The GTOS role in GEOBON

Briefing notes from Bob Scholes, Chair of GEOBON, to Riccardo Valentini, Chair of GTOS

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The GTOS role in forming GEOBON

The Group on Earth Observations Biodiversity Observation Network was formed as a result of a process which had GTOS involvement from the start. 'Terrestrial and Freshwater Biodiversity' is one of the intended core areas of GTOS, but the topic had not been significantly developed in terms of products or services. I was appointed by GEO to the Implementation Planning Task Team for the Global Earth Observation System of Systems – essentially the operational plan for GEO – while still chair of GTOS, and one of my responsibilities in that small team was to flesh out the Biodiversity Societal Benefit Area and the Ecosystems Societal Benefit Area.[1] When I finished my term as GTOS chair the GTOS steering committee asked me to convene a team to investigate how the biodiversity area in GTOS could and should be implemented. The team was nominated and met once. It was overtaken by initiatives that were highly aligned with the mandate given to the team, and a parallel process would have been pointless or even counter-productive, so we decided to converge the activities. The GTOS team helped convene the first biodiversity information user group meeting in Geneva in 2006. This revealed tentative interest in the idea, but high levels of caution, suspicion and turf-protection among the community.

GEOSS in its 2007 workplan called for a GEOBON planning task (BI-07-01). The call was directed at, and taken up by, DIVERSITAS and NASA. Within DIVERSITAS the responsible persons were myself, the Executive Director (Anne Larrigauderie) and the leader of the BioDiscovery core project (Norbert Jurgens). By mutual agreement, I represented both GTOS and DIVERSITAS in the process. Dr Gary Geller and Wood Turner were the key players from NASA. The task proceeded by the formation of an interim steering group (with much the composition as the GTOS team, but including marine experts as well). The Interim Steering Group met, drafted a Concept Document and then convened a large combined user and provider meeting, in Potsdam (September 2007). The entire tone at that meeting had changed substantially since the first stakeholder meeting, with the broad community expressing support for the idea. The Concept Document was revised to take into account input from the meeting, and an Implementation Plan was developed. A descriptive paper was published in *Science*[2], and the existence of the plan was noted by the CoP of the Convention on Biological Diversity in Bonn (May 2008). The Concept and Plan were submitted to, and approved by, the GEO V plenary in Bucharest, in November 2008. Progress was reported at the GEO VI plenary in Washington DC, November 2009.

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[1] The definition of the SBAs was a political decision that predated the formation of the IPTT, and was not subject to revision, at least within the initial period. Biodiversity practitioners and stakeholders see Ecosystems as part and parcel of a broad definition of Biodiversity, and this is the way in which we have been working in practice within GEOSS.

[2] Scholes, RJ et al 2008 Towards a global biodiversity observation system. Science 321,1044-5

A GEOBON Steering Committee was formed in January 2009 and met in June 2009. I was asked to be the first chair, which I accepted. The execution takes place via working groups, which have a specific mandate and an approximately two-year timeframe. There are eight initial working groups (chairs indicated):

- Genetic level (Tet Yahara and Daniel Faith)
- Terrestrial Species Monitoring Programmes (Henrique Pereira)
- Terrestrial Ecosystem Monitoring (Rob Jongman)
- Freshwater Ecosystem Monitoring (Ian Harrison)
- Marine Ecosystem Monitoring (Jan de Leeuw and Carlo Heip)
- Ecosystem Services (Hal Mooney)
- In-situ / Remote-sensing Integration (Simon Ferrier)
- Informatics and Portals (Hannu Saarenmaa and Eamonn O Tuama)

Clearly, all of these with the possible exception of the Marine group, are of direct interest to GTOS.

The working groups are underway, developing detailed implementation plans for their areas, and thinking about early products. A key meeting is scheduled for 22-25 February 2010 in Asilomar, USA, where all working groups will convene to finalise the plan. Selected stakeholders who are not already involved in the working groups will also be invited.

The other leg of the GEOBON roll-out is the more-or-less spontaneous formation of regional BONs, initially in Europe, Japan and Asia-Pacific.

The future GTOS niche

GTOS, despite not yet having a developed biodiversity area, currently occupies a key position within the GEOBON network. GTOS is the acknowledged coordination point for international land cover mapping and monitoring projects, in terms of its GOFC/GOLD activities. The only add-ons to this activity that are indicated at this time are

1. Develop a 'biodiversity relevant' land cover interpretation. Following the principle that all land cover legends should follow the LCCCS specifications (which continue to be refined), a variety of fit-for-purpose reclassifications are then possible: for instance, the fundamental legend can be reinterpreted for purposes of assessing carbon stocks, or ecosystem service potentials. In the same way, the global land cover maps can have a biodiversity interpretation. For illustration, the three most basic cover classes for biodiversity purposes are a) near-intact (most species still exist, and most porocesses function without intervention b) altered but still partially represented and functional, and c) substantively transformed. More elaborate schemes are possible.
2. A second key issue for biodiversity is fragmentation and connectivity. In other words, it is not just the proportion of the ecosystem in the untransformed or modified classes that matters, but the size of the fragments, and their spatial relationship to one another. These metrics are relatively easily derived from land cover classifications (especially where the base resolution approached the 100 m scale), but deciding which minimal set of metrics to chose will require expert advice.
3. Take note of the global ecosystem maps under development in GEOSS task EC-09-01a: Ecosystem Classification and Mapping. These could consist of either an overlay on the land cover, or an attribute field to be attached to the land cover. The maps for North and South America are complete, Africa is near complete and Asia is not yet started. The implementor is Roger Sayre of USGS.

In addition to the GOFC/GOLD activity, there is scope for GTOS to fill one or two other currently 'missing' elements.

1. **A global ecological interactions database**. This would take the conceptual form of 'Species A was observed to interact in way X with species B', along with the time, place and identity of the observer. 'X' could be a range of biodiversity and ecologically important interactions such as 'preys on' (for food webs, for instance), 'pollinates', 'is a disease of', 'is dispersed by' etc. Such a database does not yet exist in shared form anywhere, and is not planned by any of the key players. It would have utility is plotting the propagation of diversity-mediated stresses. For instance, what would the agricultural consequences be if a species of bee were to decline? By what path would a biodiversity-vectored disease spread?

2. **A community database (also called a plot database).** This would contain species that are observed to coexist at a given location and time. Examples are the phyto-sociological releve data collected in many parts of the world, or the forest inventory plots, or remote sensing calibration/validation plots. It is more helpful if the species have an absolute or relative abundance associated with them. It is not strictly necessary that species be the fundamental basis – function types (eg tree, grass, forb) are also useful, either in addition to the species list, or in place of it. There are many national databases of this general form, but as yet only very small and relatively inaccessible global databases.