CBD

Distr.
GENERAL

CBD/SBSTTA/21/INF/1
18 October 2017

ENGLISH ONLY

SUBSIDIARY BODY ON SCIENTIFIC,
TECHNICAL AND TECHNOLOGICAL ADVICE
Twenty-first meeting
Montreal, Canada, 11-14 December 2017
Item 7 of the provisional agenda*

UPDATE ON RELEVANT GEO BON ACTIVITIES FOR THE TWENTY-FIRST MEETING OF THE SUBSIDIARY BODY ON SCIENTIFIC, TECHNICAL AND TECHNOLOGICAL ADVICE

Note by the Executive Secretary

1. The Executive Secretary is circulating herewith, for the information of participants in the twenty-first meeting of the Subsidiary Body on Scientific, Technical and Technological Advice, an update on relevant activities undertaken by the Group on Earth Observations Biodiversity Observation Network (GEO BON). The document has been prepared by the GEO BON Policy Task Force.

2. This update is relevant to the work of the Convention on Biological Diversity, in particular with regard to decision XII/1, paragraph 16, in which the Conference of the Parties invited Parties, indigenous and local communities and other relevant stakeholders to collaborate with the Group on Earth Observations Biodiversity Observation Network and other relevant organizations that contribute to building observation systems and to biodiversity monitoring, to address the priority needs identified by Parties related to biodiversity observation and monitoring.

3. The report is presented in the form and language in which it was received by the Secretariat.

* CBD/SBSTTA/21/1.

UPDATE ON RELEVANT GEO BON ACTIVITIES FOR THE TWENTYFIRST MEETING OF THE SUBSIDIARY BODY ON SCIENTIFIC, TECHNICAL AND TECHNOLOGICAL ADVICE

EXECUTIVE SUMMARY

The Group on Earth Observations Biodiversity Observation Network, or GEO BON, was established in 2008 as the biodiversity arm of GEO (Group on Earth Observations), with the mission of improving the acquisition, coordination, and delivery of biodiversity observations, and related ecosystem services, to both the scientific community, and decision-makers. GEO BON organises its structure and its activities around two key components: the Essential Biodiversity Variables (EBVs), and the Biodiversity Observation Networks (BONs). Two GEO BON Task Forces, on Policy support, and Remote Sensing, were added to the structure of GEO BON in 2017 to better align the outputs of the different activities with the needs of its key users.

The Essential Biodiversity Variables are a minimum set of measurements covering all dimensions of biodiversity, complementary to one another, that are required to study, report, and manage biodiversity change. The EBVs are produced by integrating primary biodiversity observations (e.g. in situ observations or remote-sensing products) and constitutes the building blocks of indicators of biodiversity change. On this front, GEO BON and its partners have been developing a set of Global Indicators of Biodiversity Change that have been endorsed by the CBD to report on progress towards the Aichi Targets, as well as by the IPBES, in support of the Global Assessment. The indicators produced using the EBVs can also be used at the national and sub-national scales, for instance for National Biodiversity Stategies and Action Plans (NBSAPs), Environmental Impact Assessments, land and sea use planning, and biodiversity offsets. Several pilot applications of the EBV framework have either occurred or are being planned at national and regional scales in order to develop and test guidance on how the EBVs can be applied at various scales for improving biodiversity observation systems.

The Biodiversity Observation Networks are mandated to engage in networking, biodiversity monitoring, data mobilization, and data sharing. GEO BON is facilitating the establishment, enhancement and interlinkage of those BONs, which can be national (e.g. China), regional (e.g. Arctic), or thematic (e.g. marine). As of 2017, seven BONs are formally endorsed by GEO BON: the China BON, French BON (ECOSCOPE), Colombia BON, Arctic BON (Circumpolar Biodiversity Monitoring Program), Asia-Pacific BON, Marine BON (MBON), and Freshwater BON (FWBON). To support users, such as national governments, in the establishment of their biodiversity observation systems, BON in a Box, a capacity building and knowledge exchange online platform has been developed by GEO BON with the Alexander von Humboldt Institute in Colombia. In addition, a GEO BON working group is dedicated to improve and support the development process of BONs.

Several of the ongoing activities of the GEO BON Implementation Plan are relevant to the Parties of the CBD and can, for instance, support their reporting needs. Notable activities are the work being developed on the monitoring of Alien and Invasive Species, the monitoring of Ecosystem Services and their policy relevance, and the promotion of biodiversity data mobilisation in partnership with the Global Biodiversity Infrastructure Facility (GBIF) and the Ocean Biogeographic Information System (OBIS). In addition, all of the endorsed BONs designed specific activities to support users' needs at various scales. For instance, both the Marine BON and Freshwater BON have as one of their key objectives to support biodiversity assessments in their respective realms. At the regional level, the Arctic BON is informing the Aichi targets and Sustainable Development Goals on the contribution of the biodiversity of the Arctic region. Similarly, the China BON and Colombia BON are developing activities that will directly support the reporting needs of the national governments that supported their establishment.

I. BACKGROUND INFORMATION

1. The establishment of the Group on Earth Observations Biodiversity Observation Network (GEO BON) was noted by the 9th Conference of the Parties to the Convention on Biological Diversity (CBD/COP 9) at its 2008 meeting held in Bonn Germany, as a follow-up of the Millennium Ecosystem Assessment (Decision IX/15 in UNEP/CBD/COP/9/29). Parties and relevant organisations were invited to "support this endeavour", while the CBD Secretariat was requested to continue its collaboration with GEO BON. This support was renewed at COP 10, two years later, when Parties where invited to support and/or collaborate with GEO BON in order to strengthen the "capacity to mobilize and use biodiversity data, information, and forecasts" (Decision X/7 in UNEP/CBD/COP/10/27).

2. GEO BON was also invited to produce a report on the Adequacy of Biodiversity Observation Systems to support the CBD 2020 Targets[1] for an Ad Hoc Technical Expert Group on Indicators for the Strategic Plan for Biodiversity 2011- 2020 (Decision X/7 in UNEP/CBD/COP/10/27), and to collaborate with the CBD Secretariat and other partners (such as the Biodiversity Indicator Partnership (BIP), the Food and Agriculture Organization of the United Nations, and the International Union for Conservation of Nature) in documenting, developing, and harmonizing the indicators needed to track the progress towards the Aichi targets (Decision XI/3 in UNEP/CBD/COP/10/27).

3. In 2012 (CBD/COP 11), GEO BON and other partner organisations were more specifically asked to continue their work on the identification of Essential Biodiversity Variables (EBV) and the development of the underlying datasets (Decision XI/3 in UNEP/CBD/COP/11/35). At COP 13 (2016), a set of indicators of global biodiversity change supported by GEO BON[2] was approved as part of a larger list of Indicators for the United Nations Strategic Plan for Biodiversity 2011-2020 and the Aichi Biodiversity Targets (Decision XIII/28 in UNEP/CBD/COP/13/25). It was also recognized that "many of those indicators rely on a small set of EBVs and that further efforts are required" to improve their monitoring.

4. While "the need for more accessible, affordable, comprehensive, reliable, and comparable information streams" were identified as key scientific and technical needs for the implementation of the UN Strategic Plan for Biodiversity 2011-2020, Parties of the CBD, indigenous and local communities, and other stakeholders were also invited to collaborate with GEO BON and other partners that "contribute to building observing systems and to biodiversity monitoring" in order to address needs and opportunities to further enhance biodiversity observations (Decision XII/1 in UNEP/CBD/COP/12/29).

5. The development by GEO BON of a global toolkit for biodiversity observations, 'Bon in a Box', that can be tailored to national and regional needs was identified as a solution to fill gaps on data, monitoring, observation systems and indicators (SBSTTA 17 Recommendation in UNEP/CBD/COP/12/2).

6. Parties and relevant organizations were also invited to "provide support for developing countries in the preparation of their sixth national reports", including through GEO BON and the BIP (Decision XIII/27 in UNEP/CBD/COP/13/25).

7. Parties of the CBD were invited to engage with, and support, regional and global networks such as GEO BON for data mobilization and access, which has been identified as a key scientific and

[1] http://geobon.org/Downloads/reports/GEOBON/2011/2011_cbd_adequacy_report.pdf

[2] http://www.geobon.org/Downloads/brochures/2015/GBCI_Version1.2_low.pdf

technical needs for the implementation of the UN Strategic Plan for Biodiversity 2011-2020 (Decision XIII/31 in UNEP/CBD/COP/13/25).

8. This information note provides a brief summary of the activities that are being developed by GEO BON to address the above mentioned decisions of the COP and recommendations of SBSTTA. It is also meant to highlight key GEO BON activities and initiatives that can be of use to the Parties of the CBD.

II. THE GROUP ON EARTH OBSERVATION - BIODIVERSITY OBSERVATION NETWORK

9. GEO BON's mission is to improve the acquisition, coordination and delivery of biodiversity observations and related services to users including decision makers and the scientific community. To fulfill this mission, GEO BON focuses on the initiation and coordination of interdisciplinary efforts for the establishment of interoperable national, thematic and regional biodiversity observation systems. Through its global network, GEO BON supports the sharing and dissemination of biodiversity information and technology available locally or in large existing initiatives. GEO BON also supports the development and application of the most recent scientific knowledge to advance biodiversity observation collection, integration and interpretation.

10. GEO BON is the biodiversity arm of the Group on Earth Observation (GEO), a partnership of more than 100 national governments and more than 100 participating organizations that envisions a future where decisions and actions for the benefit of humankind are informed by coordinated, comprehensive and sustained earth observations. GEO BON is also building up the pathway to link biodiversity data and metadata to GEOSS, *the Global Earth Observation System of System*s. Founded on the acceptance of a set of high level Data Sharing Principles, GEOSS will provide decision-support tools to a wide variety of users.

11. GEO BON was approved as one of the four GEO Flagships at the GEO XIII Plenary in November 2016.

12. GEO BON identifies its key end-users as the national governments that need timely and quality information and knowledge from biodiversity monitoring and assessments to support decision making, and policy bodies such as the CBD, and the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES).

13. GEO BON is organizing its efforts using a combined top-down and bottom-up approach (Figure 1). The top-down approach involves the implementation and adoption of the Essential Biodiversity Variables (EBVs) and related monitoring guidelines, interoperable data management systems and analytical tools. The bottom-up approach involves targeted capacity building and partnership efforts for the development or enhancement of Biodiversity Observation Networks (e.g. national, regional and thematic BONs). This approach reflects the need to provide a consistent framework for global, regional and national observation systems (e.g. EBV's, common monitoring guidelines, tools and interoperable data systems) with the pragmatism of a bottom-up construction process (e.g. through user-driven national and regional capacity building), the latter being essential for ensuring that GEO BON's outputs fit the needs of their end-users.

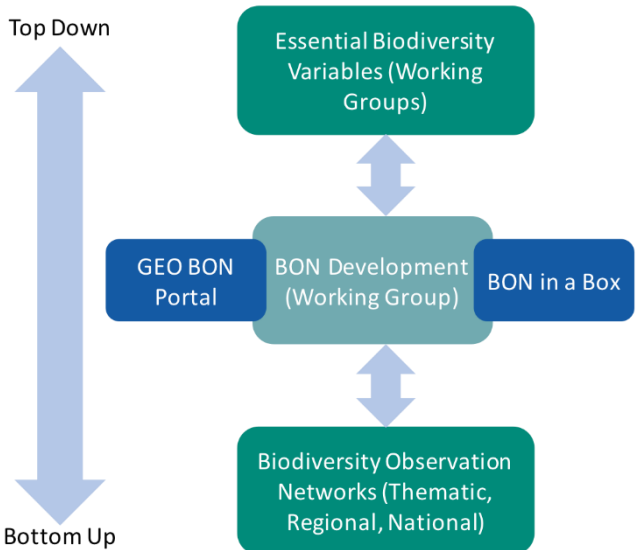

Figure 1. The combined bottom-up and top-down approach of GEO BON to develop a global biodiversity observation network.

14. GEO BON refined its structure in mid-2016 to better reflect its core objectives and activities, and produced an Implementation Plan for 2017-2020[3] which was approved at its Implementation Committee and Advisory Board Meeting in June 2017.

15. A Task Force on Policy support was added to the new structure of GEO BON in 2017 and has been mandated to:
    a. Ensure that the needs of the key users of GEO BON's outputs (identified as national governments, CBD, IPBES, Ramsar Convention) are reflected in the activities of the Implementation Plan 2017-2020.
    b. Guide the GEO BON community in connecting and positioning itself in the policy sphere to ensure its outputs are relevant and user-driven.

III. EBV DEVELOPMENT AND INDICATORS FOR AICHI TARGETS

16. The Essential Biodiversity Variables, or EBVs, are a minimum set of measurements, complementary to one another, that are required to study, report, and manage biodiversity change. The EBVs can be understood as the level of integration between the raw biodiversity observations (derived either from in-situ observations or remote sensing), and the high-level indicators that are needed by stakeholders for reporting (e.g. protected area managers, national governments) (Figure 2[4]).

17. The relevance of the Essential Biodiversity Variables, and the need for an EBV framework were first identified in the "Adequacy of Biodiversity Observation Systems to support the CBD 2020 Targets" report[1], produced in 2011 by GEO BON at the request of the CBD Secretariat (Decision X/7 in UNEP/CBD/COP/10/27).

[3] GEO BON: *GEO BON Implementation Plan 2017-2020. Version 1.3.* Group on Earth Observations Biodiversity Observation Network Secretariat.; 2017. http://geobon.org/Downloads/Other_documents/geobon_imp_plan_20172020.pdf

[4] Brummitt N, Regan EC, Weatherdon LV, Martin CS, Geijzendorffer IR, Rocchini D, Gavish Y, Haase P, Marsh CJ, Schmeller DS: Taking stock of nature: Essential biodiversity variables explained. *Biol Conserv* 2017, 213:252–255.

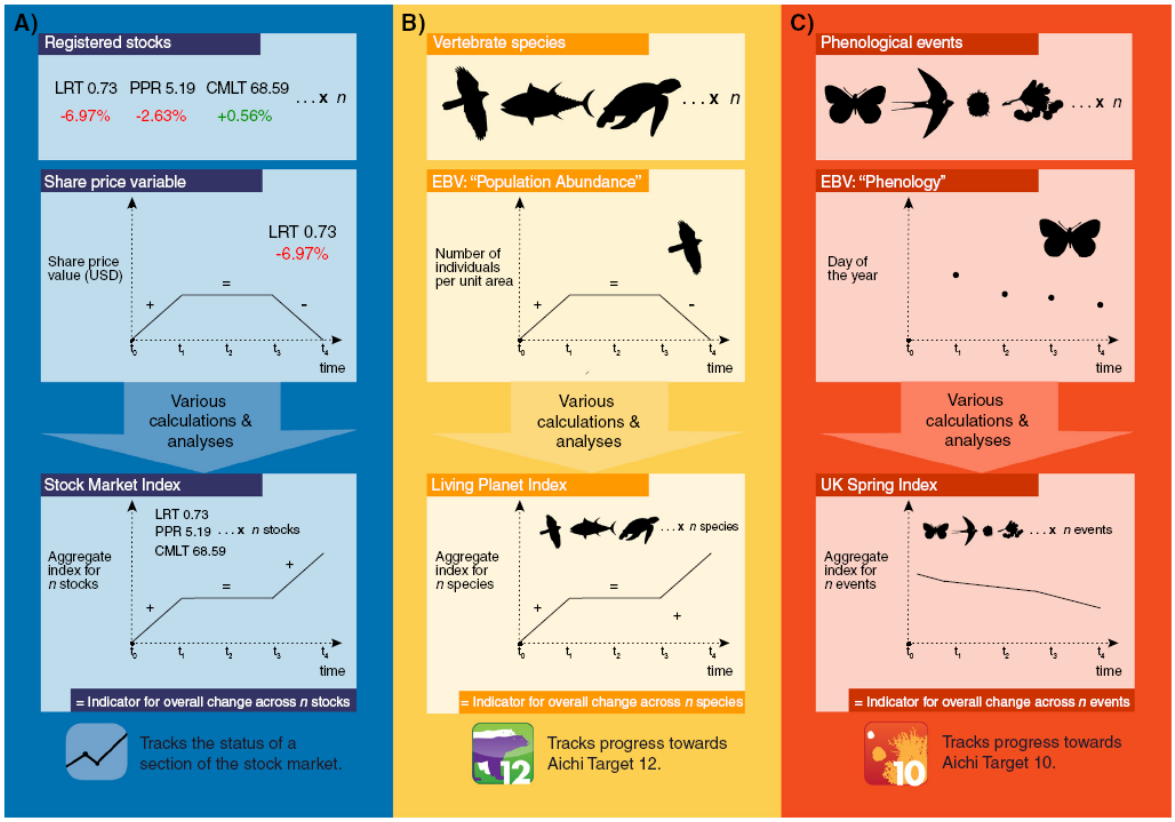

Figure 2. Using a stock market analogy, Brummitt et al (2016)[4] explained how Essential Biodiversity Variables are the level of integration between the raw biodiversity observations and high-level indicators.

18. The Essential Biodiversity Variables are organized in six EBV classes: Genetic Composition, Species Populations, Species Traits, Community Composition, Ecosystem Structure, and Ecosystem Function. Regardless of the class, these EBVs should be (1) able to capture critical scales and dimensions of biodiversity; (2) biological; (3) state variables (in general); (4) sensitive to change; (5) ecosystem agnostic (to the degree possible); and (6) technically feasible, economically viable and sustainable in time.

19. The EBVs can serve to improve the tracking of progress towards a number of Aichi Biodiversity Targets (Table 1). Improving the acquisition, coordination, and delivery of biodiversity observations, the main mission of GEO BON, is also directly supporting Aichi Target 19 (biodiversity knowledge).

20. EBVs are also relevant at the regional and national levels, and can provide the necessary information for Parties to monitor progress towards their national biodiversity targets. To date, a number of pilot applications of the EBVs at the national and sub-national scale have occurred, are starting or underway (Australia's New South Wales[5], Finland[6], Colombia, South Africa)

21. Several activities led within the different GEO BON Working Groups and/or Biodiversity Observation Networks will be producing outputs of relevance to the CBD and its Parties. This is the case for instance with Activities SP4 ("Implementing essential variables for invasion monitoring") and SP5 ("Known-unknowns for alien and invasive species distributions"), which aim at both

[5] Turak E, Brazill-Boast J, Cooney T, Drielsma M, DelaCruz J, Dunkerley G, Fernandez M, Ferrier S, Gill M, Jones H, et al.: Using the essential biodiversity variables framework to measure biodiversity change at national scale. *Biol Conserv* 2017, 213:264–271.

[6] Vihervaara P, Auvinen A-P, Mononen L, Törmä M, Ahlroth P, Anttila S, Böttcher K, Forsius M, Heino J, Heliölä J, et al.: How Essential Biodiversity Variables and remote sensing can help national biodiversity monitoring. *Glob Ecol Conserv* 2017, 10:43–59.

improving the data quality and availability on invasive and alien species, and use EBVs to develop indicators to monitor invasions at the national level, while supporting Aichi Target 9.

22. GEO BON partners with the Global Biodiversity Information Facility (GBIF) and the Ocean Biogeographic Information System (OBIS) have worked to promote the mobilization of structured biodiversity data to support the development of the species distribution and population abundance EBVs using common data standards such as the Darwin Event Core.

Table 1. Contribution of the different EBV classes to the Aichi biodiversity Targets, and to indicators of biodiversity change

EBV class	Aichi Target[7]	Indicators Supported by GEO BON[2] (2015)	Partner
Genetic Composition	12, 13		
Species Populations	4, 5, 6, 7, 8, 9, 10, 11, 12, 14, 15	Species Habitat Indices (SHI) Species Protection Index (SPI) Local Biodiversity Intactness Index (LBII) Species Status Information Index (SSII)	Map of Life Map of Life Predicts Map of Life
Species Traits	10, 15		
Community Composition	8, 10, 14	Biodiversity Habitat Index (BHI) Protected Area Representativeness and Connectedness (PARC) Local Biodiversity Intactness Index (LBII) Species Status Information Index (SSII)	CSIRO CSIRO Preditcs Map of Life
Ecosystem Structure	5, 11, 14, 15	Species Habitat Indices (SHI) Biodiversity Habitat Index (BHI) Protected Area Representativeness and Connectedness (PARC) Global Ecosystem Restoration Index (GERI)	Map of Life CSIRO CSIRO iDiv
Ecosystem Function	5, 8, 14	Global Ecosystem Restoration Index (GERI)	iDiv

23. GEO BON also has a Working Group dedicated to Ecosystem Services, which is developing some of its activities around the policy relevance of its outputs. This is exemplified by Activities ES1.2 ("Dialogue with policy bodies"), and ES1.3 ("Ecosystem Services in Global Sustainability Policies" which already resulted in a scientific publication[8]).

24. The Policy Task Force of GEO BON will be supporting the different partner institutes (e.g. CSIRO, Yale University) in the final stages of the production and publication of the Global Biodiversity Change indicators (Table 1[2]).

25. In the summer of 2017, the creation of a Task Force dedicated to improving the application of remote sensing for monitoring biodiversity change was approved by the Implementation Committee of GEO BON. This task force will be positioning GEO BON, as a hub between the space agencies that will be

[7] Pereira et al. (2013). Essential Biodiversity Variables. *Science*, *339*(6117), 277–278. https://doi.org/10.1126/science.1229931

[8] Geijzendorffer et al. (2017). Ecosystem services in global sustainability policies. *Environmental Science & Policy*, *74*, 40–48. https://doi.org/10.1016/j.envsci.2017.04.017

producing EBV relevant data and the users of this data[9] (e.g. national policy-makers). In particular, the task force was mandated to:

a. Refine a list of EBVs that can, in part, be produced using Remote Sensing and indicate the related requirements for remotely sensed biodiversity observation to the Committee on Earth Observation Satellites;
b. Engage with groups such as CBD SBSTTA, IPBES, NGOs, government and companies, on those candidate EBVs, solicit feedback, and get "buy-in" (Figure 3).
c. Ensure that the value of EBVs derived from remote sensing products to users is clear and well-communicated while highlighting their relevance to the Aichi targets and SDGs.

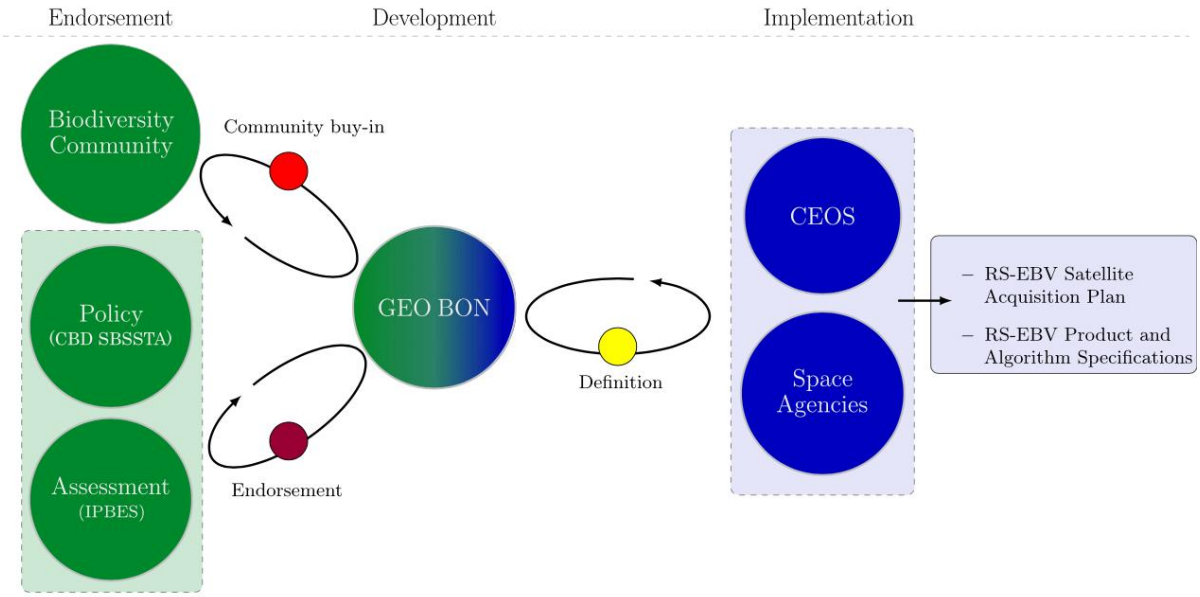

Figure 3. Outline of the overall process by which remotely sensed Essential Biodiversity Variables should be developed and matured, as proposed by Paganini et al., 2016[10].

V. BON DEVELOPMENT AND CAPACITY BUILDING

26. GEO BON is facilitating the establishment, enhancement and interlinkage of biodiversity observation networks (BONs), which can be national, regional, or thematic (e.g. marine). BONs engage in networking, biodiversity monitoring and making biodiversity data and data products publicly available. GEO BON has established criteria for the endorsement of BONs[10].

27. GEO BON set up a working group dedicated to the development of Biodiversity Observation Networks (BONs). In particular, the working group is tasked with:

a. Identifying, documenting and delivering best practices in the process of development and implementation of existing and developing BONs and using them as examples for other BONs development and enhancement;
b. Providing a flexible framework for designing a user-driven BON recognizing the diversity of objectives and users from different BONs (Figure 4);
c. Participating in the development of guidelines for applying the EBV framework for BON development and utilizing national, regional and global pilots.
d. Continue the development of the BON in a Box platform.

[9] Paganini M, Leidner AK, Geller G, Turner W, Wegmann M: The role of space agencies in remotely sensed essential biodiversity variables. *Remote Sens Ecol Conserv* 2016, 2:132–140.
[10] http://geobon.org/Downloads/Other_documents/Draft_Criteria_for_BONs.pdf

e. Promoting and facilitating cooperation and communication for knowledge and technology transfer between national, regional and thematic BONs.

28. GEO BON has developed a design process for developing BONs (Figure 4) which focuses on ensuring BONs are designed to serve clearly articulated user needs, including supporting national reports and NBSAPs. This process ensures that BONs will be able to support Parties of the CBD to meet their reporting needs by organising the acquisition and delivery of the needed biodiversity observations. This design approach was first developed and employed in the Arctic via the Circumpolar Biodiversity Monitoring Program (CBMP) and is currently being employed by Colombia in the development of their own National BON.

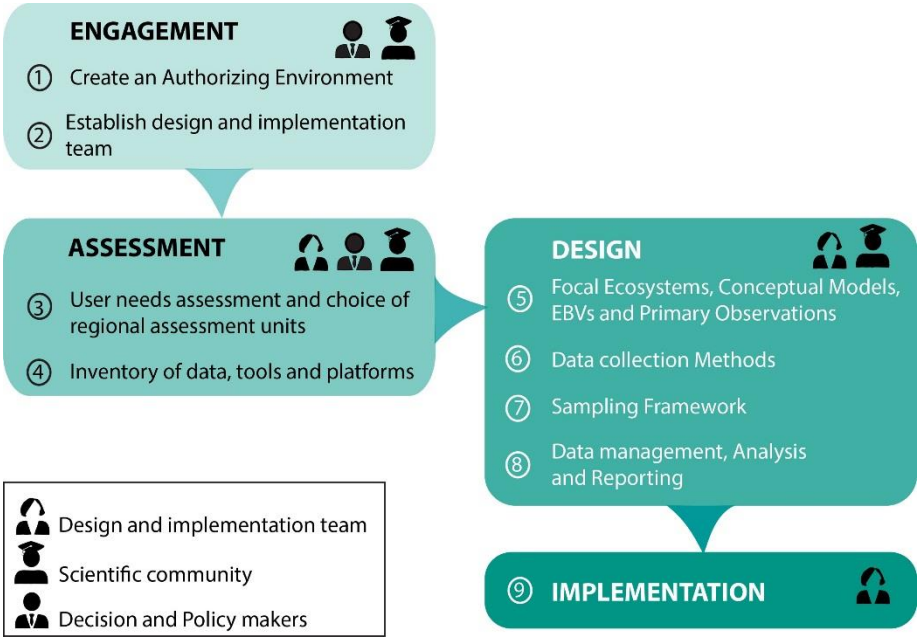

Figure 4. Nine-steps design process for the development of Biodiversity Observation Networks (BONs).

29. As of the summer of 2017, GEO BON has endorsed three national BONs in China, Columbia, and France, two regional BONs in the Arctic (CBMP) and Asia-Pacific region (AP BON), and two thematic BONs, the Marine BON (MBON) and Freshwater BON (FWBON). Other national initiatives emerged and BONs are in the process of being developed, in collaboration with GEO BON, in South Africa, Australia, South Korea, and Japan.

30. GEO BON has developed, with the Alexander von Humboldt Institute in Colombia, BON in a Box[11], an online platform that provides access to state-of-the-art tools created to assist users, including national governments, in designing their biodiversity observation systems. BON in a Box is regularly being updated with tools identified and endorsed by the GEO BON working groups and BONs.

31. The Marine BON with its partners (e.g. Global Ocean Observing System GOOS, OBIS) is engaged in the development of the Essential Ocean Variables (EOVs) needed to assess the status of marine ecosystems, including progress towards Aichi Targets 6, 10, 11, and 14. It is also piloting the development of interoperable Marine BONs that utilize new technologies for monitoring marine biodiversity with the plan to make these new systems and technologies available for coastal nations to adopt.

[11] https://boninabox.geobon.org/

32. The Freshwater BON was established in 2016 as a community of practice dedicated to tracking change in global biodiversity of inland waters. The network will be establishing partnerships with organisations needing freshwater biodiversity observations for assessment purposes, which will include the CBD, Ramsar Convention, and IUCN. The key objectives of the Freshwater BON until 2020 are to produce globally harmonized sampling protocols for fish and macroinvertebrates; to facilliate the use indigenous and local knowledge in freshwater biodiversity assessments; to mobilize freshwater biodiversity data; and to contribute to a global classification of freshwater ecosystems.

33. The Arctic BON (CBMP) is already involved with the CBD in a "Cooperative Strategy for the Conservation of Biological Diversity in the Arctic Region". One of its key objectives for the 2017-2020-time period is to inform on the contribution of the Arctic region to both the SDGs and Aichi targets, while contributing to the assessment of the Arctic biodiversity.

34. The China BON, supported by the Chinese Ministry of Environmental Protection and the Ministry of Finance, has attracted approximately 3500 trained biologists, protected area managers and volunteer citizen scientists from over 400 universities, research institutes, protected areas and civil societies to get involved in field monitoring of biodiversity. China BON adopted national standards and field protocols for the monitoring of mammals, birds, amphibians, vascular plants, and butterflies in 441 sites that are part of an observation system of over 9000 line transects and point transects[12].

35. The Colombia BON is developing a biodiversity observation system that will improve access to data and information for both national and subnational environmental authorities that are responsible for biodiversity and ecosystem services management[13]. In particular, the Colombia BON has defined a conceptual and methodological framework for integrating information needs from decision makers with biodiversity observation systems via the development of subnational biodiversity assessments. During the next three years, this framework will be implemented in at least two different regions of Colombia. The Alexander von Humboldt Institute will lead the implementation of this framework in the Orionoquia Region.

_____

[12] Xu H, Cao M, Wu Y, Cai L, Cao Y, Ding H, Cui P, Wu J, Wang Z, Le Z, et al.: Optimized monitoring sites for detection of biodiversity trends in China. *Biodivers Conserv* 2017, 26:1959–1971

[13] Sierra CA, Mahecha M, Poveda G, Álvarez-Dávila E, Gutierrez-Velez VH, Reu B, Feilhauer H, Anáya J, Armenteras D, Benavides AM, et al.: Monitoring ecological change during rapid socio-economic and political transitions: Colombian ecosystems in the post-conflict era. *Environ Sci Policy* 2017, 76:40–49