

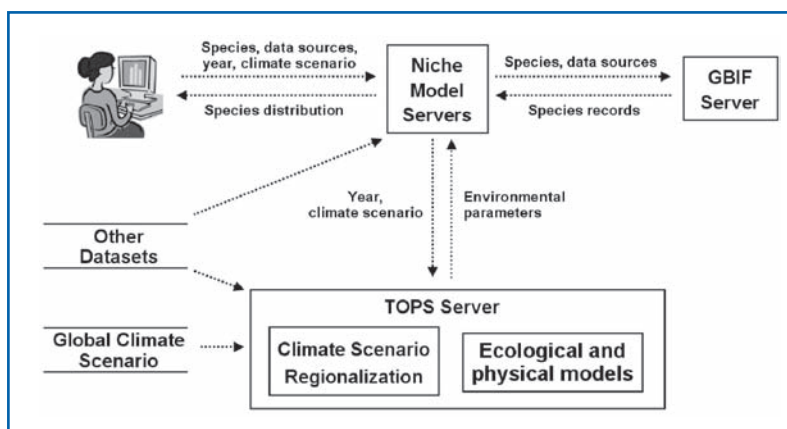
Towards a global biodiversity observation network

Description

1. To start the process of monitoring biodiversity on a global scale, a workshop in October 2006 (Geneva, Switzerland) established the GEO Biodiversity Observation Network (<http://www.bioobservation.net/>) which is a global partnership to collect, manage, analyze and report on the status and trends of the world's biodiversity. The network will first provide a framework for global biodiversity monitoring, and then generate biodiversity data and information from many different provider communities (e.g. museum collections, organism observations, remote sensing systems, intensive plot-type biodiversity measuring and monitoring systems, etc.), ascertain data requirements of user groups, review and prioritize research, facilitate interoperability among information system components and the interconnectivity of databases, generate regularly repeated assessments of global biodiversity trends, design decision support systems that integrate monitoring with ecological modelling and forecasting, and make data and reports available to users via the internet using the GEOSS framework. It is made up of many relevant programs and networks, e.g. Census of Marine Life, DIVERSITAS, GBIF, GTOS, IUCN, NASA, UNESCO-MAB and 2010 BIP, to name just a few (see also <http://www.twentyten.net/partnership.htm>).

The task of the network is to assess biodiversity at both the species and ecosystems level, and thereby identify unique or highly diverse ecosystems and those supporting migratory, endemic or globally threatened species, those whose biodiversity is of socio-economic importance, while taking into account the results of the Millennium Ecosystem Assessment and progress towards the CBD 2010 Targets. DIVERSITAS and NASA are leading the early planning stages for the Network, and for this purpose, DIVERSITAS has assembled an expert group of monitoring and modelling scientists under its bioDISCOVERY Core Project which will develop a scientific framework to improve global biodiversity monitoring.

2. The Ecological Forecasting Program at NASA is developing the concept of an Ecological Model Web (see Figure below), which would be an open-ended system to improve ecological forecasting abilities via improved model interoperability. Largely through the use of web services, and following the GEOSS architecture, the Model Web would allow various computer models and databases covering a broad range of processes to interoperate and so increase the range of questions they can answer. Currently, model interoperability is limited by both technical and non-technical barriers, thus limiting their potential uses and users. The Model Web would lower such barriers so that global access to sophisticated ecological modelling and forecasting becomes a reality.



Simplified view of the initial Ecological Model Web demonstration system. A user first selects a species and climate scenario. This information is then used to build a model correlating species distribution with present climate variables. Next, a global climate scenario is combined with other ecological and physical models by the Terrestrial Observation and Prediction System (TOPS) model framework. TOPS then passes the future climate scenario back to the Niche Model which then calculates the species' future distribution. This can then be used for conservation

3. The USGS, NBII, and other governmental and non-governmental institutions are developing the following tools to improve analyses of biodiversity data:

- the Global Integrated Trends Analysis Network (GITAN) is developing a Global Data Toolset (GDT, <http://rockyitr.cr.usgs.gov/gitan/>) which is an operational and easy to use on-line polygon data entry tool to facilitate an organization's ability to engage their network in the entry and/or validation of digital data (e.g. protected areas, species distributions, Important Bird Areas);

- Rapid Land Cover/Ecosystem Mapping Tool: an on-line technique to manually interpret satellite imagery for mapping land cover;
- Integrated Taxonomic Information System (ITIS): a taxonomic crosswalk to operationally compare, integrate, and apply global biodiversity data sets; and
- TerraLook (<http://terralook.cr.usgs.gov/>): a joint NASA/USGS project that expands and broadens the remote sensing user community by providing user-selectable collections of satellite images from three historical epochs (circa 1975, 1990, and 2000), as well as current images.

4. The 2010 Biodiversity Indicators Partnership was established in direct response to the need for global biodiversity indicators to track progress toward the 2010 biodiversity target. The Partnership brings together the numerous organisations and agencies working on developing and communicating biodiversity indicators in support of the 2010 target, and will facilitate the regular delivery of global biodiversity indicators into the CBD and other relevant fora in order to help track progress toward the 2010 target.

Added value

As described above, GEOSS-related activities have helped to improve data access, sharing, and use, and to establish forums for interdisciplinary collaboration and community building within the observation community, thus providing tools to advance biodiversity science and its applications. In the near future, the biodiversity science community, through the GEOSS framework, will define an implementation strategy for a biodiversity observation network; increase capacity building; develop more tools for policy making to be used in decision-making; develop cross-links with other GEOSS «Societal Benefit Areas», e.g. land use change, coastal zones, water management, health, etc.; and further integrate monitoring activities and modelling exercises.

Relevance to GEO

Biodiversity is one of the nine «Societal Benefit Areas» of GEOSS because biodiversity contributes both utilitarian values (e.g. ecosystem goods and services) as well as intrinsic values (e.g. aesthetic enjoyment) to human well-being. Moreover, it is inextricably linked to the other eight «Societal Benefit Areas» and to at least three of the Millennium Development Goals. The functional connections between the elements of biodiversity make up the life-support system of the biosphere, and thus monitoring the global status and trends of biodiversity is integral to the mission statement of GEOSS. More specifically, the development of long-term monitoring sites and programs, of improved analysis of remote data, of accelerating digitization of observation data, of increased interconnectivity of databases, of global conservation priorities, and of more reliable biodiversity indicators, are to a large part the result of the work initiated by the CBD 2010 Targets and the establishment of GEOSS. The activities related to the Biodiversity Task are making GEOSS a more reliable system for analysis, prediction, conservation management, and policy making.

Participants

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Current status and next steps

Further GEOSS-sponsored workshops are planned for December 2007 and early 2008, while the associated initiatives are all continuing their work through workshops, reports and ongoing tool development. Efforts are ongoing to establish several working groups advised by a steering committee and the development of tools (such as the Global Data Toolset, Rapid Land Cover/Ecosystem Mapping Tool, ITIS, TerraLook and the Ecological Model Web) continues. A demonstration system is being developed that will test the viability of the concept and provide a core onto which further components and tools can be added.