



# European Contribution to GEO BON

**Report of an Electronic Conference, September 2008**  
for the European Contribution to GEO BON workshop organised by  
Biostrat ([www.biostrat.org](http://www.biostrat.org))  
25-27 September 2008, Cegléd, Hungary



**Biodiversity  
Observation  
Network**

### E-Conference organisation:

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# Preface

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Research on biodiversity is essential to help the European Union and EU Member States to implement the Convention on Biological Diversity as well as reach the target of halting the loss of biodiversity in Europe by 2010.

The need for co-ordination between researchers, the policy-makers that need research results and the organisations that fund research is reflected in the aims of the “European Platform for Biodiversity Research Strategy” (EPBRS), a forum of scientists and policy makers representing the EU countries, whose aims are to promote discussion of EU biodiversity research strategies and priorities, to exchange information on national biodiversity activities and to disseminate current best practices and information regarding the scientific understanding of biodiversity conservation.

This is a report of the E-Conference entitled “European Contribution to GEO BON” preceding the BioStrat workshop to be held at Cegléd, Hungary from the 25<sup>th</sup> – 27<sup>th</sup> September 2008.

# Introduction

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*Katalin Török*

This electronic conference is intended to provide information from the widest possible range of experts to a workshop, organised by the BioStrat project, which aims at developing links and instigating networks between the Global Earth Observation System of Systems (GEOSS, [www.earthobservations.org](http://www.earthobservations.org)) and the European Platform of Biodiversity Research Strategy (EPBRS, [www.epbrs.org](http://www.epbrs.org)). The cooperation is meant to strengthen both sides by incorporating GEOSS objectives related to biodiversity in the EU Biodiversity Research Strategy, as well as incorporating European vision into the development of a global biodiversity observation network

GEOSS has nine Societal Benefit Areas (SBAs), one of which is Biodiversity. It has been decided that the main aim of this particular SBA should be to set up a Biodiversity Observation Network that should link together the world's many stand-alone biodiversity monitoring systems. Working towards this aim, the GEO Secretariat and DIVERSITAS joined forces to outline the framework of a Global Biodiversity Observation Network (GEO BON). Two other tasks of this SBA are to capture historical biodiversity data (lead by GBIF) and to build an Invasive Species Monitoring System (lead by the US).

GEO BON will create a global platform for integrating biodiversity data with data on climate and other key environmental and social factors. It will fill gaps in taxonomic and biological information and increase the pace at which information is collected and disseminated. The task of GEO BON is to develop a strategy for assessing biodiversity at both the species and ecosystem level, in order to facilitate the establishment of monitoring systems that enable globally coordinated assessment of trends and distributions of species and ecosystems of special conservation merit. An Implementation Plan is to be released by October 2008. Seven Task Groups (TGs) are currently working on the initial concept documents as follows:

- Data TG
- Network and Governance TG
- Scaling, Integration and Models TG
- Early Products TG
- Capacity Building TG
- Citizen Science TG
- Resources and Business Plan TG

EPBRS is a forum of scientists and policy makers, dedicated to the development of the European Biodiversity Research Strategy. In its biannual meetings during the last nine years it has focused on different research issues related to the above tasks (e.g. monitoring, scaling). Some new topics to be addressed by GEO BON, relevant to EPBRS, are to review and prioritize research and design decision-support systems that integrate monitoring with ecological modelling and forecasting. I sincerely hope that the themes discussed during the E-conference and its main outcomes can be channelled to both the EU biodiversity research strategy and the GEO BON Implementation Plan.

'Ecosystems' is another Societal Benefit Area of GEOSS which overlaps with GEO BON, as ecosystem classification and mapping are a common interest. Knowledge gaps in linking these two areas require research. For example, we lack approaches and possibilities to identify and map by remote sensing the environmental stress of ecosystems, a question raised by Biostrat partners. The integration of ecosystem and species level is another problem that needs further research. EPBRS by its long tradition of expert discussions that lead to ready-to-use products can also provide support to GEO BON on management issues, for example the facilitation of consensus on data collection protocols and the coordination of the development of interoperability among monitoring programmes. GEO BON will give a global view to EPBRS: in this way both programmes can mutually benefit from the collaboration.

The summary report of the E-conference will be presented at the GEO BON – Biostrat Workshop, 25-27 September 2008, Cegléd, Hungary. The main conclusions of this summary will serve as the basis for the recommendations to be prepared by the meeting participants.

# Summary of Contributions

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*Fiona Grant and Allan Watt*

## **European Contribution to GEO BON**

In her introduction to the GEO BON e-conference, Katalin Török set out the main aims of the e-conference, namely to provide information from a range of experts in order to develop links and instigate networks between the Global Earth Observation System of Systems (GEOSS) and the European Platform of Biodiversity Research Strategy (EPBRS).

In response to the introduction, Daniel Faith noted that as well as observation goals for ecosystems and species, GEO BON will also facilitate the global monitoring of genetic diversity, using a combination of remote sensing and in situ approaches, and highlighted that these will be most effective when integrated with GEO BON observation strategies at species and ecosystem levels. A new type of fast and easy-to-use identification service for species was introduced by Mauri Ahlberg, which she believed would greatly promote any Global Biodiversity Observing System.

Cornelia Nauen called for emphasis to also be placed on the systematic extraction of information from the scientific literature, in particular historical records and associated ecological information, so as to combine with earth observation of habitats (and their change over time), in situ observations and genetic studies. Donat Agosti agreed with Cornelia's emphasis for the improvement of the use of literature. He argued that full text publications need to be made available in a machine readable format so that the machine is able to find all taxonomic names, geographic entities and much more. He outlined current systems available in order to begin this process. The significance of historical records was re-emphasized by Simon Tillier, who also highlighted the importance of keeping specimens in taxonomic collections as an objective reference to the occurrence of species.

Doug Muchoney's contribution outlined how GEOSS (Global Earth Observing System of Systems) can aid current biodiversity monitoring systems by creating links with other Earth Observation networks to help fill in gaps in our present taxonomic and biological knowledge, generate updated assessments of global biodiversity trends, track the spread and retreat of invasive alien species, and monitor how biodiversity responds to climate change. Rob Jongman also indicated the need to develop a monitoring approach that covers all aspects of biodiversity in one coherent system and the potential for Earth Observation to contribute to this monitoring system to provide a vehicle for generalisation of observations and a context to field samples.

Anne Larigauderie and Bruno Walther outlined the key concept of GEO BON as a shared and interoperable system bringing data of different types and from many sources to bear on the information needs as defined by users. They highlighted GEO BON's main aims which are to create a global network from the many already existing efforts by linking and supporting them within a scientifically robust framework, and using the best technologies available. Rob Jongman also recognized

the need for a cost-efficient data collection system for biodiversity that is linked to a sound institutional framework in order to harmonize and share monitoring approaches at a European scale.

The technological requirements in order to be able to monitor biodiversity at global and intervening scales was addressed by Zoheir Sabeur who noted the need for the deployment of open systems around the world in order for scientists to get the bigger picture of the state of our biodiversity and ecosystems. Gediminas Vaitkus outlined the Experimental High-Resolution Information System (HIRIS) of the Baltic Sea and Europe, as a multi-purpose open structure statistical grid system that could be used for the deployment, processing and analysis of the diversity of ecosystems, biocenoses and species. He proposed the system to be an on-line service covering the whole of Europe with a broad range of thematic information and specifically targeted at high-resolution continental-scale modelling of environmental and socio-economical processes.

Some potential research needs relating to the required integration of decision-support systems, modelling, and forecasting were raised by Daniel Faith. He argued that effective biodiversity spatial modelling approaches are needed in order to add value to primary biotic observations through integration with key environmental variables. He suggested that such research is needed to enable better estimates of land condition in critical places, which in turn may result in a reduced rate of biodiversity loss. Gediminas Vaitkus outlined the RGB clustering method as a classification method for automated production of thematic land cover datasets. He argued that landscape structure and diversity are critical factors for the quality and diversity of biocenoses, and therefore the application of standard methods for rapid extraction of specific land cover thematic information from satellite images is essential for mapping landscape structures and identification of ongoing changes in a study area.

Klaus Henle called for emphasis to be placed on bridging the gaps between theoretically ideal monitoring approaches and real world constraints. He also highlighted the need to further explore and strengthen the role of volunteer involvement in monitoring, and to explore the geographic and expansion of web-based monitoring overviews and support tools developed in EU projects. Similarly Zoheir Sabeur recognized the need for near real-time monitoring of biodiversity at a global scale and argued that multidisciplinary approaches are required in order to achieve this.

# Research Priorities

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*Fiona Grant and Allan Watt*

## **1. Research needed to improve biodiversity monitoring:**

- Develop multidisciplinary approaches to monitoring biodiversity globally in near real-time.
- Develop a monitoring framework that covers all aspects of biodiversity in one coherent system, including genetic diversity, species diversity and ecosystem diversity.
- Bridge gaps between theoretically ideal monitoring approaches and real world constraints to further strengthen the role of volunteer involvement in monitoring.
- Explore the geographic and expansion of web-based monitoring overviews and support tools developed in EU projects.
- Understand the sensitivity of volunteer-based monitoring to the cultural, political and economic conditions of a country, particularly non-European countries.
- Support integration of in situ and earth observation by inter-calibration of EO and field observation at the habitat scale.

## **2. Research needed to improve technological tools:**

- Develop better and sustained observation systems, nested global sampling, and modelling, computational and analytical tools.
- Make full text versions of publications available in machine readable form.
- Develop ways to convert current publishing workflows into one that has underlying XML, in order to allow automatic extraction of data.
- Develop effective biodiversity spatial modelling approaches that can add value to primary biotic observations through integration with key environmental variables.
- Enable better estimates of land condition, and support the interpretation of observations through the lens provided by the biodiversity models.

## **3. Research needed to improve data collection systems and databases:**

- Develop a cost-efficient data collection system for biodiversity linked with extant data at national, regional and continental levels to produce statistical estimates of stock and change of key indicators and a system for estimating change for forecasting and testing policy options.
- Develop a common reference dataset, against which LTER and Natura 2000 sites can be compared and the impact of conservation policies reviewed.
- Expand and broaden the scope of web-based databases to provide an overview of monitoring activities outside Europe.
- Develop web-based support tools for monitoring activities, such as BioMAT.
- Extract information, in particular historical records and associated ecological information, and combine with earth observation of habitats (and their change over time), in situ observation and genetic studies, as appropriate.
- Maintain taxonomic collections and allow access to the information which they contain.

# Annex - List of Contributions

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## Session I: European contribution to GEO BON

Title of contribution	Author(s)
RE: Introduction to 'European Contribution to GEO BON'	Daniel Faith
RE: Introduction to 'European Contribution to GEO BON'	Cornelia Nauen
RE: Introduction to 'European Contribution to GEO BON'	Donat Agosti
RE: Introduction to 'European Contribution to GEO BON'	Simon Tillier
Geographically-Distributed Ecosystem Monitoring Service	Zoheir Sabeur
Promoting Citizen Science and Biodiversity Research	Mauri Ahlberg
Earth Observation Science Requirements for Characterizing and Monitoring Biodiversity	Doug Muchoney
Toward a Global Biodiversity Observing System	Anne Larigauderie and Bruno Walther
Observing Genomes, Species and Habitats in a Cost-Efficient Way	Rob Jongman
Research Strategies for Integrating Monitoring Activities in the Real World	Klaus Henle
HIRIS - Experimental High-Resolution Information System of the Baltic Sea Region and Europe	Gediminas Vaitkus
Application of the RGB-Clustering Method for Automated Production of Thematic Land Cover Datasets	Gediminas Vaitkus
GEO BON and the 2010 Biodiversity Target	Daniel Faith