Programme (GISP) are well established and known for undertaking important research initiatives, organizing conferences and workshops, and producing high-quality publications. Three networks agroBIODIVERSITY, freshwaterBIODIVERSITY and ecoHEALTH have started to implement their scientific objectives.

International Project Offices coordinate DIVERSITAS Cross-cutting Networks



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agroBIODIVERSITY

Co-Chairs: **L.E. Jackson**, University of California, Davis, USA and **L. Brussaard**, Wageningen University, The Netherlands

www.agrobiodiversity-diversitas.org

agroBIODIVERSITY addresses the trade-offs between food production, biodiversity conservation and ecosystem services in agricultural landscapes, which can be described as mosaics of agricultural fields, natural/wild land, and urban areas.

Agrobiodiversity science for sustainable agricultural landscapes

“Assessment and Adaptive Management of Biodiversity in Agricultural Landscapes. A Global Perspective” is the title of the main project of agroBIODIVERSITY. This ongoing research project is aimed at **1)** synthesizing literature and data on biodiversity utilization and conservation in agricultural landscapes, **2)** cataloguing approaches for assessment of biophysical and socioeconomic tradeoffs in biodiversity-friendly landscape management, and **3)** comparing these interactions across eight sites along a global gradient of agricultural intensification.

The eight study sites are: **1)** Jambi, Sumatra, Indonesia; **2)** Western Ghats, India; **3)** Eastern Amazon, Brazil; **4)** Zona da Mata, Minas Gerais, Brazil; **5)** La Sepultura, Chiapas, Mexico; **6)** Hoeksche Waard, The Netherlands; **7)** Sacramento Valley, California, USA; **8)** Koubri Central

Plateau, Burkina Faso (new site in 2009). Each site includes examples of biodiversity-friendly management, aimed at simultaneously supporting sustainable agricultural production and biodiversity conservation. Ongoing research at these network sites is providing scientific data on the interconnections between biodiversity, ecosystem services and socioeconomic sustainability.

agroBIODIVERSITY contributed to the Second DIVERSITAS Open Science Conference in S-Africa by organizing **1)** the symposium “Biodiversity and agricultural sustainability: from assessment to adaptive management”; **2)** a science-policy round-table “Is simultaneously meeting the Millennium Development Goals on food production and biodiversity possible?”. These events resulted in two papers (Jackson *et al.*; Brussaard *et al.*, 2010, COSUST). In addition, G Brown presented a plenary keynote entitled “Unearthing below-ground biodiversity: Management and conservation implications”. A 5 day agroBIODIVERSITY workshop was held in connection with this DIVERSITAS OSC2 during which data on the eight sites were shared and integrated. Scientific papers are in preparation.

Example of synergistic activities in 2009-10

- ▶ UN FAO and Bioersity International joint programmes to formulate the agenda for the role of agrobiodiversity in climate change and in ecological intensification.
- ▶ Participation in The European Learning Network on Functional Agrobiodiversity (ELN-FAB) aiming at knowledge sharing between scientists, policy makers, farmers and other land managers (www.eln-fab.eu).
- ▶ FAO Commission on Genetic Resources for Food and Agriculture regarding a scoping study on invertebrates for food and agriculture.
- ▶ In addition, agroBIODIVERSITY Scientific Committee Members have contributed to various advisory committees, policy debates and outreach programmes on (agro) biodiversity conservation at national and regional levels.

The new agroBIODIVERSITY website was launched in September 2009.

freshwaterBIODIVERSITY

Chair: **M A Palmer**, University of Maryland, Solomons, USA

www.diversitas-international.org

freshwaterBIODIVERSITY aims to establish the scientific basis for effective conservation measures and actions, thereby ensuring a sustainable use of freshwater resources and of the ecosystem goods and services they provide.

Environmental flows

The long-term aim of this activity is to identify robust indicators of river ecosystem health that can be reported at the global scale, in order to determine: **1)** how much flow variables can be modified without major degradation to river ecosystems; and **2)** how this is likely to vary between biomes and climatic regions. Activities in 2009-10 included:

- ▶ International conference on implementing environmental flow allocations; Promoting the sustainable use of rivers, wetlands, estuaries and groundwater. Making it happen! (23-26 February 09, Port Elisabeth, S-Africa).
- ▶ Special issue of *Freshwater Biology*: Arthington AH, McClain ME, Naiman RJ and Nilsson C (eds). 2010. Environmental Flows: science and management. *Freshwater Biology*. Volume 55(1).

Freshwater biodiversity and ecosystem services

The main goal of this activity is to bring, in a joint framework, the following projects:

- ▶ EU-Biofresh project (Leader: K Tockner): **1)** to build an information platform as a gateway for scientific research on freshwater biodiversity; **2)** to raise awareness of the importance of freshwater biodiversity and its role in providing ecosystem services; and **3)** to predict the future responses of freshwater biodiversity to multiple stressors in the face of global change.
- ▶ AquaBase – Biophysical basis of freshwater ecosystem services (Leader: M Palmer).

Science-policy activities: World Water Forum (WWF)

freshwaterBIODIVERSITY-led session: “Why are flows important for people and the environment?” at the WWF in 2009 (16-22 March, Stockholm, Sweden).

Additional activities

- ▶ Symposium at the conference “Climate Change: Global Risks, Challenges and Decisions” – “The impact of climate change on biodiversity and the delivery of ecosystem services”.
- ▶ Symposia at the Second DIVERSITAS Open Science Conference (October 2009, Cape Town, S-Africa):
 - “Genetic drivers of freshwater biodiversity”. Organiser: Koen Martens (Belgium)
 - “The freshwater biodiversity crisis: a global threat to ecosystems and people” (jointly organised with ESSP-GWSP).
- ▶ Launch of the MaraFlows project (Leader M McClain) focusing on the influence of flow regime on ecosystem processes and their role in supporting human development needs in the basin.

Global Mountain Biodiversity Assessment (GMBA)

Chair: **Christian Körner**, Institute of Botany, University of Basel, Switzerland

<http://gmba.unibas.ch>

The Global Mountain Biodiversity Assessment (GMBA) is a crosscutting network of DIVERSITAS. It actively explores and explains the great biological richness of the mountains of the world. GMBA seeks to provide input to policy makers and stakeholders for the conservation and sustainable use of biodiversity in mountain regions.

Mountain Biodiversity Portal

GMBA, in cooperation with the Global Biodiversity Information Facility (GBIF), released on 10th May 2010, the **Mountain Biodiversity Portal (www.mountainbiodiversity.org)**. The portal allows to explore GBIFs' biodiversity archive data for mountain regions, from region to globe, or by mountain life zones (such as the treeless alpine zone). The data can be used by scientists or managers to assess patterns and trends or parameterise models to make predictions about future changes in mountain biodiversity.

To encourage dataholders to share their mountain biodiversity data, and to improve data quality, GMBA held a hands-on training workshops on "Open Access to, and documentation of, Mountain Biodiversity Data" in Kunming,

China 29-30 July 2009. Another training course in Kathmandu with GBIF and the International Centre for Integrated Mountain Development (ICIMOD) takes place 14-18 June 2010. GMBA facilitated the online delivery and use of the Himalayan Upland Plant Database ("HUP", by B. Dickore and collaborators, Herbarium of München) available via GBIF (164'360 records of ca. 5562 species). GMBA also started a project with Georgia (Iliia State University, Tbilisi) to provide open access to plant diversity data of the Great Caucasus. Another project is to build a GMBA metadata catalogue of GBIF mountain biodiversity datasets.

Ongoing projects

- ▶ "Towards sustainable use of mountain rangelands in Tibet: integration of pasture biodiversity management and reforestation", project with the Sino Swiss Science and Technology Cooperation Program.
- ▶ Joint Research Project with SNF/SCOPES in the Central Caucasus in Georgia: "Mountain biodiversity in the Caucasus and its functional significance".
- ▶ "IMpacts of EXtreme CLIMatic Events on ecosystem functioning in alpine

grasslands (IMEXCLIME)", a study in the Swiss Alps.

Outlook on activities in 2010

- ▶ Second International **GMBA-DIVERSITAS conference on "Functional significance of mountain biodiversity"** in Chandolin (Valais), Switzerland, 27-30 July 2010: to celebrate the 10th anniversary of GMBA-DIVERSITAS and the International Year of Biodiversity 2010.
- ▶ **Global Change and the World's mountains.** Perth, Scotland, 26-30 September 2010: 3 sessions on "Changes in Mountain Biodiversity" organised by GMBA.
- ▶ Report on "**Impacts of climate change on mountain biodiversity in Europe**" for the Council of Europe, Convention on the Conservation of European Wildlife and Natural Habitats (January-September 2010).

MIREN (Mountain Invasion Research Network, www.miren.ethz.ch) and **GLORIA** (Global Observation Research Initiative in Alpine Environments, www.gloria.ac.at) are initiatives associated to GMBA.

ecoHEALTH

Building bridges between biodiversity science and health

Chair: **P Daszak**, Consortium for Conservation Medicine, Wildlife Trust, USA
www.diversitas-international.org

There is a growing understanding of the ways environmental changes (land use change, wildlife trade, deforestation, climate change and others) affect the health of wild and domestic animals, plants and humans. These changes are drivers of disease emergence in wildlife, humans, domestic animals and plants, and studies that address how these drivers change disease prevalence and impact humans, or wildlife are underway. Those changes will not only affect human health, but will also have an important economical cost.

ecoHEALTH aims at providing **1)** a fora to bring scientists from natural, social and medical sciences together to address the issues mentioned above; **2)** a conceptual framework to carry out research on these topics; **3)** accurate information to decision-makers.

The DIVERSITAS ecoHEALTH Economics of Emerging Diseases project (DEEED)

The objective of DEEED is to provide a bio-economic modelling framework to evaluate the risk posed by Emerging Infectious

Diseases (EIDs) from wildlife in trade. This includes formulation of the underlying model describing the transport of infected wildlife to new destinations, deriving the distribution of the net present value for evaluating the underlying economics, and providing a risk management strategy for making decisions. This project organised its second meeting (July 2009, New-York, USA) and some preliminary results were presented at the DIVERSITAS OSC2 (October 2009, Cape Town, S-Africa). The group is currently collecting data from several studied diseases to test the model. A paper was published in *Science* (Smith *et al.* 2009) and another one is in preparation.

Additional activities

Additional activities during 2009-10 included:

- ▶ Symposium at the DIVERSITAS OSC2 (13-16 October 2009, Cape Town, S-Africa): Ecological and economic impacts of disease emergence through wildlife trade: consequences for biodiversity and public health policies (K Smith and P Daszak).
- ▶ Presentations at the DIVERSITAS OSC2 (13-16 October 2009, Cape Town, S-Africa):
 - J Mills: Decreasing small mammal diversity and increasing human disease risk: a case study from the hantaviruses
 - I Rwego and T Gillespie: Environmental change and pathogen transmission between humans and wild apes
- ▶ Submission of a proposal to USA-NSF: Predicting the Disease-Risks of International Commerce and Trade (PreDICT): this project would be a follow up activity of the DEEED project and would be jointly organised by ecoHEALTH and ecoSERVICES.
- ▶ Resubmission of this grant (RCN) to USA-NSF: Ecology, Environmental Science and Health Research Network (EcoHealthNet).

Global Invasive Species Programme (GISP)

Chair: **William Jackson**, IUCN, Gland, Switzerland

www.gisp.org

GISP is an international non-for-profit partnership dedicated to tackling the global threat of invasive species through policy development, awareness raising and information exchange. Its goal is that by 2020, the majority of countries will have the necessary policies and laws in place to implement their national invasive species (biosecurity) strategies and action plans.

2009 was the first full year of implementing GISP's new Global Strategy (2008-2010), and proved to be a particularly exciting year, in which considerable progress was made towards achieving this goal.

Scientific highlights

Scientific highlights included publication of a scientific paper on global indicators of biological invasion (McGeoch *et al.*, 2010) to improve quantification of progress towards the CBD 2010 and post-2010 Targets. This was the culmination of a two-year collaboration led by GISP, under the auspices of the GEF-funded 2010 Biodiversity Indicators Partnership, which included the Centre for Invasion Biology (CIB) at the University of Stellenbosch, IUCN and BirdLife International. In a separate report on indicators, prepared for GISP by BirdLife International and

IUCN, Red List Indices for invasive species' impacts, were investigated. The study demonstrated the magnitude of the threat to biodiversity, with the percentage of threatened species impacted by invasive species ranging from 33% for birds, to 16% for mammals, and 28% for amphibians (Butchart *et al.*, 2009).

Other highlights included a celebration of International Biodiversity Day (22 May), which in 2009 focussed on invasive alien species, embarking on an exciting new World Bank-funded project on mainstreaming gender into invasive species management, jointly organising an international conference on biological invasions in Fuzhou, China and initiating a process to identify the linkages between climate change and invasive species.

Dissemination outputs

GISP started hosting a new database on invasive species policy developed by Dr Peter Stoett, Concordia University, published a new 'Best Practices Manual'. GISP also continued to provide policy support to the CBD Parties and Secretariat on issues specific to invasive species as well as the broader post-2010 CBD strategic Plan.

Contributing to 2010

Looking ahead to 2010 and the United Nations declared, 'International Year of Biodiversity', strategic priorities for GISP include invasive species on islands and exploring the links between climate change and invasive species in more depth. In the run-up to the CBD's 10th Conference of Parties in Nagoya, Japan (October 2010), there are numerous preparatory meetings to which GISP has been invited to contribute and/or co-host including, the 6th Trondheim Conference on Biodiversity (February 2010), 'Helping Islands Adapt – a workshop on regional action to combat invasive species', in Auckland, New Zealand (April 2010) and the CBD-SBSTTA 14 in Nairobi, Kenya (May 2010).

People

In September, GISP welcomed a new Chairman of its Executive Board, William Jackson (Deputy Director General of IUCN), who took over from Dennis Rangi (Executive Director of CABI). The year ended on a high note with the recruitment of GISP's new Policy Director, Stas Burgiel and a new GISP presence in Washington DC.

EARTH SYSTEM SCIENCE PARTNERSHIP

Developing a common strategy for integrative global environmental change research and outreach

The Earth System Science Partnership (ESSP) facilitates the study of the Earth's environment as an integrated system in order to understand how and why it is changing, and to explore the implications of these changes for global and regional sustainability.

Joint research projects on carbon dynamics, food, water and health have been established.

In 2009-10, the ESSP has developed new services that include knowledge products, Earth system science fora, and interdisciplinary collaborative research. The ESSP launched a new synthesis journal with Elsevier (COSUST¹) at the DIVERSITAS OSC. A special issue was published in June 2010 led by DIVERSITAS scientists on biodiversity and ecosystem services. In 2010, the Consultative Group on International Agricultural Research (CGIAR) and the ESSP launched a major new research project: the CGIAR Challenge Program on "Climate Change, Agriculture and Food Security (CCAFS)". It is aimed at overcoming the additional threats posed by a changing climate to achieving food security, enhancing livelihoods and improving environmental management in the developing world.

The ESSP is extremely grateful of financial support from IGFA member countries to the ESSP Coordination Office in 2009: Austria (Ministry for Education, Science and Culture), France (INSU-CNRS), Germany (DFG), Norway (Research Council), United Kingdom (Natural Environmental Research Council), and the USA (National Science Foundation).

ESSP Joint Projects include:

- ▶ GWSP – Global Water System Project
- ▶ GECAFS – Global Environmental Change and Food Systems
- ▶ GCP – Global Carbon Project
- ▶ GECHH – Global Environmental Change and Human Health

1. Current Opinion in Environmental Sustainability, COSUST: www.elsevier.com/wps/find/journaldescription.cws_home/718675/description#description

THE EARTH SYSTEM SCIENCE PARTNERSHIP (ESSP)

The ESSP is a partnership between the following programmes:

- ▶ DIVERSITAS
- ▶ International Geosphere-Biosphere Programme (IGBP)
- ▶ International Human Dimensions Programme on global environmental change (IHDP)
- ▶ World Climate Research Programme (WCRP)

International Project Offices coordinate ESSP Joint Projects



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Global Water System Project (GWSP)

Co-chairs: **C Vörösmarty**, The City University of New York, USA and **J Alcamo**, UNEP, Nairobi, Kenya

www.gwsp.org

The central research question of the GWSP is: “How are humans changing the global water cycle, the associated biogeochemical cycles, and the biological components of the global water system and what are the social feedbacks arising from these changes?”

In order to address this question, the GWSP launched three Global Initiatives:

1) Global Scale Initiative (GSI): Ranking of Threats to the Global Water System

- 2) Global Catchment Initiative (GCI): Bringing the Global Perspective to River Basin Research and Management
- 3) Global Water Needs Initiative (GWNI): Assessment of the water needs of humans and ecosystems.

These initiatives are targeted towards the production of scientifically cutting-edge and highly policy-relevant results.

In 2009, GWSP held a session on water governance at the Open meeting of IHDP

(Bonn, Germany, April) and convened its Scientific Steering Committee in Stellenbosch (South Africa, October). In terms of capacity building, GWSP developed a series of lectures on global water system and global water problems at FH Cologne and Technical University of Aachen (October/November), as well as “Teaching Adaptive Water Management—A Training Course for Instructors” by the NeWater project hosted by the UNU Institute for Environment and Human Security (UNU-EHS).

Global Environmental Change and Human Health (GECHH)

Co-chairs: **M Rosenberg**, Queen’s University, Canada and **U Confalonieri**, National School of Public Health, Brazil

www.gechh.unu.edu

The main research objectives of the project are to:

- 1) Identify and quantify health risks posed by Global Environmental Change, now and in the reasonably foreseeable (scenario) future
- 2) Describe spatial (geographic, inter-population) and temporal differences in health risks, to better understand vulnerabilities and, therefore, intervention priorities

- 3) Develop adaptation strategies to reduce health risks, assess their cost-effectiveness, and communicate results
- 4) Foster research training, to boost networked international research capacity in Global Environmental Change and Human Health.

In 2009 GECHH convened its 2nd Scientific Steering Committee (SSC) meeting (Dublin, Ireland, 24-25 August) in conjunction with the International Society for Environmental

Epidemiology. GECHH co-sponsored a workshop for young scientists in Beijing (China, November) on health and the environment in the Beijing-Tianjin region. GECHH participated at the GEOSS workshop on Using Earth Observations for Health (Washington, D.C, November). ESSP and the Project Co-Chairs negotiated an International Project Office agreement with the United Nations University – Institute for Water, Health and the Environment and recruited a Project Officer, **Dr Lucilla Spini**.

Global Carbon Project (GCP)

Co-chairs: **A Patwardhan**, Technology Information, Forecasting and Assessment Council, New Delhi, India, **Philippe Ciais**, Commissariat à l'Énergie Atomique, France, and **Corinne Lequéré**, University of East Anglia and British Antarctica Survey, UK

www.globalcarbonproject.org

The single biggest added value of the GCP is integration of multiple components of the carbon cycle into a coherent and consistent picture, including the natural and human components. This integration is implemented at the global and regional scales (including urban regions) to understand **1**) the drivers of atmospheric CO₂ accumulation, **2**) the magnitude of the carbon-climate feedback, and

3) points of intervention in managing future carbon trajectories which requires an integration of mitigation strategies and the dynamics of the natural environment. In 2009, major scientific findings resulted from the new analyses of recent trends in the global carbon cycle:

▶ The efficiency of the natural sinks to remove carbon dioxide is declining

- ▶ The current fossil fuel emission trajectory is tracking if not surpassing the most carbon intense IPCC scenarios
- ▶ The growth in CO₂ for 2009 will decline by 2.8% owing to financial crisis but will begin recovery in 2010
- ▶ Global carbon emissions from fossil fuel and land use were 8.7 PgC and 1.2 PgC in 2008 of which 55% is taken by natural CO₂ sinks on land and oceans.

Global Environmental Change and Food Systems (GECAFS)

Chair: **D Liverman**, University of Arizona, USA

www.gecafs.org

Following on from the conference that GECAFS held in April 2008 entitled 'Food Security and Environmental Change: linking science, development and policy for adaptation', a special issue of *Environmental Science and Policy* (Vol. 12(4)) was edited by Dr Polly Ericksen, John Ingram and Professor Diana Liverman.

In 2009, GECAFS organised a high level briefing on "Environmental Change and Food Security in the Indo-Gangetic Plains" in New Delhi; Food security/GEC contributions to high-level UK-China discussions in Beijing; Food security/GEC contributions to GTZ/DFID/World Bank in Berlin; and Inputs to US State Department World Hunger Strategy discussions.

GECAFS coordinated the development of a successful proposal for collaborative research between the CGIAR and ESSP, called Challenge Programme "Climate Change, Agriculture and Food Security" (CCAFS). This ~USD25M/year project presents a highly innovative approach to linking best climate and environmental science with the development agriculture agenda.

DIVERSITAS at the interface between science and policy making: Contributing to assessments

DIVERSITAS has worked hard on promoting IPBES, the envisaged assessment mechanism for biodiversity and ecosystem services, and has contributed to GBO-3, the regular assessment mechanism of the CBD.



Toward an Intergovernmental Platform on Biodiversity and Ecosystem Services, IPBES

<http://ipbes.net>

2nd ad hoc intergovernmental and multistakeholder meeting on an IPBES

Governments, UN agencies, scientific bodies and the NGO community met for a second time to deliberate on IPBES at UNEP (5-9 October 2009, Nairobi). DIVERSITAS was represented by its chair, H Mooney, and Executive Director, A Larigauderie. ICSU was represented by its Executive Director, D Chen.

Based on the gap analysis of needs presented by UNEP, participants

in general agreed that “no intergovernmental mechanism currently existed to meet all the science-policy needs of the multiple multilateral environmental agreements and processes in the field of biodiversity and ecosystem services”, and therefore that there was a need for an IPBES.

Four main needs were discussed and accepted in general by the participants, and, to address these needs, the four following functions were proposed for IPBES:

- 1) Knowledge generation: Catalysing an improved collaboration and coordination for the generation of knowledge
- 2) Assessment of knowledge: Coordinating and performing regular and timely assessments (global, sub-global)
- 3) Using knowledge: Identifying key policy tools that can be used by decision-makers, and assist decision-makers in accessing and using these tools
- 4) Capacity building.

UNEP Governing Council

The UNEP Governing Council/Global Ministerial Environment Forum at its eleventh special session (Bali, 24-26 February 2010) authorized the ED of UNEP to convene a third and final meeting on IPBES. DIVERSITAS was represented by M Lonsdale at this meeting.

Next steps: IPBES-3 (7-11 June 2010, Busan, Republic of Korea)

The next key step is the 3rd IPBES meeting, which may be the final negotiation meeting for IPBES.

The role of DIVERSITAS in the IPBES consultation

DIVERSITAS has been leading the scientific community, since 2005, in efforts to establish an “IPCC like mechanism for biodiversity”, called IPBES. DIVERSITAS’ contributions to the IPBES consultation in 2009-10 included:

- 1) Editorial by Mooney and Mace: Biodiversity policy challenges, Science, 18 September 2009
- 2) Science-Policy panel on IPBES at DIVERSITAS OSC2 and Cape Town statement supporting IPBES (October 2009; [see pages 6-7](#))
- 3) CBD-PreCOP10 in Japan (Nagoya, February 2010); successful plenary science-policy dialog on IPBES with Japanese Vice-Minister of Environment; 300 participants (DIVERSITAS/Govt of Japan/Secretariat CBD)
- 4) US consultation on IPBES (USNC DIVERSITAS, UNEP regional office North America): 27 April 2010, Washington DC
- 5) Larigauderie and Mooney: IPBES: moving a step closer to an IPCC-like mechanism for biodiversity. 2010, COSUST, 2:9-14
- 6) Side event on IPBES at CBD-SBSTTA14, Nairobi, Friday 14 May (DIVERSITAS-IUCN-ICSU-IHDP).

Global Biodiversity Outlook 3 (GBO- 3): Projections of 21st century change in biodiversity and associated ecosystem services

<http://gbo3.cbd.int>

The scenario synthesis called on more than 40 leading scientists, including bioDISCOVERY SC members Rob Alkemade and Miguel Araujo, and Chair Paul Leadley. The synthesis focused on 21st century biodiversity change as predicted by models based on experiments and observed trends. The following key conclusions were reached:

- ▶ Projected global change impacts will result in significant changes in distribution and abundance of species, assemblages and biomes, leading to considerable ecosystem modifications. Species extinctions and natural habitat loss will continue or even accelerate. The projected changes show considerable regional differences, with impacts being highest in tropical forests, boreal and Arctic tundra, as well as in freshwater and marine systems.
- ▶ A number of “tipping points”, i.e. an irreversible conversion of an ecosystem, were identified (e.g. Amazonian forest or Arctic Tundra). These “tipping points” are caused by complex feedback mechanisms that are not yet fully understood, and

thus difficult to predict. The effect of thresholds, amplifying feedbacks and time-lags have been underestimated, and major biodiversity transformations might occur even below a warming of 2°C, calling for a precautionary approach to human activities.

- ▶ Biodiversity tipping points identified will be linked to large negative regional or global scale impacts. Biodiversity loss and ecosystem service delivery capacity decline respond in similar ways to drivers, however, their linkages and relationships are not fully understood. Changes in key stone or dominant species are expected to have a greater impact on ecosystem services than species extinctions.
- ▶ A reduction or reversal of undesirable and dangerous biodiversity transformation requires the development of adaptive management strategies on international, national and local level. Necessary actions to be taken include increasing agricultural efficiency, international regulation of fisheries, climate mitigation and limited deployment of biofuels. Protected areas are still the most effective means of biodiversity conservation. Spatial conservation planning needs to take into consideration future biodiversity transformation, and include ecosystem-based approaches. Ecosystem restoration could play a considerable role in maintaining biodiversity and provisioning of ecosystem services.

Building a global biodiversity observation system: GEO BON

www.earthobservations.org/geobon.shtml

Background: the Global Earth Observation System of Systems (GEOSS)

The Group of Earth Observations (GEO; <http://earthobservations.org>) has initiated a process to build a GEOSS, designed around nine Societal Benefit Areas (SBAs): disasters, health, energy, climate, water, weather, ecosystems, agriculture and biodiversity.

DIVERSITAS, US-NASA, and EU-EBONE have accepted the lead in coordinating the early planning stages towards the establishment of this global biodiversity observation system. We call the system and the partners who develop it “GEO-BON”, which stands for “Group of Earth Observations – Biodiversity Observation Network”. GEO BON is being built by some 100 governmental and non-governmental organisations.

The vision of GEO BON

The vision of GEO BON is for a coordinated, global network that

gathers and shares information on biodiversity, provides tools for data integration and analysis, and contributes to improving environmental management and human well-being.

The first GEO BON implementation plan

In 2009-10, GEO BON formalised its governance (1st meeting of SC-GEO BON), and progressed in the development of its implementation plan. Eight working groups were appointed to develop the various sections of the GEO BON concept document. They met in February 2010 to finalise the implementation plan. GEO BON was presented at a side event at CBD-SBSTTA 14 (13 May 2010, Nairobi). A draft 1.0 of this GEO BON implementation plan was released on 22 May 2010 (International Day of Biodiversity).

The implementation plan proposes to the global observing community



activities and deliverables at the genetic, species and ecosystem levels, including ecosystem services, in terrestrial, freshwater and marine ecosystems.

Key developments in 2009-10

October 2008: Parties to the Convention on Biological Diversity (CBD) invited at COP9 to support GEO BON 9 in Decision IX/9 on Follow-up to the Millennium Ecosystem Assessment

January 2009: 2nd GEO BON interim Steering Committee meeting (Washington)

June 2009: 1st GEO BON Steering Committee meeting; Chair: B Scholes (Geneva)

November 2009: Report by GEO BON at GEO-VI Plenary (Washington)

February 2010: 3rd International GEO BON workshop (90 participants; Asilomar, California)

May 2010: GEO BON featured at CBD-SBSTTA 14 (side event)

22 May 2010: GEO BON implementation plan released (version 1.0)

Landmark documents

GEO BON concept document (October 2008)
GEO BON implementation plan version 1.0 (May 2010)

Role of DIVERSITAS

The role of DIVERSITAS has been **1)** to coordinate the development of the GEO BON concept and implementation plan, with US-NASA and EC-EBONE, to ensure that GEO BON develops within a robust scientific framework, and **2)** to mobilise the attention of policy makers and of the scientific community toward GEO BON. As GEO BON continues its development, DIVERSITAS will support some of the GEO BON working groups which are more closely associated to research. Examples include work with the genetic diversity working group (via bioGENESIS; co-chairs: D Faith and T Yahara) and with the ecosystem services working group (chair: H Mooney).



In addition to the activities already mentioned, DIVERSITAS promoted or presented GEO BON at the following events:

May 2009: Pruhonice, Czech Republic: World biodiversity and European taxonomy; organised by European Platform for Biodiversity Research Strategy (EPBRS); GEO BON mentioned in final EPBRS recommendations;

October 2009: Nairobi, Kenya (UNEP): 2nd intergovernmental and multistakeholder consultation on an IPBES;

October 2009: Cape Town, S-Africa: Symposium (Analysis and forecasting of biodiversity and ecosystem processes: a contribution to GEO BON, co-chairs: T Yahara and M Fischer), and session of contributed papers (Monitoring biodiversity, chair: N Jürgens), both at DIVERSITAS Open Science Conference 2;

February 2009: Trondheim, Norway: Getting the biodiversity targets right – working for sustainable development;

January 2009: Paris, France: UNESCO International Year of Biodiversity Science Policy Conference;

March 2009: Nagoya, Japan: CBD Pre-COP10, including a one-day-workshop on Asia Pacific BON, co-organised by Ministry of the Environment of Japan and DIVERSITAS;

April 2009: Paris, France: Séminaire Observatoires, collections et bases de données sur la biodiversité : vers une stratégie nationale. Organised by FRB and MNHN.

DIVERSITAS at the interface between science and policy making: Contribution to the work of Conventions

DIVERSITAS is playing an increasingly important role at the interface between science and policy. In 2009-10, it has contributed to the work of the CBD, and is starting, together with the Earth System Science Partnership, to collaborate with the Convention on Climate Change.



Convention on Biological Diversity

1-Contributing to discussions on biodiversity targets beyond 2010

During the year 2010, Parties to the CBD will evaluate progress against the 2010 biodiversity targets adopted by the Parties to the CBD, and by governments at the World Summit on Sustainable Development in 2002.

The Scientific Committee of DIVERSITAS under the leadership of Georgina Mace (Imperial College, London, UK) produced a position paper entitled "Biodiversity targets after 2010" (Mace *et al.*, 2010, *Current Opinion in Environmental Sustainability*, 2:1-6), analysing the 2010 targets process, and proposing criteria for a set of achievable second generation (post

2010) targets, to contribute to the post 2010 selection of indicators for biodiversity changes. This paper, together with Mooney and Mace, 2009 (Biodiversity policy challenges, *Science* 325:1474) and Larigauderie, Mace and Mooney, 2010 (Colour-coded targets would help clarify biodiversity priorities, *Nature*, 464:160) were formally made available to delegates at SBSTTA 14 and used for statements at SBSTTA 14 (paper UNEP/CBD/SBSTTA/14/10).

2- Contribution to the Global Biodiversity Outlook-3 of the CBD

DIVERSITAS, in partnership with UNEP-WCMC, was contracted by the Convention on Biological Diversity (CBD) to prepare a synthesis of scenarios of biodiversity change over the 21st century for GBO-3, released by the CBD at its SBSTTA 14 in Nairobi,

Kenya (10 May 2010). [See page 27, this report.](#)

3- Contributing to CBD-SBSTTA 14 (Nairobi, Kenya, 10-21 May 2010)

DIVERSITAS made contributions to discussions at SBSTTA 14 on the programme of work on mountain biodiversity, climate change, GBO-3, the Global Taxonomy Initiative, and the 2020 targets.

DIVERSITAS co-organised four side events:

- ▶ GBO-3: Progress towards the 2010 target, future prospects and implications for the post-2010 strategic plan of the CBD (S-CBD, DIVERSITAS, UNEP-WCMC; 11 May).
- ▶ GBO-3: Biodiversity futures for the



21st century (S-CBD, DIVERSITAS, UNEP-WCMC; 12 May).

- ▶ GEO-BON: Building a Global Biodiversity Observing System (GEO, Japan, DIVERSITAS, NASA and EBONE; 13 May).
- ▶ Toward an IPBES (DIVERSITAS, IUCN, IHDP, ICSU; 14 May).

4- Preparing for CBD-COP10: CBD-COP10 preConference (Nagoya, Japan, 21-23 March 2010)

DIVERSITAS co-organised with the Japan Ministry of the Environment, Nagoya University and the Secretariat of the CBD (S-CBD) a CBD-COP10 preConference to contribute to discussions on IPBES, the 2020 targets, and further development of AP-BON (Asia Pacific BON) as part of GEO BON. The meeting which involved an audience of 300 scientists and policy

makers from the Asia Pacific region featured a science-policy plenary dialog on IPBES between Mr Tajima, Senior-Vice Minister of the Environment of Japan, and DIVERSITAS scientists. The report of the event was used to prepare statements for SBSTTA 14, and will also feed into statements and be presented at COP10 (Nagoya, October 2010).

UN Framework Convention on Climate Change (UNFCCC)

DIVERSITAS has been invited over the past two years by the SBSTA of the climate change convention (UNFCCC) to participate in annual “Research Dialogues” between Parties to UNFCCC on one hand, and programmes of the ESSP and IPCC on the other hand. ESSP programmes

(DIVERSITAS, IGBP, IHDP and WCRP) have been invited to report and dialog with SBSTA delegates on emerging scientific findings, research plans, gaps and priorities.

In 2010, DIVERSITAS will report at SBSTA 32 (Bonn, 3 June 2010) on: **1)** Observing climate change impacts on biodiversity and ecosystem services, **2)** Modelling the interactions between biodiversity and climate change, **3)** Assessing future changes (GBO-3 scenarios), **4)** Toward an IPCC-like mechanism for biodiversity and ecosystem services (IPBES), **5)** Biodiversity tipping-points (GBO-3), and **6)** Adaptive management strategies for biodiversity in the face of climate change.

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DIVERSITAS COMMITTEES

Expanding network strengthens international framework

DIVERSITAS Committees enlarge DIVERSITAS' scientific and policy networks, thereby helping to establish crucial links between national biodiversity programmes and international framework activities. They also make it possible to implement the DIVERSITAS science plan, adapting where necessary to local and regional concerns. To this end, each DIVERSITAS Committee is encouraged to include representatives from three key groups: active scientists, policy makers and managers of national biodiversity programmes.

The DIVERSITAS National Committees include:

- ▶ Full members, who provide an annual financial contribution to DIVERSITAS
- ▶ Affiliated members who have identified a contact point or assembled a national committee, but who do not contribute financially to the programme.

In 2009, DIVERSITAS organised a very successful meeting of all its National Committees (13 October 09, Cape Town, S-Africa). At the time of the conference, there were 16 Full Members and 15 Affiliated Members. In addition to these national members, DIVERSITAS has strong ties with regional networks: DIVERSITAS in Western Pacific and Asia (DIWPA), the Asia-Pacific Network for global change research (APN), the Inter-American Institute for global change research (IAI), EPBRS (European Platform for Biodiversity Research Strategy), and AfricanNESS (African Network for Earth System Science). 28 countries and 3 regional committees were represented at this meeting.

The goals of this meeting were to:

- ▶ Review activities of the past 4 years (in both DIVERSITAS and National Committees);
- ▶ Discuss how to strengthen the role of DIVERSITAS Committees;
- ▶ Engage the Committees into discussions about the future of DIVERSITAS through exchanges on the draft DIVERSITAS Strategic Plan.

The report from this meeting is available at www.diversitas-international.org.



DIVERSITAS NATIONAL COMMITTEES 2009
(Full Members**; Affiliated Members: Established committee°, Contact point)

- | | |
|----------------|-------------------|
| Argentina** | Malaysia |
| Australia° | Morocco |
| Austria** | Mexico** |
| Belarus° | The Netherlands** |
| Belgium** | Norway** |
| Brazil | Pakistan |
| Chile | Philippines° |
| China – CAST° | Romania |
| China-Taipei** | Russia |
| Columbia | Saudi Arabia |
| Costa Rica | Slovak Republic** |
| Estonia | South Africa** |
| France** | Spain** |
| Germany** | Sri Lanka |
| Greece | Sweden** |
| Hungary | Switzerland** |
| Indonesia° | United Kingdom** |
| Italy | USA** |
| Japan° | Vietnam |

DIVERSITAS COMMITTEES' INITIATIVES IN 2009

The following provides examples of activities undertaken by DIVERSITAS Committees in support of the global science framework

January	Chinese National Committee for DIVERSITAS (China-CAST) Joint annual academic conference of Chinese National Committees of WCRP, IGBP, IHDP and DIVERSITAS (China) Future climate-change response research: Learning from IPCC's Fourth Assessment (The Netherlands) Monitoring of Rain forestation Project (Philippines)
February	Second National Biodiversity Conference (Spain) Twenty-fifth Century Ecosystems: Systemic risk and the public good (USA) 6 th National Research Council of the Philippines Mindanao Cluster Annual meeting (Philippines)
March	Comité National Français sur les Changements Globaux (France) 10 th Swiss Global Change Day (Switzerland)
April	Milstein Science Symposium: Exploring the dynamic relationship between health and the environment (USA) New nature management act will secure Norway's natural environment (Norway)
May	Norway's national report on implementation of the convention on biological diversity (Norway)
October	15 th International Symposium on problems of landscape ecological research "LANDSCAPE – Theory and practice" (Slovak Republic) DIVERSITAS National Committees meeting in Cape Town, S-Africa

PEOPLE

DIVERSITAS Scientific Committee

Chair

Hal Mooney
Stanford University, USA

Members

Doris Capistrano (Vice Chair)²
School of Environmental Science and Management, University of the Philippines

David Cooper
Convention on Biological Diversity, Montreal, Canada

Wolfgang Cramer
Potsdam Institute for Climate Impact Research, Potsdam, Germany

Peter Daszak (Treasurer)

Consortium for Conservation Medicine, Wildlife Trust, USA

Sandra Diaz

IMBIV
Universidad Nacional de Cordoba, Argentina

Anantha Duraiappah²

United Nations Environment Programme (UNEP), Nairobi, Kenya

Kazuhiro Kogure²

Ocean Research Institute, University of Tokyo, Japan

Philippe Le Prestre

Laval University, Canada

Mark Lonsdale

CSIRO Entomology, Australia

Georgina Mace (Vice Chair)

Imperial College London, UK

Hiroyuki Matsuda¹

Faculty of Environment and Information Sciences Yokohama National University, Japan

Robert Scholes (Vice Chair)

Natural Resources and Environment, CSIR, South Africa

Billie L. Turner¹

School of Geographical Sciences and Urban Planning
University of Arizona, USA

Ex-officio Members³

ICSU

Deliang Chen
ICSU, France

IUBS

Jean-Marc Jallon
Institut de Biologie Animale
Intégrative et Cellulaire (IBAIC)
Université Paris-Sud Orsay, France

CBD

Ahmed Djoghlaif
Executive Secretary, Canada

SCOPE

Paul G. Risser
University Research Cabinet,
University of Oklahoma
USA

UNESCO

Salvatore Arico
Natural Sciences, UNESCO,
France

1. Starting first mandate in January 2010

2. Ending mandate in December 2009

3. The Chairs of DIVERSITAS Core Projects and Cross-Cutting Networks serve as ex-officio members of the SC

Global Environmental Change Programmes

IGBP

Carlos A Nobre

Centro de Previsao de Tempo e Estudos Climaticos, Brazil

IHDP

Oran R Young

Bren School of Environmental Science and Management, Santa Barbara, CA, USA

WCRP

Tony Busalacchi

University of Maryland, USA

International Advisory Committee

Partha P Dasgupta

Cambridge University, UK

Paul Ehrlich

Stanford University, USA

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Munasinghe Institute for Development (MIND), Sri Lanka

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Ismael Serageldin

Bibliotheca Alexandrina, Egypt

MS Swaminathan

Centre for Research on Sustainable Agricultural and Rural Development, India

Edward O Wilson

Harvard University, USA

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Anne Larigauderie

Executive Director

Julie Dardanelli

Executive Assistant

Melinda Seeneevassen/Carole Odou

Administrative Assistant

Anne-Hélène Prieur-Richard

Deputy Director

Kerstin Schmidt-Verkerk

Web Assistant

Manuelle Rovillé

OSC2 Coordinator

Financial Summary

Statement of income and expenditure 2009

1st January to 31st December 2009

In kind contribution from France
From CNRS: bioDISCOVERY Science Officer
From MNHN (Muséum National d'Histoire Naturelle): host of secretariat

DIVERSITAS hosts and provides in-kind contribution to the ESSP office



INCOME – CALENDAR YEAR 2009	EUROS
National contributions	606 655
USA	
France	
Germany	
United Kingdom	
The Netherlands	
Belgium	
South Africa	
Spain	
Norway	
Switzerland	
Austria	
China-Taipei	
Mexico	
Argentina	
Slovak Republic	
Grants for DIVERSITAS projects (UNEP, ICSU, UNESCO, UK-QUEST)	85 236
Grants for DIVERSITAS OSC2	181 407
Exhibitors for OSC2	8 601
Registration fees for OSC2	218 214
Other (Reimbursement, bank profit, etc.)	194 586
TOTAL INCOME	1 294 699
EXPENSES – CALENDAR YEAR 2009	
Scientific activities	644 760
DIVERSITAS Open Science Conference 2	443 354
Communication and publications	42 944
Operating costs	128 982
Provision for 2010	34 658
TOTAL EXPENSES	1 294 699
Mandatory reserve	266 045

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Academia Sinica, China-Taipei | Beijer International Institute of Ecological Economics, Sweden | Eppley Foundation | EU EVOLTREE project | Federal Ministry of Education, Science and Culture, Austria | French Ministry for Higher Education and Research (MESR), France | German Federal Ministry of Education and Research (BMBF) | German Research Foundation (DFG) | GIS “Climat”, France | Global Centers of Excellence Program (COE, Japan) | International Council for Science (ICSU) | Ministries of Agriculture and Environment, The Netherlands | NASA, USA | National Centre for Scientific Research (CNRS), France | National Council on Science and Technology (CONACYT), Mexico | National Council for Scientific and Technological Research (CONICET), Argentina | National Research Foundation (NRF), South Africa | National Science Foundation (NSF-BIO and NSF-GEO), USA | Natural Environment Research Council (NERC), UK | Netherlands Organisation for Scientific Research (NWO) | New York Community Trust, USA | QUEST programme, University of Bristol, UK | Politique Scientifique Fédérale de Belgique, Belgium | Research Council of Norway | Royal Netherlands Academy of Arts and Sciences (KNAW) | Slovak Academy of Sciences | Spanish Ministry of Science and Technology (MYCT) | Stockholm Resilience Centre | Swedish International Development Agency (SIDA) | Swedish Science Council (Formas) | Swiss National Science Foundation (SNF) | Switzer Foundation | United Nations Environment Programme (UNEP) | United Nations Educational, Scientific and Cultural Organization (UNESCO) | University of California – Davis, USA | US Global Change Research Program (USGCRP) | V Kann Rasmussen Foundation | Wageningen University, The Netherlands | Wildlife Trust, USA | World Wildlife Fund

DIVERSITAS expresses its gratitude to all of the above organisations, to the International Group of Funding Agencies for global change research (**IGFA**) for their help in promoting dialog with national funding agencies as well as to the French Muséum National d’Histoire Naturelle, **MNHN**, for hosting the DIVERSITAS International Secretariat. In addition, DIVERSITAS expresses its gratitude to all of the sponsors of the Second DIVERSITAS Open Science Conference ([see page 7](#)).

Acronyms

AfricanNESS African Network for Earth System Science	FRB Fondation pour la Recherche sur la Biodiversité	IYB International Year of Biodiversity
AP BON Asia Pacific Biodiversity Observation Network	GBIF Global Biodiversity Information Facility	MA Millennium Ecosystem Assessment
APN Asia Pacific Network for global change research	GB03 Global Biodiversity Outlook 3	MIREN Mountain Invasion Research Network
BESTnet Biodiversity and Ecosystem Services Training Network	GCI Global Catchment Initiative	MNHN Muséum National d'Histoire Naturelle
CABI Commonwealth Agricultural Bureaux International	GCP Global Carbon Project	NASA National Air and Space Administration (USA)
CBD Convention on Biological Diversity	GECAFS Global Environmental Change and Food Systems	NC National Committee
CCAFS Climate Change, Agriculture and Food Security	GECHH Global Environmental Change and Human Health	NERC Natural Environment Research Council (UK)
CEA Commissariat à l'Énergie Atomique	GEF Global Environment Facility	NGO Non Governmental Organisation
CGIAR Consultative Group on International Agriculture Research	GEO Group on Earth Observation	NSF National Science Foundation (USA)
CIB Centre for Invasion Biology	GEO-BON Group on Earth Observations Biodiversity Observing Network	OSC Open Science Conference
CIRAD Centre de cooperation internationale en recherche agronomique pour le développement	GEOSS Global Earth Observation System of Systems	QUEST Quantifying and Understanding the Earth System
CNRS Centre National de la Recherche Scientifique	GISP Global Invasive Species Programme	RCN Research Council of Norway
CONABIO Comisión nacional para el conocimiento y uso de la biodiversidad (Mexico)	GLORIA Global Observation Research Initiative in Alpine Environments	SBA Societal Benefit Area
COP Conference Of the Parties	GMBA Global Mountain Biodiversity Assessment	SBSTA Subsidiary Body for Scientific and Technological Advice
COSUST Current Opinion in Environmental Sustainability	GSI Global Scale Initiative	SBSTTA Subsidiary Body for Scientific, Technical and Technological Advice
CSIR Council for Scientific and Industrial Research (South Africa)	GTI Global Taxonomy Initiative	SC Scientific Committee
CSIRO Australia's Commonwealth Scientific and Industrial Research Organisation	GTZ Deutsche Gesellschaft für Technische Zusammenarbeit (GTZ) GmbH, (German Technical Cooperation)	S-CBD Secretariat of the Convention on Biological Diversity
DEEED DIVERSITAS ecoHEALTH Economics of Emerging Diseases project	GWNI Global Water Needs Initiative	SCOPE Scientific Committee on Problems of the Environment
DFG Deutsche Forschungsgemeinschaft - German Research Foundation	GWSP Global Water System Project	SNF Swiss National Science Foundation
DFID UK Department for International Development	IAI Inter-American Institute for global change research	TEEB The Economics of Ecosystems and Biodiversity
DIWPA DIVERSITAS In Western Pacific Asia	ICIMOD International Centre for Integrated Mountain Development	UN United Nations
ELN-FAB European Learning Network on Functional Agrobiodiversity	ICSU International Council for Science	UNAM Universidad Nacional Autónoma de México
EPBRS European Platform for Biodiversity Research and Strategy	IGBP International Geosphere-Biosphere Programme	UNEP United Nations Environment Programme
ESSP Earth System Science Partnership	IGFA International Group of Funding Agencies for global change research	UNEP WCMC UNEP World Conservation Monitoring Centre
EU European Union	IHDP International Human Dimensions Programme on global environment change	UNESCO United Nations Educational, Scientific and Cultural Organization
EC-EBONE European Biodiversity Observation Network	INSU Institut National des Sciences de l'Univers	UNFCCC-COP United Nations Framework Convention on Climate Change – Conference of the Parties
EUF7 European Union's Seventh Framework Program	IPBES Intergovernmental Platform on Biodiversity and Ecosystem Services	UNU-EHS United Nations University – Institute for Environment and Human Security
FAO Food and Agriculture Organization	IPCC Intergovernmental Panel on Climate Change	USAID-GLOWS United States Agency for International Development – Global Water for Sustainability Program
	IPO International Project Office	WCRP World Climate Research Programme
	IUBS International Union of Biological Sciences	WWF World Wide Fund for Nature
	IUCN International Union for Conservation of Nature	ZEF Centre for Development Research

Getting involved...

The success of DIVERSITAS is directly related to the voluntary involvement of scientists and organisations from around the world. The following paragraphs briefly describe the primary means of contributing to this Programme. More detailed information is available in the **Getting involved** section of our website: www.diversitas-international.org



as a Scientist

DIVERSITAS invites individual scientists to make the Secretariat aware of their ongoing research and to suggest ways to integrate local and international initiatives. The DIVERSITAS Secretariat, as well as the Core Project and Cross-cutting Network offices, welcome proposals for collaborative activities (research projects, workshops, syntheses, etc.) that support the implementation of the DIVERSITAS Science Plan.

as a National Committee

DIVERSITAS encourages the establishment of National Committees as a mean of building a truly international network to support integrated biodiversity science. These Committees play an important role in linking national and international programmes, as well as interacting with policy makers and other stakeholders in their home countries.



as a Funder

Funding DIVERSITAS initiatives provides an excellent opportunity for individuals and organisations to demonstrate a strong commitment to conservation and sustainable use of biodiversity-issues that often have strong appeal for their own stakeholders and publics. DIVERSITAS welcomes the opportunity to collaborate with private industries, non-governmental/inter-governmental organisations, foundations and associations.

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DIVERSITAS
an international programme
of biodiversity science



ICSU
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