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Workshop Report

Biodiversity data provision and decision-making - addressing the challenges

Katherine Despot-Belmonte[‡], Carsten Neßhöver[§], Hannu Saarenmaa[|], Eugenie Regan[¶], Carsten Meyer[#], Eline Martins[¤], Quentin Groom[«], Anke Hoffmann[»], Alessandra Caine[^], Nadine Bowles-Newark[‡], Haejin Bae[ˇ], Dora Ann Lange Canhos[¦], Stefanie Stenzel[ʔ], Diana Bowler[ˤ], Aline Schneider[¢], Lauren V. Weatherdon[‡], Corinne S. Martin[‡]

‡ UNEP World Conservation Monitoring Centre, Cambridge, United Kingdom
§ UFZ-Helmholtz Centre for Environmental Research, Leipzig, Germany
| University of Eastern Finland, Joensuu, Finland
¶ The Biodiversity Consultancy, Cambridge, United Kingdom
# German Centre for Integrative Biodiversity Research (iDiv), Leipzig, Germany
¤ National Centre for Flora Conservation/Rio de Janeiro Botanical Garden, Rio de Janeiro, Brazil
« Botanic Garden Meise, Meise, Belgium
» Leibniz Institute for Research on Evolution and Biodiversity, Berlin, Germany
^ Commonland, Amsterdam, Netherlands
ˇ National Institute of Ecology, Choongnam, Seocheon-gun, Maseo-Myeon, Geumgang-ro, Korea, South
¦ Centro de Referência em Informação Ambiental, Barão Geraldo, Campinas/SP, Brazil
ʔ Federal Agency for Nature Conservation (BfN), Bonn, Germany
ˤ Senckenberg Biodiversität und Klima- Forschungszentrum (BiK-F), Frankfurt am Main, Germany
¢ Martin Luther University of Halle-Wittenberg, Halle, Germany

Abstract

Essential Biodiversity Variables (EBVs) are measurements required for study, reporting, and management of biodiversity change. They are being developed to support consistency, from the collection to the reporting of biodiversity data at the national, regional and global scales. However, "EBV stakeholders" need to strike a balance between 'doing innovative research' and 'having positive impact' on biodiversity management decisions. This paper reports on a workshop entitled *Identifying joint pathways to address the challenges of*

biodiversity data provision and decision-making and presents the main workshop's output, a "researcher's brief" entitled *Guiding principles for promoting the application of EBVs for current and future needs of decision-makers*. These guiding principles are: Speak with a common voice; Clearly define what is an EBV and how it relates to indicators; Engage beyond the research world; Be realistic about what can be done now and later; Define criteria for good EBVs; Use EBV as a clearing house; Convey the limitations of EBVs; Clarify what impact EBVs should have; Be salient, credible, legitimate, iterative; Don't put an EBV skin on everything you do; Don't create too many EBVs; and Don't reduce EBVs to building blocks of indicators. This brief is of relevance to the wider GEO BON (Group on Earth Observation Biodoversity Observation Network) community, and in particular those scientists/researchers interested in the application of EBVs.

Keywords

Introduction

This report provides a summary of the joint EU BON - EKLIPSE workshop which took place during the 2016 GEO BON (Group on Earth Observation Biodiversity Observation Network) 'Open Science Conference & All Hands Meeting' (4-8 July, Leipzig, Germany, http://conf2016.geobon.org/). This four day event was attended by a few hundreds biodiversity experts ranging from scientists and researchers of museums, universities and nationally-funded centres, to conservation practitioners (from Non- and Inter-Governmental Organisations, the private sector, etc). During the 'All Hands Meeting', UNEP-WCMC (United Nations Environment Programme World Conservation Monitoring Centre) and UFZ (Helmholtz Centre for Environmental Research), as part of their respective "[EU BON](#)" and "[EKLIPSE](#)" projects, co-hosted a workshop entitled *Identifying joint pathways to address the challenges of biodiversity data provision and decision-makin*g.

The EU BON ("[Building the European Biodiversity Observation Network](#)", (Hoffmann et al. 2014) project is the European contribution to [GEO BON](#). GEO BON itself aims to develop 'a global biodiversity observation network that contributes to effective management policies for the world's biodiversity and ecosystem services' (GEO BON 2016). Like EU BON, EKLIPSE ("[Knowledge & Learning Mechanism on Biodiversity and Ecosystem Services](#)") is a project funded by the European Union. The main difference between these two projects is that EU BON focuses on addressing the challenges of 'biodiversity data provision', whilst EKLIPSE focuses more on addressing the needs of 'end users of biodiversity data and knowledge', in particular decision-makers, including from the policy sphere. As a result, these two projects are particularly complementary for *Identifying joint pathways to address the challenges of biodiversity data provision and decision-making*.

One main focus of the 'Open Science Conference & All Hands Meeting' was for participants to discuss the implementation of Essential Biodiversity Variables (EBVs). EBVs are defined "as a measurement required for study, reporting, and management of biodiversity change" (Pereira et al. 2013). They are being developed to support consistency, from the collection to the reporting of biodiversity data at the national, regional and global scales (Geijzendorffer et al. 2016). In this context, GEO BON's efforts have been endorsed by Parties to the Convention on Biological Diversity (CBD, Decision XI/3*1), given their relevance to indicators (Brummitt et al. 2016) for tracking progress against internationally agreed targets such as the Aichi Biodiversity Targets of the UN Strategic Plan for Biodiversity 2011-2020. As a result, this theme emerged during discussions at the joint EU BON - EKLIPSE workshop, and indeed some of the workshop participants had been involved in the development and/or application of the EBV framework. Discussions at the workshop were captured in the form of a "researcher's brief" entitled *Guiding principles for promoting the application of EBVs for current and future needs of decision-makers*. This brief is of relevance to the wider GEO BON community, and in particular those scientists/ researchers interested in the application of EBVs.

Background information and aims of the workshop

Recent decades have seen major developments in the discoverability and accessibility of biodiversity data, with key players such as GEO BON, GBIF*2 and OBIS*3 fostering this process at the global level, and working towards identifying and filling extensive gaps in knowledge. At the regional and local scales, projects such as EU BON and e-infrastructures such as Atlas of Living Australia*6, Conabio (Mexico)*7, and *species*Link (CRIA, Brazil)*8, among others, have made significant advances in making data *discoverable* (i.e. adequately documented), *accessible* (i.e. uploaded in public repositories) and *digestible* (i.e. interoperable) (Wetzel et al. 2015). In parallel to these efforts, the need for better informed decision-making is increasing, both in Europe and globally, thus putting a new emphasis on improving the pathway from data to information to knowledge. In this respect, the EKLIPSE project has been set up to create a support mechanism for decision-making in relation to biodiversity and ecosystem services, and to facilitate linkages between science, policy and society.

Both sides of the picture, i.e. 'biodiversity data provision' and 'decision-making based on information/knowledge derived from biodiversity data', have distinct but intertwined challenges that are often discussed and tackled independently. The joint EU BON – EKLIPSE workshop aimed to identify some of the challenges of turning biodiversity data into knowledge to support decision-making, and to identify possible pathways to make biodiversity data more relevant to decision-makers. The workshop had a global focus in order to make useful contributions to the GEO BON network, and potentially inform relevant international processes such as IPBES*4.

Key discussions and outcomes of the workshop

The workshop began with a series of short presentations to set the scene and to provide European and global perspectives on the challenges of 'biodiversity data provision' and 'decision-making' based on available data. The second part of the workshop was more interactive, and organised around two case studies where participants worked in groups to address the key challenges of biodiversity data provision to support decision-making.

Challenges of biodiversity data provision - presentation

Hannu Saarenmaa (University of Eastern Finland, EU BON) presented on the challenges of biodiversity data provision at the European scale. He highlighted that biodiversity data are compiled and stored by a number of organisations and initiatives but that only around 10-20% of these data are shared openly, despite most countries having signed up to the GEOSS Data Sharing Principles*5. There are a number of challenges and barriers from data collection to dissemination (e.g. curation, mobilisation, standards, analysis, licensing), as well as various data gaps (e.g. spatial, temporal, and taxonomic). The EU BON network has been working on integrating a wide variety of biodiversity data layers and formats in order to make data useful for monitoring biodiversity trends. The following are some of the steps taken by different EU BON work packages to help address some of these challenges and barriers:

- working through the existing networks (systems of systems) to advance interoperability and data integration,
- developing links with a number of networks that provide data (e.g. GEOSS, GBIF, Long Term Ecological Research Network LTER, Lifewatch, DataONE),
- providing data hosting to make data available and discoverable,
- developing tools to mobilise, share and publish data (e.g. via GBIF),
- providing training to enable efficient processing of data from collection to dissemination.

EU BON has also recently launched the European Biodiversity Portal, which is a single interface for the provision of European biodiversity data and information.

Biodiversity data needs by European and global policies - presentation

Corinne Martin (UNEP-WCMC, EU BON) provided an overview of the biodiversity data needs by European and global policies, and the use of biodiversity data by decision-makers more broadly. The main users of biodiversity data are national governments, inter-governmental & non-governmental organisations, corporations/businesses, and research bodies. Users fall largely within these four categories (Fig. 1) and use data for decision-making. Many in the wider GEO BON community fall in the "research bodies" category, but the workshop mainly focused on the other three categories of decision-makers.

Who are the main users of biodiversity data?

Local, national, regional and global scale biodiversity data are needed by:

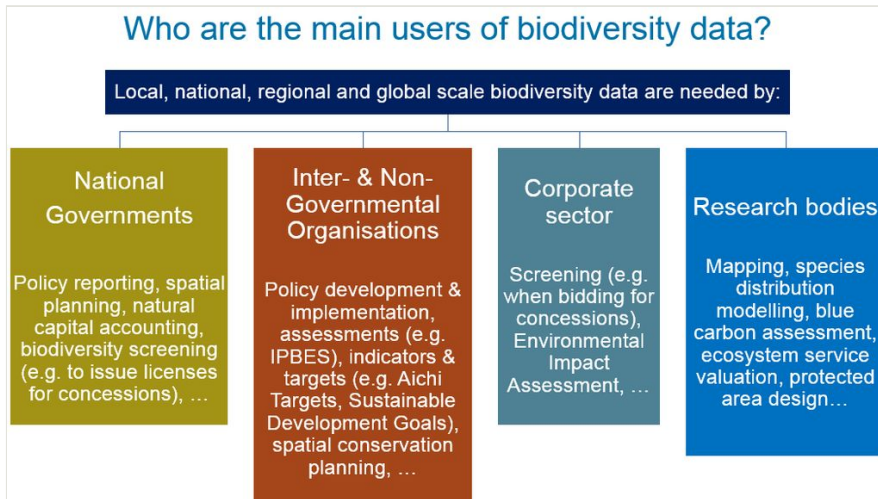| National Governments	Inter- & Non-Governmental Organisations	Corporate sector	Research bodies
Policy reporting, spatial planning, natural capital accounting, biodiversity screening (e.g. to issue licenses for concessions), …	Policy development & implementation, assessments (e.g. IPBES), indicators & targets (e.g. Aichi Targets, Sustainable Development Goals), spatial conservation planning, …	Screening (e.g. when bidding for concessions), Environmental Impact Assessment, …	Mapping, species distribution modelling, blue carbon assessment, ecosystem service valuation, protected area design…

Figure 1.

The main users of biodiversity data.

Decision-makers use biodiversity for different purposes, and as such, their needs in terms of spatial scales and data formats vary. For example, researchers tend to use raw data for mapping, modelling and other analytical work. In contrast, national government officials may prefer data that have already been processed and packaged into an information product for policy-reporting and assessments. Thus, besides the three main issues of discoverability/accessibility/digestibility highlighted earlier, it is important to acknowledge that a certain expertise is often required to use data, which must be packaged into information and knowledge products (e.g. indicators, traffic-light maps, databases, decision-support tools, websites) and designed around the varying needs and capacity of end-users (e.g. decision-makers).

In the biodiversity policy context, the availability of comprehensive, sound, and up-to-date data is a key requirement to implement policies, strategies and actions to address biodiversity loss, monitor progress towards biodiversity targets, as well as to assess the current status and future trends of biodiversity. The biodiversity policy context is complex (Fig. 2) and "data hungry".

The provision of data, information and knowledge in Europe - presentation

Carsten Nesshöver (UFZ) provided an overview of the EKLIPSE project, which aims to set up a long-term, self-sustainable support mechanism for evidence-based and evidence-informed policy on biodiversity and ecosystem services for Europe (see www.eklipse-mechanism.eu for details). Currently, the best available science and expertise regarding biodiversity and ecosystem services are not being used effectively to inform policy-making in Europe. For example, it is said that around 80% of information and knowledge used to inform environmental policy in the European Union is provided via consultancy-based

services contracts. However, there are experts and institutions that are willing to share relevant data and knowledge that informs policy-making processes. As such, the overall goal of the EKLIPSE project is to improve the interface between science, policy and society in order to support decision-making based on the best available knowledge (Nesshöver et al. 2016).
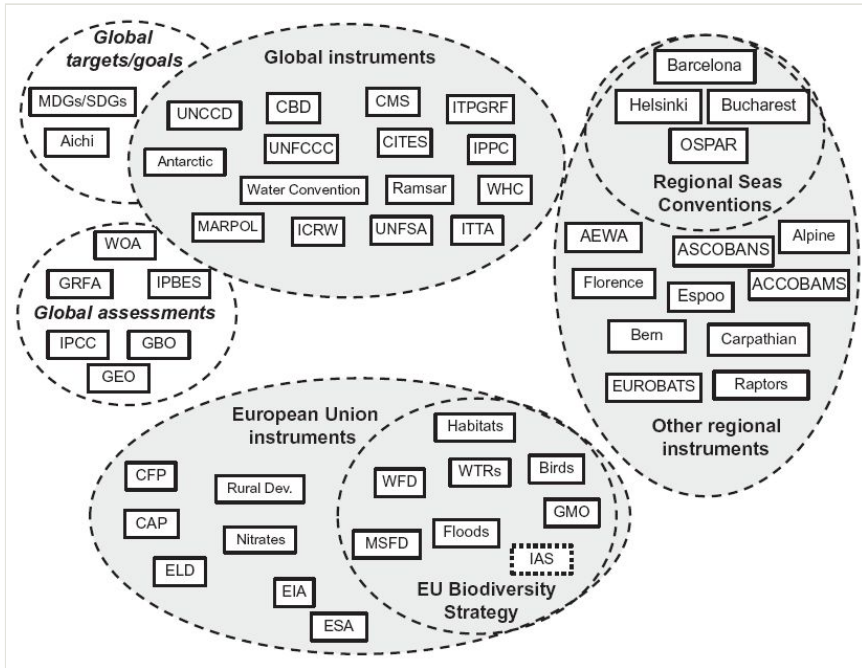

Figure 2.

From a European perspective, the European biodiversity policy landscape is complex and "data hungry" (Wetzel et al. 2015).

The core tasks of the EKLIPSE project are as follows:

1. To build the underlying network of networks: develop the links with experts and institutions,

2. To build the capacity to get engaged: support engagement of network partners and individuals,

3. To synthesise knowledge, and to provide in-depth and high quality policy responses.

The roles of individuals and institutions are crucial to make this support mechanism self-sustainable after the funding phase (2020). For example, the mechanism needs to be set up to effectively answer policy-makers' needs and concerns, and to add value to the decisions they need to make (Livoreil et al. 2016). On the other hand, the mechanism

needs to be attractive for knowledge holders, who can provide the thematic and methodological expertise on relevant issues and future research needs. As such, the EKLIPSE project will: i) design an effective process from data provision to data knowledge, ii) include different groups and stakeholders in all phases of knowledge synthesis, and iii) communicate knowledge effectively for policy-making purposes, first of all by addressing their needs explicitly via open calls for requests, and secondly by continuous dialogue offers.

The EKLIPSE project is currently working on building the links between data providers and data users, as well as the links with similar platforms/mechanisms (e.g. the community platform on ecosystem services, OPPLA), thus identifying different roles for different knowledge providers in such mechanism.

Workshop outputs

The second part of the workshop focused on using the expertise of the room to identify pathways to address the aforementioned challenges in regards to biodiversity data provision and data-derived information use, and to produce an output of relevance to the wider GEO BON community. Participants were divided into two groups – the first group developed a case study on the first "Red Book" of Brazilian plants (Fig. 3), whilst the other focused on making Essential Biodiversity Variables relevant to a broad audience
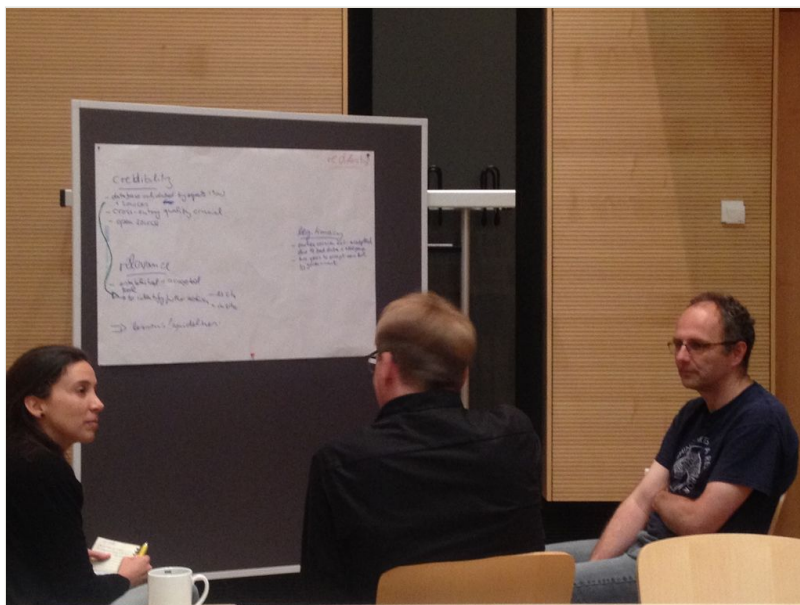

Figure 3.
Discussing the development of the "Red Book" of Brazilian plants - case study.

"Red Book" of Brazilian plants - The Botanic Gardens in Rio de Janeiro - case study

The National Centre for Flora Conservation/Botanic Gardens in Rio de Janeiro has the mandate to produce lists of threatened plant species under the oversight of Brazil's Ministry of Environment. The so-called "Red Book" of Brazilian plants (Martinelli and Moraes 2013) uses the framework of the International Union for Conservation of Nature's (IUCN) Red List of Threatened Species. This work used as taxonomic base the online Brazilian Flora (Brazilian Flora 2020 project) and the *species*Link Network in Brazil for occurrence data from Brazil's Virtual Herbarium (http://inct.splink.org.br/index). The Red Listing process was done openly and collaboratively in an online platform with more than 400 experts who contributed towards the production and validation of all data used. The Red Book successfully turned biodiversity data into relevant information that supports decision-making processes. As a result, the Red Book of Brazilian plants is currently used by both experts and policy-makers in Brazil and is the base for other instruments as recovery plans, priority maps and field guides. Moreover, this red book with 2113 threatened species subsidised the official threatened flora species list and all these species are now protected by law.

Placing EBVs at the heart of decision-making: a researcher's brief - case study

Several group members (Fig. 4) had knowledge of EBVs, and framed their discussion around the development of a "researcher's brief" entitled *Guiding principles for promoting the application of EBVs for current and future needs of decision-makers*. The brief (Fig. 5) aims to provide a quick guide for researchers wishing to use EBVs to inform decision-making processes.
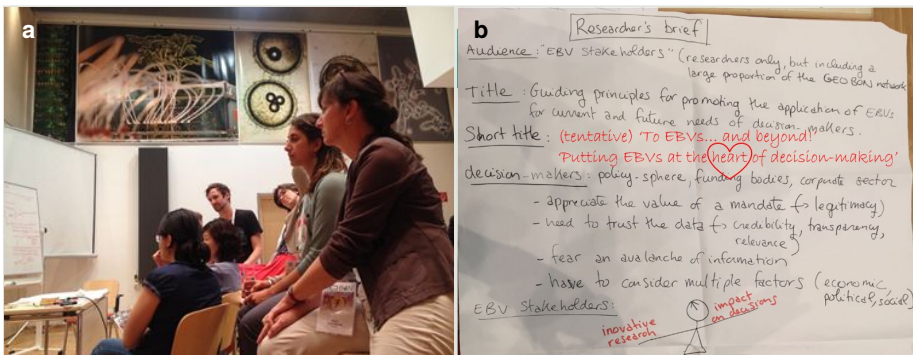

Figure 4.

Discussing the development of an EBV-based "researcher's brief"

a: Workshop participants
b: Developing the brief

Figure 5.

Guiding principles for promoting the application of EBVs for current and future needs of decision-makers - researcher's brief.

Conclusions

The joint EU BON – EKLIPSE workshop explored pathways to make biodiversity data useful in monitoring biodiversity trends, and communicating data-derived information to end-users (i.e. decision-makers). The following topics were covered: the importance of linking expert/research networks, promoting ongoing stakeholder engagement, addressing policy needs, and packaging data-derived information into concise formats. The main workshop output, a brief entitled *Guiding principles for promoting the application of EBVs for current and future needs of decision-makers* was then presented during the final plenary of the GEO BON All Hands Meeting, and was extremely-well received. As a result, this workshop has helped raise the importance of "science-policy interfacing in GEO BON". The EU BON and EKLIPSE projects will continue to work together, and in this context their project Coordinators signed a Memorandum of Understanding to continue collaborating towards the provision of biodiversity data to inform policy-making processes.

Acknowledgements

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Endnotes

[*1] https://www.cbd.int/doc/decisions/cop-11/cop-11-dec-03-en.pdf

[*2] Global Biodiversity Information Facility, http://www.gbif.org/

[*3] Ocean Biogeographic Information System, http://www.iobis.org/

[*4] Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services

[*5] Global Earth Observation System of Systems, https://www.earthobservations.org/geoss_dsp.shtml

[*6] http://www.ala.org.au/

[*7] https://www.gob.mx/conabio

[*8] http://splink.cria.org.br/