STANDARDIZE METHODS AND DATA SYNTHESIS

Participants: Jörg Roembke (Chair), David Bignell (Rapporteur), Fredrick Ayuke, Lijbert Brussaard (visiting), TS de Carvalho, Andy Ogram.

a. Some terminologies have changed in recent years and new concepts have emerged. There is therefore an immediate need for a glossary, especially focused on location terms (region, landscape, gradsect, landscape, land use, location, site, sampling point etc.) and functionality (engineer, functional group, trait analysis, service, goods etc.). There is also a corresponding need to have an index of current networks and projects where soil biodiversity is a component activity (see below). Suitable modes and starting points are provided by Harrington et al. (2010) Ecosystem services and biodiversity conservation: concepts and a glossary. Biodivers. Conserv. 19, 2773-2790 and by Scholes et al. (2012) Building a global observing system for biodiversity. Curr. Opin. Environ. Sustainability 4, 139-146.

b. There has been recent progress in compiling cross-taxon standardised methods for sampling soil biotas under the umbrellas of CIAT-TSBF (Tropical Soil Biology and Fertility Programme: http://www.taylorandfrancis.com/books/details/9781844075935/), EU JRC (Joint Research Centre Ecofinders, Soil Biodiversity and ENVASSO projects: http://www.EcoFINDERS.eu; http://eusoils.jrc.ec.europa.eu/library/themes/Biodiversity/; http://eusoils.jrc.ec.europa.eu/projects/envasso/documents/ENV_Vol-I_Final2_web.pdf), EU Environment Directorate (http://ec.europa.eu/environment/soil/pdf/7%20Ch%205.pdf), IRD France ftp://ftp.fao.org/docrep/fao/011/i0211e/i0211e.pdf/), GEO BON (Group on Earth Observations: Biodiversity Observation network http://www.earthobservations.org/documents/cop/bi_geobon/geobon_technical_summary_imp_plan.pdf) and the ISO (International Organisation for Standardisation http://www.iso.org/iso/iso_catalogue/catalogue_tc/catalogue_detail.htm?csnumber=38529).

c. In contrast to the projects listed above the role of ISO may be pivotal because:

   i) it is an international organisation consisting of >100 national agencies world-wide.

   ii) its guidelines (= standard methods) are legally accredited by many national or international authorities when putting conservation laws and regulations into practice.

   iii) its Technical Committee 190 (covering all soil-related matters) has already published a series on soil invertebrate (earthworms, micro-arthropods, enchytraeids, nematodes etc.) sampling (ISO No. 23611-1/6) and soil microbial DNA extraction (ISO 11063).

ISO standards are regularly reviewed every 5 years, thus they can easily be updated.

d. The design of multi-taxon sampling programmes is a somewhat different issue, with a more dispersed literature and less agreed common ground (but see http://www.worldagroforestry.org/downloads/publications/PDFs/wp08177.pdf). Much of the recent literature includes discussion of which organisms to sample (i.e. the best indicators of soil health/quality and/or those that contribute the most important ecosystem services) and putative rules of documentation (what information is needed, what units are used for measurement and how biodiversity assessments are collated for end users).

e. The main arguments for standardisation are i) it generates datasets which can be compared with one another, ii) it permits regional and global trends to be discerned and iii) it provides consistent and reliable metrics to present to policy makers. A fourth argument is that it encourages simplified and economical schemes of sampling which can be readily used in the field. In fact, in the context of the new project EcoFinders, EU authorities are looking urgently for standard methods to ensure that monitoring of soil biodiversity can actually be launched. The main argument against is that no single set of methods is satisfactory for all sites and settings; in particular cases standard methods may fail to assess the biota accurately if the spatial scales of the work allow some organisms to be missed or under-sampled, the protocols are unsuited to local land use patterns or do not take account of characteristic or idiosyncratic site-level or regional dispersals of the organisms targeted.

f. Some components of soil biodiversity sampling are likely to benefit strongly from standardization. These include site and parent soil descriptions, organism retrieval (extraction from soil for identification and counting), data matrices (how to report below-ground biodiversity) and possibly an agreed list of functional groups to be investigated.

g. Other components of work would benefit from harmonization, i.e. a set of guidance documents that would contain case studies and/or a menu of approaches to meet user-defined needs. Such components might include the design of sampling, a database of traits, the choice of organisms to address and the selection of appropriate holistic molecular genetic methods (especially those that can be extended to fauna).

h. Summary

Standardize	Harmonize
Site and soil description	Sampling design
Organism retrieval	Trait selection and analysis
Reporting matrix	Choice of organisms to be addressed
Key functions of soil biota to be assessed	Selection of molecular genetic methods

DEB 7 April 2012.