Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services

Plenary of the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services
Ninth session
Bonn, Germany, 3–9 July 2022
Item 8 (a) of the provisional agenda*

Building capacity, strengthening knowledge foundations and supporting policy: work programme deliverables and task force workplans

Information on advanced work on knowledge and data

Note by the secretariat

1.   In section II of decision IPBES-2/5, the Plenary of the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES) established a task force on knowledge and data for the period of its first work programme (2014–2018). In section II of decision IPBES-3/1, the Plenary approved the data and information management plan set out in annex II to that decision.

2.   At its seventh session, in decision IPBES-7/1, the Plenary adopted the rolling work programme of the Platform for the period up to 2030, which includes among its six objectives advanced work on knowledge and data (objective 3 (a)). The objective focuses on identifying, prioritizing, mobilizing and facilitating access to existing knowledge, information and data, including indicators and metrics to be used in assessments; further developing a web-based infrastructure in support of open data sharing and information management; identifying gaps in knowledge and data arising from the completed deliverables of IPBES work programmes; systematically cataloguing knowledge and data gaps identified in the work programme; and catalysing the generation of new knowledge by making those gaps known, including to research funding agencies, research programme developers, and institutions involved in prioritizing and funding data mobilization, and considering them for further prioritization of deliverables in the work programme.

3.   In section IV of decision IPBES-7/1, the Plenary recalled the establishment of the task force and extended its mandate for the implementation of objective 3 (a) of the rolling work programme of the Platform up to 2030, in accordance with the revised terms of reference set out in annex II to that decision, and requested the Bureau and the Multidisciplinary Expert Panel, through the IPBES secretariat, to constitute the task force in accordance with the terms of reference.

4.   According to its terms of reference, the task force on knowledge and data oversees and takes part in the implementation of objective 3 (a) and acts in accordance with relevant decisions by the Plenary and its subsidiary bodies, including by building on lessons learned in the implementation of deliverable 1 (d) of the first work programme; supporting assessment experts in identifying, prioritizing and mobilizing existing knowledge and data needed for IPBES assessments; guiding the secretariat, including the dedicated technical support unit, in the management of the data, information and knowledge used in IPBES products, including the development of the web-based infrastructure, to ensure their long-term availability and data interoperability; and supporting the Bureau and the Multidisciplinary Expert Panel in reviewing the knowledge needs and gaps identified through IPBES assessments and other IPBES deliverables and in catalysing the generation of new knowledge and

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* IPBES/9/1.

data. In section IV of decision IPBES-7/1, the Plenary also decided to review the mandate and terms of reference of the task force at its tenth session

5. The general terms of reference for the task forces for the rolling work programme up to 2030, set out in annex II to decision IPBES-7/1, stipulate that each task force will, among other activities, provide a regular progress report and, in consultation with the Multidisciplinary Expert Panel and the Bureau, develop and update a workplan that sets out clear milestones and deliverables with regard to the relevant topics and objectives of the rolling work programme up to 2030 for periodic consideration by the Plenary.

6. In decision IPBES-8/1, section IV, the Plenary welcomed the progress made by the task force on knowledge and data in the implementation of objective 3 (a) of the work programme of the Platform up to 2030. The Plenary also approved the interim workplan of the task force on knowledge and data for the intersessional period 2021–2022, as set out in annex IV to the decision. Finally, the Plenary took note of the data management policy of the Platform as set out in the annex to document IPBES/8/INF/12.

7. Deliverables for objective 3 (a), a workplan for the task force for the intersessional period 2022–2023 and a draft workplan for the intersessional period 2023–2024 are set out in annex II to document IPBES/9/10 for consideration by the Plenary. An overview of activities carried out by the task force since the eighth session of the Plenary is set out in the report of the Executive Secretary on progress in the implementation of the rolling work programme up to 2030 (IPBES/9/4).

8. The annex to the present note sets out further information on activities carried out by the task force in addressing its mandate, activities planned for the next intersessional period, and an overview of possible activities related to ongoing IPBES assessments. The annex is presented without formal editing.

Annex*

Progress in the implementation of objective 3 (a): Advanced work on knowledge and data

1.   This annex sets out progress in the implementation of objective 3 (a), advanced work on knowledge and data. The task force implemented its activities working in two sub-groups, on knowledge generation catalysis and on data management, to implement these two work streams of the objective.

I.   Knowledge generation catalysis

2.   This section sets out activities undertaken by the task force on knowledge and data between June 2021 and March 2022 under objective 3 (a), advanced work on knowledge and data, with regard to knowledge generation catalysis.

A.   Review and further development of the process to catalyse the generation of new knowledge, living guidelines and template to support assessment authors in the identification of knowledge gaps, based on lessons learned from ongoing assessments

3.   The Multidisciplinary Expert Panel and Bureau at their 18th meetings in February 2022 approved an updated version of the guidelines, prepared by the task force on knowledge and data, to support assessment authors in the identification of knowledge gaps. The updated version is based on feedback provided by the task force, assessment authors and technical support units during the annual meeting of the task force (29-30 November 2021). It includes a template for the collection of knowledge gaps and illustrative examples from ongoing assessments. The latest version of these guidelines is available on the IPBES website.[1]

B.   Support to assessment authors in the process of knowledge gaps identification

4.   The task force on knowledge and data and its technical support unit participated in several meetings of ongoing assessments, with the objective to continue to support assessment experts in the knowledge gaps' identification process. This included support towards the development of the final versions of the chapters and summaries for policymakers of the values and sustainable use of wild species assessments, and of the second order draft of the chapters and first order draft of the summary for policymakers of the invasive alien species assessment.

5.   In October 2021, some members of the task force on knowledge and data participated in the workshop to advance the summary for policymakers of the sustainable use of wild species assessment, where knowledge gaps were discussed, to remind experts of the importance of identifying knowledge gaps, to review and address challenges raised and comments received through the external review and to plan next steps. Experts and the technical support unit for the sustainable use assessment were invited to participate in the annual meeting of the task force on knowledge and data, to provide input to the update of the guidelines for knowledge gaps identification.

6.   In February 2022, the technical support unit participated in the online introduction sessions for the nexus and transformative change assessment experts, to introduce members of the knowledge and data team to the assessment experts and to raise awareness among the experts on the need to identify knowledge gaps as part of the assessment.

7.   The task force on knowledge and data will continue to support experts of ongoing assessments in the knowledge gaps' identification process.

C.   Promote the uptake of identified knowledge gaps by relevant external organizations and initiatives

8.   Under this deliverable, the task force on knowledge and data and its technical support unit for knowledge generation are facilitating dialogues between experts of IPBES assessments and research programmers and funders who have a focus on biodiversity. In 2021, the main objective in this regard

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* The annex has not been formally edited.
[1] https://ipbes.net/modules-assessment-guide.

has been to identify networks for these five regions for the dialogues that will be organized throughout 2022.

9. Several meetings were held with organizations and networks identified for the five regions. The progress made for dialogue workshops is as follows:

(a) The Belmont Forum and the task force plan to organize two sessions at the global level, at the Sustainability Research Innovation Congress, scheduled to be held online from 20 to 24 June 2022. A first two-hour public session will be organized as part of the congress, followed by a second, shorter session, as part of the plenary meeting of members of the Belmont Forum - with Belmont Forum members and possibly their partners (e.g., Inter-American Institute for Global Change Research);

(b) Biodiversa+ and the task force plan a stand-alone online meeting in the beginning of June 2022 with members of Biodiversa+ and beyond (European Commission, non-Biodiversa national programmes, non-European funders with whom Biodiversa+ is engaged);

(c) For the Africa region, the Science for Africa Foundation was identified as a key actor for the dialogue in this region. The task force is seeking support from African experts for this dialogue workshop;

(d) For the Asia and the Pacific region, the task force contacted IPBES experts of the region for their support in the identification of relevant research funding networks and organizations and is in the process of reviewing the recommendations made.

10. In support of the dialogue workshops, an extensive document on the knowledge gaps identified in the IPBES Global and Regional Assessments of Biodiversity and Ecosystem Services and in the Workshop Reports on Biodiversity and Pandemics and on Biodiversity and Climate Change (with applicable disclaimers) was developed. Following a meeting held on 24 August 2021 with the co-chairs of the Global and Regional Assessments and based on the feedback received from assessment experts, the extensive document was updated, further completed, and subsequently reviewed by the Multidisciplinary Expert Panel and Bureau at their 18th meetings.

11. On 3 March 2022, the assessment experts who actively participated in the review of the extensive document were invited to an online workshop to identify the best format to present the gaps during the dialogue workshops. This workshop led to experts testing different ways of clustering knowledge gaps.

D. Monitor the impact of knowledge generation catalysis efforts to effectively fill identified gaps

12. The task force on knowledge and data discussed a plan to monitor the catalysis of new knowledge generation during its annual meeting. This plan is available in appendix I. The task force found that a distinction needs to be made between monitoring the work of the task force itself, and monitoring the wider impact of IPBES knowledge generation catalysis activities.

13. It was decided that the technical support unit and interested task force members would explore the automatization of monitoring activities – at the crossroads of knowledge generation and data management aspects of the task force, and a first meeting to discuss related matters was held in December 2021. In the short run, monitoring would continue to be conducted manually.

14. To this end, the task force developed a collaborative file, which allows task force members to add examples and success stories identified in their organizations, countries or regions, where strategies, programmes, meeting agendas or calls for projects referenced knowledge gaps identified in IPBES assessments.

II. Data management

15. This section sets out activities undertaken by the task force between June 2021 and March 2022 under objective 3 (a), advanced work on knowledge and data, with regard to data management.

A. Data and knowledge management policy and the long-term vision on data and knowledge management

16. Since the eighth session of the Plenary, the task force on knowledge and data in collaboration with the task force on indigenous and local knowledge revised the IPBES data and knowledge management policy, following a comprehensive process described in the following paragraph. In February 2022, the Multidisciplinary Expert Panel and Bureau approved version 2.0 of the policy.

17.   The task force on knowledge and data reviewed version 1.1 of the data management policy and concluded that it should more explicitly address the use of indigenous and local knowledge in IPBES products. To this end, the task force, with the approval of the Multidisciplinary Expert Panel and Bureau, collaborated with the task force on indigenous and local knowledge and reworked the policy to include alongside the FAIR guiding principles for scientific data management and stewardship[2] the CARE indigenous data governance principles[3]. The document was thus renamed as "data and knowledge management policy." The Multidisciplinary Expert Panel and Bureau provided comments on a draft of the policy at their 17th meetings in November 2021, and, approved version 2.0, once revised by the task force, at their 18th meetings in February 2022. Version 2.0 of the IPBES data and knowledge management policy is openly available online (see https://doi.org/10.5281/zenodo.3551078) and also reproduced in appendix II to this note.

18.   With respect to the development of a long-term vision on data and knowledge management, the task force on knowledge and data developed a draft document in 2021. The draft was distributed to the IPBES task forces, secretariat, and a few selected external experts for comments and feedback. The Multidisciplinary Expert Panel and Bureau were also invited to review and provide feedback on the long-term vision at both their 17th and 18th meetings. The advanced draft version of the vision is available in appendix III to this note for information. The long-term vision on data and knowledge management will form the basis for the development of revised terms of reference for the task force for the period between the tenth and thirteenth sessions of the Plenary and for the development of specific activities which will be reflected in any workplan of the task force for that period.

B.   Support to assessment authors on aspects relating to the data and knowledge management policy and the generation, management, handling and delivery of IPBES products

19.   In collaboration with the secretariat, the task force on knowledge and data created the IPBES delivery protocol for drafts of assessments to track their compliance with the IPBES data and knowledge management policy (see https://doi.org/10.5281/zenodo.5509137). The protocol is intended to assist the technical support units of the assessments in complying with the policy when finalizing milestone drafts of the assessment. The document was distributed to and reviewed by the technical support units of the values, sustainable use of wild species, and invasive alien species assessments. The technical support unit for knowledge and data then revised the delivery protocol in light of comments received and included a timeline and clarified terms. The protocol is being followed for the finalization of the values and sustainable use assessments.

20.   The technical support unit for knowledge and data reviewed the data management reports submitted for the second order drafts of the chapters of the invasive alien species assessment for compliance with the data management policy and discussed comments with the assessment technical support unit. Several meetings were held with the assessment technical support unit to answer questions and facilitate the production of these data management reports in preparation for their final drafts.

21.   The technical support unit for knowledge and data also reviewed the data management reports for the final drafts of the values and sustainable use of wild species assessments for compliance with the data management policy and discussed comments with the corresponding assessment technical support units. Several ad-hoc meetings were held with these assessment technical support units and selected experts to answer questions and facilitate the production of these data management reports in preparation for their final drafts.

22.   Two presentations are planned for the first author meetings of the nexus and transformative change assessments to familiarize experts with the IPBES data and knowledge management policy and available resources. Upon request, in March 2022, an initial meeting was held between the technical support unit for knowledge and data and three coordinating lead authors of the nexus assessment to understand how best to support experts in the access and handling of a wide range of external spatial datasets.

23.   Four additional guidelines were published by the task force on knowledge and data within the technical guideline series. These guidelines help IPBES experts implement specific recommendations within the data management policy.

      (a)   *Part 4 – Guidelines for colour.* The guide presents recommendations for the use of colour in maps which can be applied to other visualisations within IPBES products

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[2] https://www.go-fair.org/fair-principles/

[3] https://www.gida-global.org/care

(see https://ict.ipbes.net/data-management/technical-guidelines/guidelines-for-colour and https://doi.org/10.5281/zenodo.4756596)

    (b)   *Part 5 – File formats.* The guide recommends specific open file formats for IPBES experts to use to increase the interoperability of IPBES products (see https://ict.ipbes.net/data-management/technical-guidelines/file-formats and https://doi.org/10.5281/zenodo.5509739)

    (c)   *Part 6 – How to upload to and download from Zenodo*. The guide teaches users how to upload, share, and download IPBES products from Zenodo both manually and programmatically (see https://ict.ipbes.net/data-management/technical-guidelines/Zenodo and https://doi.org/10.5281/zenodo.5713977)

    (d)   *Part 7 – How to cite IPBES assessment reports*. The guide lists the suggested recommendations for the Global Assessment of Biodiversity and Ecosystem Services. Assessments approved at each future Plenary session will be added to the list (see https://ict.ipbes.net/data-management/technical-guidelines/suggested-citations and https://doi.org/10.5281/zenodo.5783348)

24.   The technical support unit developed procedures to represent country borders according to United Nations guidance for original maps. Resources to assist experts in following these procedures have been provided by the technical support unit for knowledge and data (see https://doi.org/10.5281/zenodo.5883633).

25.   The "Valuation Atlas" of the values assessment, associated with chapter 3, assessment of valuation methods, and chapter 4, valuation for decisions, was developed by the technical support unit for knowledge and data in collaboration with assessment authors. The Valuation Atlas is available online as a semi-interactive and reproducible product. It showcases a series of maps based on the corpus of systematic literature review (~80,000 studies) describing the geographic distribution of study locations and organizations (see https://jkumagai96.github.io/VA_version2/Valuation_atlas.html).

26.   The technical support unit for knowledge and data developed an ontology for IPBES assessments. The IPBES Global Assessment has been converted into a linked-open-data format using the developed ontology and presented to the task force of knowledge and data at their fourth meeting.

27.   The technical support unit for knowledge and data supported the authors of the value assessment with various applications of natural language processing, which required processing and analysing large amounts of textual data. The corresponding data management reports documented the underlying datasets and process, including open-source scripts, and are referred to in the assessment.

C.   Engaging with external initiatives and service providers on data, including geospatial and earth observation, infographic and cartographic visualizations, and web systems and services.

28.   An online meeting was held with the GEO BON (Group on Earth Observations Biodiversity Observation Network) co-chairs, the Chair of IPBES and the technical support unit for knowledge and data to introduce the technical support unit to the new GEO BON secretariat and brainstorm regarding future options for engagement. The technical support unit for knowledge and data participates regularly in the meetings of the GEO BON task force on policy.

29.   Two online meetings were held with the Biodiversity Indicators Partnership focused on the revision of the IPBES-related content on the Biodiversity Indicators Partnership website and the inclusion of any future indicators used within IPBES assessments. Suggested revisions have been incorporated onto the current website, and larger suggested revisions will be taken into consideration when they revise their website in light of the post-2020 global biodiversity framework.

30.   Members of the task force and technical support unit will present the IPBES data and knowledge management policy at two international conferences: the World Biodiversity Forum 2022, and INTECOL 2022 to expand outreach. An introductory presentation to the policy has been published on Zenodo for external audiences (see https://doi.org/10.5281/zenodo.6322966).

III.   Composition of the task force

31.   The Multidisciplinary Expert Panel and Bureau, at their 13th meetings selected the members of the task force in line with its terms of reference set out in annex II to decision IPBES-7/1.

32.   Since the eighth session of the Plenary, one of the task force co-chairs, member of the Bureau, Youngbae Suh, stepped down from his role as a Bureau member. Douglas Beard, member of the Bureau, was appointed as new co-chair of the task force. Member of the task force Melissa Ljusa

stepped down from the task force and was replaced by Katalin Török, ensuring consistent regional and gender balance within the task force.

33.   The current composition of the task force is as follows:

Name	Country	Function
Doug Beard	United States of America	Task force co-chair, Member of the Bureau
Isabel Sousa Pinto	Portugal	Task force co-chair, Member of the Multidisciplinary Expert Panel
Mohammed Sghir Taleb	Morocco	Member of the Multidisciplinary Expert Panel (alternate)
Katalin Török	Hungary	Expert, Member of the Multidisciplinary Expert Panel
András Báldi	Hungary	Expert
Kalpana Chaudhari	India	Expert
Debora Drucker	Brazil/Italy	Expert
Gregoire Dubois	Belgium	Expert
Rainer Krug	Germany	Expert
Howard Nelson	Trinidad and Tobago	Expert
Xubin Pan	China	Expert
Fatima Parker-Allie	South Africa	Expert
Dave Thau	United States of America	Expert
Bi Tra Aimé Vroh	Côte d'Ivoire	Expert
Rebecca Chaplin Kramer	United States of America	Liaison expert (values assessment)
Hanno Seebens	Germany	Liaison expert (invasive alien species assessment; alternate)

34.   Representatives of the United Nations Educational, Scientific and Cultural Organization (UNESCO), the United Nations Environment Programme - World Conservation Monitoring Centre (UNEP-WCMC) and the Global Biodiversity Information Facility (GBIF), as well as two individual experts (Wouter Addink, Naturalis Biodiversity Center, and Cornelia Krug, University of Zurich) participated in the work of the task force as resource persons.

35.   BiodivERsA (France) and Senckenberg Society for Nature Research (Germany) were selected by the Bureau at its 13th meeting as hosts of the two technical support sub-units of the task force on knowledge and data, respectively, under the 2030 rolling work programme until the tenth session of the Plenary.

IV.   Meetings and activities of the task force

36.   Since the eighth session of the Plenary, the task force on knowledge and data held an interim online task force meeting on 28 May 2021 to update task force members on progress towards the key activities set out in the interim workplan of the task force approved by the Plenary at its eighth session in June 2021 (decision IPBES-8/1, annex IV). An in-person meeting was originally planned during the second half of 2021, but in light of the continuing coronavirus pandemic and restrictions on travel, the meeting was held online on 29 and 30 November 2021.

37.   The main topics of the annual task force meeting were the following:

     (a)   Knowledge generation

          (i)   Reviewing and updating the guidelines to support assessment experts in the knowledge gaps' identification process;

(ii)   Planning for the dialogue workshops with research programming and funding organizations on knowledge gaps;

(iii)   Monitoring the catalysis of new knowledge generation.

(b)   Data management

(i)   Progress report and discussions on ongoing activities, including resources for data and knowledge management, meetings with external organizations, and the status of the data and knowledge management policy and long-term vision on data and knowledge management;

(ii)   The workplan for the intersessional period 2022-2023 and next steps for the 18th meetings of Multidisciplinary Expert Panel and Bureau.

38.   The first day of the meeting was dedicated to knowledge generation and split into two sessions. The first one focused on reviewing and updating the guidelines to support assessment experts in the identification of knowledge gaps with a participative segment. The second part of the discussion concentrated on the dialogue workshops with research programming and funding organizations on knowledge gaps and the monitoring of the catalysis of new knowledge generation.

39.   The second day of the meeting was focused on the data management related aspects of the task force. Two group discussions were held. The first discussion focused on the current support to assessments provided by the technical support unit for knowledge and data. The second session focused on the IPBES data and knowledge management policy, the long-term vision on data and knowledge management and updates to the implementation resources for data management.

40.   Finally, the task force on knowledge and data approved the draft task force workplans for 2022-2023 and 2023-2024, which were subsequently made available for external review, and planned next steps until the ninth session of the Plenary for both knowledge generation and data management aspects of the task force.

41.   To accomplish the activities and outputs specified in the implementation plan before the ninth session of the Plenary on matters related to knowledge generation catalysis, a specific working group was established. The knowledge working group met online once between June 2021 and March 2022.

42.   To accomplish the activities and outputs specified in the implementation plan before the ninth session of the Plenary on matters related to data management, a series of topic-specific meetings were organized. Task force members discussed current progress on specific activities and next steps to develop deliverables, such as the IPBES data and knowledge management policy.

Appendix I

The monitoring plan on the catalysis of new knowledge generation

The objective of this plan is to monitor the impacts of the IPBES knowledge generation catalysis efforts. This monitoring plan will be implemented continuously with regular reports to the Multidisciplinary Expert Panel and Bureau. The plan will include three levels, going from monitoring the efforts allocated to this endeavor (level 1) to its actual impacts (level 3).

Monitoring level	Description/comments
Level 1 **Monitor the efforts made to catalyse the generation of new knowledge**	**Description** Under this level, the objective is to monitor the efforts put in place by the task force.
	Efforts will be monitored by keeping track of: ● Number of dialogue events organized for specific lists of knowledge gaps (starting by the gaps identified in the global assessment – and if manageable gaps from regional assessments); ● Number of organizations and institutions reached during these dialogue events, number of participants; ● Satisfaction survey on the dialogue events.
Level 2 **Monitor the uptake of IPBES knowledge gaps by relevant programmers and funders**	**Description** Under this level, the objective is to monitor how the efforts put in place by the task force supported by its technical support unit led to an uptake of identified gaps in research programmes.
	External factors Under this level, the outputs focus on the uptake of IPBES knowledge gaps by relevant programmers and funders which depends on external factors including interests, strategies and priorities of the programmers and funders. Collecting some of these data might be challenging as they will need to be sought from programmers and funders.
	Efforts will be monitored by keeping track of: ● Follow up contacts with programmers and funders after dialogue events; ● Uptakes or references to IPBES knowledge gaps in attendees' programmes and strategies following dialogue events; ● Diversity of knowledge gaps' uptake (e.g. regionally, thematically) **Example of expected potential impact**: ● Number of projects / funding amount invested by programmes that address knowledge gaps identified by IPBES.
Level 3 **Monitor the generation of new knowledge based on gaps identified in IPBES assessments**	**Description** This level of monitoring applies to a **longer term** and relies on a **qualitative approach** rather than a quantitative one.
	External factors The responsibility of the task force is limited as the outputs mainly rely on the interests, strategies and priorities of relevant institutions. Collecting some of these data will be challenging as they will need to be sought from programmers and funders.
	Example of expected potential impact ● Success stories in relation to new knowledge generated following catalysis efforts and responding to gaps identified by IPBES ● Examples of publications produced from programmes that account for knowledge gaps identified by IPBES.

Appendix II

IPBES Data and Knowledge Management Policy

Version 2.0
https://doi.org/10.5281/zenodo.3551078

Preamble

The *Plenary* of the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES), in section II of its decision IPBES-2/5, established a *task force* on knowledge and data for the period of its first work programme 2014–2018. In decision IPBES-3/1, section II, the *Plenary* approved the data and information management plan set out in annex II to the same decision. At its seventh session, in decision IPBES-7/1, section II, the *Plenary* adopted the rolling work programme of the Platform up to 2030, which included among its six objectives objective 3 (a), advanced work *on knowledge and data*. In section IV of its decision IPBES-7/1, the *Plenary* recalled the establishment of the *task force* and extended its mandate for the implementation of objective 3 (a) of the rolling work programme of the Platform up to 2030, in accordance with the revised terms of reference set out in annex II to the same decision, and requested the *Bureau* and *Multidisciplinary Expert Panel*, through the *IPBES secretariat* to constitute the *task force* in accordance with the terms of reference. According to its terms of reference, the *task force* on knowledge and data oversees and takes part in the implementation of objective 3 (a) of the rolling work programme up to 2030 and acts in accordance with relevant decisions by the *Plenary* and its subsidiary bodies. Its mandate includes, among other things, to guide the *secretariat*, including the dedicated *technical support unit*, in the management of the *data*, information and knowledge used in *IPBES products*, including the development of the web-based infrastructure, to ensure their long-term availability and data interoperability.

In line with this mandate, the *task force* on knowledge and data drafted and, upon approval by the *Multidisciplinary Expert Panel* and *Bureau* at their 14th meetings in January 2020, published the first version of the IPBES data management policy (version 1.0). The *task force* revised the policy in September 2020 and published the revision (version 1.1) after approval by the *Multidisciplinary Expert Panel* and *Bureau* at their 15th meetings in November 2020. The data management policy was presented to the *Plenary* in document IPBES-8/INF/12. The *Plenary*, in decision IPBES-8/1 section IV, took note of the data management policy, as presented. The data management policy was further revised in 2021 and the task force on knowledge and data published the IPBES data and knowledge management policy (version 2.0) after approval by the *Multidisciplinary Expert Panel* and *Bureau* at their 18th meetings in February 2022.

The purpose of the policy is to provide overarching guidance on the management of *data and knowledge* to current assessments and the work of *task forces* regarding *IPBES products*. The policy is grounded in the principles of open science, accessibility, and building knowledge through partnerships.

Introduction

This policy builds on the data and information management plan approved by the *IPBES Plenary* set out in annex II to decision IPBES-3/1 and the terms of reference of the *task force* set out in annex II to decision IPBES-7/1. In particular, it builds on the activity "reviewing and developing data and metadata guidelines", and is grounded in its principles for "managing knowledge, information, and data" in the Platform, in particular accessibility, and open science. Definitions of the terms used throughout this policy can be found in annex I.

Open science. The open science approach promotes the generation of *knowledge* through collaboration based on free and open access to *knowledge*, information, and *data*. Open science, therefore, ensures that the work of all the *experts* and *stakeholders* involved is fully recognized, properly attributed, documented, and preserved. Adoption of these principles and of this approach means a significant cultural change in the ways in which science is done and scientific results and underlying *data* are shared publicly by authors, journals and research organizations and thus made relevant to society. In the context of the Platform, the open science approach could engender very significant advances in *data* integration, analysis and interpretation and could lead to a better understanding of nature and its contribution to a good quality of life. Two key aspects of open science are "accessibility" and "inclusivity and *collective benefit*".

- **Accessibility.** Free and open access to its deliverables and to the material on which they are based is a core value of the Platform. Consequently, the policy will aim for open, permanent access to *data* and information sources for its deliverables (e.g., in the scientific literature) with minimal restrictions; enforce the use of common and accessible file formats in the Platform's deliverables; emphasize the need to communicate the availability of *data* and information; and, facilitate multilingual discovery and sharing of *data* and information. The Platform acknowledges that making *data* and information accessible may not always mean it is always accessible to all IPBES members and *stakeholders*, including IPLCs, as technical, economical, political or any other reasons may limit the accessibility, but not its findability.

- **Inclusivity and *collective benefit*.** Cooperation in *research* and broad acceptance of the resulting *IPBES products* is essential for the Platform to fulfil its mandate. For the acceptance and cooperation of *stakeholders* and *data and knowledge holders*, inclusivity in all stages of the *research* is essential, and IPBES takes many steps to try to enhance participation beyond only scientific researchers. IPBES acknowledges the richness of diverse knowledge systems and epistemologies and diversity of knowledge holders and producers, including ILK and IPLCs; also outlined in the *UNESCO Open Science recommendations*[4].

Thus, *data and knowledge* management within IPBES should be based on UNEP's over-arching strategies, policies and guidelines[5], to the maximum extent possible within the mandate of the Platform, allowing IPBES members and *stakeholders*, *IPLCs* and other interested parties to use and access *IPBES products*, and *knowledge and data* gathered or documented during their production and consequently derive benefit from them. IPBES has recognised the importance of *indigenous and local knowledge* (ILK) to the conservation and sustainable use of ecosystems, and the procedures and protocols to be used with regard to ILK and IPLCs have been developed in detail. From its inception, the Platform aims to enhance inter-relationships and complementarities between different knowledge systems.

Objectives

To fulfil its function to generate transparent assessments, IPBES is committed to implementing *data and knowledge* management procedures that are discipline-appropriate, practical, cost-effective and sustainable, and supportive of its objectives. The data and knowledge management policy is the primary reference document for IPBES *data and knowledge* management. It serves to ensure that *data and knowledge* is managed correctly and consistently, and is maintained to the highest possible standard. The data and knowledge management policy has the following objectives:

(a) To ensure that *data and knowledge* produced during IPBES *research* activities, within as well as between assessments, follow the *FAIR* and *CARE principles to the fullest extent possible within the mandate of the Platform*;

(b) To ensure that *IPBES products*, to the maximum extent possible within the mandate of the Platform, are openly available and designed so they are accessible; allowing all scientists, IPBES members, IPLCs and others to use them and consequently derive benefit from them.

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[4] https://en.unesco.org/science-sustainable-future/open-science/recommendation

[5] https://www.unep.org/about-un-environment/policies-and-strategies

(c) To provide a framework for all IPBES entities, including *technical support units* and *experts,* to fulfil their responsibilities with respect to management, handling, preservation, and distribution of *data and knowledge* and *generated data* within the Platform;

(d) To guide the *experts* to fulfil their responsibilities to develop one or more *data and knowledge management reports* which fulfil the requirements of this policy;

(e) To provide a suggested *workflow* for long-term storage and preservation of *IPBES products* to the *experts*;

(f) To promote the usage of open-source software to enable users to recreate and use *IPBES products* without limitations.

General Principles

To the fullest extent possible within the mandate of the Platform, *IPBES products* and associated *research* should be managed following the *FAIR and CARE principles* throughout their life cycle in line with the commitment to open science and accessibility.

IPBES products and associated research relating to *IPLCs* or incorporating *indigenous and local knowledge*, will follow IPBES's approach to recognising and working with *indigenous and local knowledge* (Annex II to decision IPBES-5/1).

IPBES products which follow the *FAIR* and *CARE* principles *to the fullest extent possible within the mandate of the Platform* are essential for fulfilling the functions of IPBES, to perform regular and timely assessments of *knowledge* on nature, its contribution to good quality of life, and their interlinkages, in a transparent and reproducible manner.

In the management, handling, and delivery of *IPBES products*, national law should be respected, which includes rights of privacy, intellectual property rights, data governance regulations, and duties of confidentiality as well as other legal obligations to which IPBES has agreed as binding upon IPBES and that fall outside the scope of this policy. *IPBES products* should be anonymized, if necessary, before long-term storage and publication.

IPBES is committed to providing guidance to all *experts* associated with IPBES to ensure that they are aware of and follow IPBES procedures, which will aim to follow the *FAIR and CARE principles* to the fullest extent possible within the mandate of the Platform.

Application

IPBES will apply this policy to all new and ongoing *IPBES products* and related *research*. The policy should be reviewed at least every 2 years by the *task force* on knowledge and data to align with new developments concerning *data and knowledge management and FAIR* and *CARE* data principles.
Exceptions and deviations to this policy have to be agreed upon in the *data and knowledge management report* in writing and shared with *secretariat* and the *technical support unit* on knowledge and data.

Scope

This policy applies to all *IPBES products*. *IPBES experts* are required to abide by the terms and conditions agreed with third parties. IPBES also recognizes that such third parties' policies are evolving and that the latter may require higher levels of data accessibility and dissemination in the future.

Compliance and enforcement

Compliance with the data and knowledge management policy is mandatory for all IPBES entities involved in the preparation of the *IPBES products*. Compliance will be monitored by the *technical support unit* on knowledge and data. Products will not be accepted as *IPBES products* unless they comply with this policy.

Roles and responsibilities

    (a) *Bureau* **and** *Multidisciplinary Expert Panel*
- Will review any changes to the policy as proposed by the *task force* on knowledge and data and consider these for approval;

    (b) Secretariat
- Will execute, under the guidance of the *task force* on knowledge and data and in cooperation with the *technical support unit* on knowledge and data, the development and maintenance of the guidelines, tutorials, *workflows* and examples to enable *experts* to implement these policies;

- Will keep an accurate, up-to-date and accessible list of *references* (including rich metadata), and links to *external data*, *knowledge* and generated *data* as used for and in the *IPBES products*;
- Will add specific and consistent keywords and metadata to the *data deposit packages* (e.g., chapter, assessment, figure) to make the *data* findable and identifiable;

(c) *Task force* on knowledge and data

- Will provide guidelines and examples for *data and knowledge* management*,* and guide the development and maintenance of these, as well as *data and knowledge* management *reports* and advise the *technical support unit* on knowledge and data in questions regarding *data and knowledge* management and *reporting* as outlined in the section on provisions on *data and knowledge* management reporting;
- Will review the policy at least every 2 years;
- Will work with the ILK *task force* to determine procedures that fulfil *FAIR and CARE principles* to the fullest extent possible within the mandate of the Platform;
- Will review the guidelines, tutorials, *workflows*, and examples related to this policy on a yearly basis to identify gaps and implement new developments;

(d) *Task force* on indigenous and local knowledge

- Will work with the *task force* on knowledge and data to review the policy with regard to aspects relating to IPLCs and ILK at least every 2 years, including to determine procedures that fulfil *FAIR and CARE principles* to the fullest extent possible within the mandate of the Platform;
- Will review the guidelines, tutorials, *workflows*, and examples related to this policy, particularly with regard to aspects relating to IPLCs and ILK, on a yearly basis to identify gaps and implement new developments;

(e) *Technical support unit* on knowledge and data

- Will provide support, advice, and participate in efforts from the *task force* on knowledge and data to develop guidelines and examples for *data and knowledge management* and *reporting*;
- Will review the *data and knowledge management reports* from the corresponding assessment *technical support units* so that they follow the data and knowledge management policy and are updated regularly;
- Will make sure that the assessment *technical support units* fulfil their responsibilities as outlined in this policy and the *data and knowledge management reports* and will collect the metadata of the *IPBES products* from the *technical support units*, so that they can be accessible and searchable;
- Will provide assistance in making sure that the *data and knowledge management reports* adhere to this policy;
- Will execute, under the guidance of the *task force* on knowledge and data, and in cooperation with the *secretariat*, the development and maintenance of the guidelines, tutorials, *workflows*, and examples (*data and knowledge management reports*) to enable IPBES to implement this policy;

(f) *Technical support unit* on indigenous and local knowledge

- Will provide support, advice, and participate in efforts from the *task force* on knowledge and data to develop guidelines and examples for *data and knowledge* management and reporting working with *ILK* and *CARE principles*;
- Will review the *data and knowledge management reports* upon the request of the *technical support unit for knowledge and data* so that they follow the data and knowledge management policy with regard to ILK and IPLCs considerations;
- Will provide support, advice, and participate in efforts to implement these guidelines in IPBES assessments and other processes;

(g) Assessment *technical support unit*

- Will collect the *data and knowledge management reports* from assessment *experts*;
- Will provide assistance to assessment *experts* in making sure that the *data and knowledge management reports* adhere to this policy;
- Will provide a *DOI* for each *data deposit package;*
- Will make sure that their *experts* fulfil their responsibilities as outlined in this policy and in the *data and knowledge management reports* and will collect the metadata of the *IPBES products* from the *experts* so that it can be handed over to the *task force* on knowledge and data;
- Will develop and maintain, under the guidance of the *technical support unit* on knowledge and data, and in cooperation with the *secretariat*, guidelines, tutorials, *workflows*, and examples (*data and knowledge management reports*) to enable IPBES to implement this policy;

(h) Experts
- Will prepare and keep up to date *data and knowledge management reports* for their IPBES-related *research*. These *data and knowledge management reports* should be available at the latest at the first *milestone*, and be updated for each following *milestone*. The *data and knowledge management reports* should conform with this policy and follow the examples in the technical guidelines;
- Are responsible for fulfilling the requirements as outlined in the implementation resources listed in Annex 2 of this policy;
- Are responsible for reporting issues on the implementation of the *data and knowledge management reports* to the associated *technical support unit*.

Provisions on *data and knowledge* management reporting

(a) A *data and knowledge management report* is expected for each IPBES *research project*. This can be achieved by a single *data and knowledge management report* for a *research project* or by an individual *data and knowledge management report* for each research aspect within a *research project*;

(b) The *data and knowledge* management should comply with this policy. If this is not possible, the exceptions and justifications need to be specified in the *data and knowledge management report* and be acknowledged by the *technical support unit* on knowledge and data;

(c) It is the responsibility of the *expert* to ensure that the *data and knowledge management report* is created, maintained, and updated throughout the *research project* life cycle and submitted to the associated *technical support unit*;

(d) The *technical support unit* on knowledge and data provides support, and where appropriate guidelines and examples (*data and knowledge management report*), to the *experts* to make sure that *FAIR* and *CARE principles* are followed, within the mandate of the Platform, for *data and knowledge* management and documented in *data and knowledge management reports*. This includes the use of open formats suitable for long-term storage and retrieval of *data*;

(e) The *task force* and *technical support unit* on indigenous and local knowledge provide support, and where appropriate, guidelines and examples, to the *experts* to make sure that *FAIR* and *CARE principles* are followed, to the fullest extent possible within the mandate of the Platform, for *data and knowledge* management and documented in *data and knowledge management reports*, where such *data* relates to *indigenous and local knowledge* or *IPLCs*;

(f) The IPBES *secretariat* provides information about recommended long-term, and to the extent possible certified, open data repositories which provide *DOIs*.

Provisions on accessibility, inclusivity, and *collective benefit*

(a) *IPBES products* should be preserved including a *DOI* for each *milestone* of an IPBES *research project*;

(b) *IPBES products* in or associated with an assessment or other *IPBES products*, including *data and knowledge management reports*, should be made openly accessible in a form that follows this policy at the latest one calendar month after the approval/acceptance of the assessment, or approval or acknowledgement of other IPBES product by the *Plenary*. *Data* related to *milestones* should also be made accessible, as far as confidentiality rules allow for this. Embargo periods are possible but need to be approved by the *task force* on knowledge and data. Restricted access to the IPBES *data* underlying *IPBES products* is only allowed under special circumstances and needs to be approved by the *technical support unit* on knowledge and data;

(c) Applicable ethical, privacy and confidentiality, and data governance requirements need to be followed and *generated data*, if deemed necessary, anonymized before preservation;

(d) The management, handling, and delivery of the materials from IPLCs adhere to the *FAIR* and *CARE principles* to the fullest extent possible as outlined in this policy, as well as to other binding conditions outside this policy in accordance with national law;

(e) *IPBES products* and their metadata are released with a clear and accessible data use license;

(f) Allowed licenses for the *IPBES products* are Creative Commons Copyright Waiver (CC0) and Creative Commons By Attribution (CC-BY) or licenses equivalent to these. Divergent licenses need to be approved by the *technical support unit* on knowledge and data;

(g) All *research* within IPBES has to be conducted in accordance with agreements with the holders of the *knowledge and data* regarding use, reuse, presentation and procedures. Communication with IPLCs needs to be maintained over the whole research cycle to the extent possible within the mandate of the Platform and IPBES' mandate to provide feedback to the knowledge holders as well as include feedback from the

knowledge holders in the *research,* as outlined in the IPBES approach to recognizing and working with *indigenous and local knowledge* as set out in annex II to decision IPBES-5/1[6];

(h) *IPBES products* will be made available and accessible to the holders of the *knowledge and data*, in line with agreed terms documented during ILK dialogue workshops or other activities, with due consideration to *FAIR and CARE principles*.

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[6] https://ipbes.net/sites/default/files/inline/files/ipbes_ilkapproach_ipbes-5-15.pdf

Definitions

- **Bureau**: A subsidiary body established by the *Plenary* which carries out administrative functions. It is made up of representatives nominated from each of the United Nations regions and is chaired by the Chair of IPBES.

- **CARE Principles for Indigenous Data Governance (short: CARE principles)**: A set of guiding principles for indigenous data governance focusing on appropriate use and reuse of indigenous *data and knowledge*. See here[7] for specifications. CARE is people and purpose-oriented and includes the principles of Collective Benefit, Authority to Control, Responsibility and Ethics. These guiding principles should also be applied to the management of *knowledg*e.

- **Collective benefit:** Benefits for all. These are, in the context of this policy, direct benefits resulting from use of and access to *IPBES products*, and *knowledge and data* gathered or documented during their production. To this end*, IPBES products* and *knowledge and data* should, to the maximum extent possible, be openly available and designed so they are accessible to all, to allow scientists, IPBES members, IPLCs and others to use them and consequently derive benefit from them.

- **Citations and references**: A *citation* within an *IPBES product* refers to the source of information to the *data* and metadata supporting IPBES deliverables, and addresses where the information came from. A *reference* includes adequate details about the source of the information making it findable and traceable.

- **Data** and **knowledge**: In many cases, *data* can not be interpreted without *knowledge* and must be seen as an item together with *knowledge*. *Data* and *knowledge* form a continuous spectrum and must not be separated from each other. In a general sense, they consist of individual units of information, which are obtained from observations, measurements, experiences, value systems, etc. They form the basis of monitoring, *research*, assessments, and analysis.

  Data can be of any nature, including among others, spatial or non-spatial, qualitative or quantitative, descriptive, and from all scientific disciplines. This includes information from *indigenous peoples and local communities (IPLC)*;

  Knowledge is the understanding gained through experience, reasoning, interpretation, perception, intuition, and learning that is developed as a result of information use and processing. *Knowledge* is often essential in the interpretation and understanding of associated *data*.

- **Data and knowledge management report (short: data management report)**: A *data and knowledge management report* is a formal document containing information concerning the handling of *data and knowledge* during and after the finalization of the *research project*. It should be drafted at the beginning of the project and be maintained and updated during the whole duration of the assessment to be kept up to date. It describes: The *data and knowledge* that will be created; the process of how the *data and knowledge* have been created, including references to the original data sources, scripts, and software used (see "*Workflow*" below); all additional information to make the process of the *data and knowledge* generation as transparent and reproducible as possible; access to the *data and knowledge* and where the *data and knowledge* will be preserved.

- **Data deposit package**: the content deposited in a long-term repository. Each *data deposit package* has a *DOI*. A *data deposit package* consists of at least the *data and knowledge* itself and the *data and knowledge management repor*t describing the *data* as outlined above, unless the data is a final product such as an assessment.

- **DOI:** a Digital Object Identifier as defined in the DOI Handbook[8]. A *DOI* is a digital identifier of an object, not an identifier of a digital object. *DOIs* are an ISO standard (ISO 26324-2012) and provide an actionable, interoperable, and persistent link.

- **External data and knowledge (hereafter "external data")**: *External data* is *data* and *knowledge* which has been generated outside of IPBES and *IPBES products,* and is available and published in peer-reviewed journals, grey literature or other sources or available as *indigenous and local knowledge* (ILK). These products of external entities are typically the input for *research* within IPBES. IPBES is not responsible for any preservation of these products; however if the Platform documents any existing knowledge, IPBES is responsible for preserving the documentation upon agreement with the knowledge holders such as IPLCs in the case of ILK.

- **FAIR data principles (short: FAIR principles)**: A set of guiding principles to make *data* Findable, Accessible, Interoperable, and Reusable (FAIR). See here[9] for specifications. These guiding principles should also be applied to the management of *knowledg*e.

- **Indigenous and local knowledge (ILK) systems:** As noted in the IPBES core glossary; "indigenous and local knowledge systems are social and ecological knowledge practices and beliefs pertaining to the

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[7] https://www.gida-global.org/care

[8] https://www.doi.org/overview/DOI_article_ELIS3.pdf

[9] https://www.go-fair.org/fair-principles/

relationship of living beings, including people, with one another and with their environments." See https://www.ipbes.net/glossary/indigenous-local-knowledge-systems

- **Indigenous peoples and local communities (IPLCs):** As noted in the IPBES core glossary; "*indigenous peoples and local communities* (IPLCs) are, typically, ethnic groups who are descended from and identify with the original inhabitants of a given region, in contrast to groups that have settled, occupied or colonized the area more recently." See https://www.ipbes.net/glossary/indigenous-peoples-local-communities

- **IPBES expert (hereafter "expert")**: Any person conducting *research* in the context of IPBES, in particular, its assessments and *task forces*. *IPBES Experts* also include *task force* members advising in the context of the preparation of *IPBES products.*

- **IPBES products**: Factual records produced by and within IPBES which can be used as primary sources for scientific research and which are required to validate its results. They vary according to the area of *knowledge* and may be contained in textual, non-textual, digital or physical formats including documents, spreadsheets, databases, maps, statistics, diaries, questionnaires, transcriptions, audio files, video, photographs, images, models, algorithms, scripts, log files, simulation software, methodologies and *workflows*, operating procedures, standards, protocols and any new products developed in the future in digital or physical formats. *Knowledge* and the data generated by applying this *knowledge* to *external data* are referred to as *IPBES products*.

- **Milestone**: A significant step towards the completion of the overall goal of a *research project* which warrants its long-term storage. In the case of assessments, this would include the completion of zero-, first- and second-order drafts of the chapters of the assessment as well as their final versions. Other defined *milestones* can be added if deemed necessary. For other *research projects*, *milestones* should be defined in the planning phase of the *research project*.

- **Multidisciplinary Expert Panel (MEP)**: a subsidiary body established by the *IPBES Plenary* which oversees the scientific and technical functions of the Platform; a key role is to select *experts* to carry out assessments.

- **Plenary**: The decision-making body of IPBES comprising representatives of members of IPBES.

- **Research**: *Research* refers to all activities within IPBES which collect, measure, aggregate, process, integrate, or analyse *data*, including *indigenous and local knowledge (ILK)*, or newly generated *data and knowledge*. It also includes the documentation of *ILK* during dialogue workshops or other activities with IPLCs. The term "*research*" used in this policy refers to the process of preparation of *IPBES products.*

- **Research project**: A chapter in an assessment, which is coordinated by coordinating lead author(s) and conducted by lead authors and/or fellows; a task associated with a single or multiple *IPBES product(s)*.

- **Secretariat**: The *secretariat* of the Platform.

- **Stakeholders in IPBES (short: stakeholders)**: In the context of the work programme and the IPBES stakeholder engagement policy as set out in decision IPBES-3/4, *stakeholders* act as both contributors and end-users of the Platform and are individual scientists or knowledge holders, and also institutions, organizations or groups working in the field of biodiversity (See IPBES/3/16), which: Contribute to the activities of the work programme through their experience, expertise, *knowledge, data*, information and capacity-building experience; Use or benefit from the outcomes of the work programme; Encourage and support the participation of scientists and knowledge holders in the work of the Platform.

- **Task force**: A working group of domain *experts*, established by the *Plenary*, to carry out tasks as defined in the terms of reference under the Platform's rolling work programme.

- **Technical support unit**: The *technical support unit* works under the oversight of the *secretariat* to coordinate and administer the activities of *expert* groups in support of the development of deliverables. Technical support units are dedicated to a specific assessment or a *task force*.

- **UNESCO Open Science recommendations**: An international framework for open science policy and practice as unanimously adopted by UNESCO Member States at the Science Commission plenary at its 41st General Conference. See here[10] for specifications. The recommendation outlines common definitions, shared values, principles and standards for open science at the international level and proposes a set of actions conducive to a fair and equitable operationalization of open science for all at the individual, institutional, national, regional and international levels.

- **Workflow**: A repeatable set of steps involved in achieving a goal. Individual steps could be '*data and knowledge* gathering', '*data* filtering', '*data* preparation', '*data and knowledge* analysis', and '*data and knowledge* visualisation'. An analytical workflow, for example, represents the transformations made to *data* along the scientific process, including *data* sources, scripts and software used.

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[10] https://en.unesco.org/science-sustainable-future/open-science/recommendation

Implementation Resources

IPBES Data and Knowledge Management Tutorials:
The task force on knowledge and data has created a series of tutorials focused on data and knowledge management to facilitate the implementation of the IPBES data and knowledge management policy. These short 3-10 minute tutorials cover the following topics: the data and knowledge management policy (formally known as the data management policy), data management reports, active research data, tools, and examples.
The tutorials can be found on the IPBES website: https://ipbes.net/dmp/tutorials

IPBES Technical Guidelines:
The technical support unit on knowledge and data has produced a series of technical guidelines on data and knowledge management, handling, and delivery to provide detailed information and recommendations on specific topics such as cartographic elements for maps or file formats. These guidelines have been reviewed by the task force on knowledge and data and serve as an important resource for assessment experts and technical support units.

The technical guidelines can be found on the IPBES ICT portal: https://ict.ipbes.net/data-management/technical-guidelines

IPBES Delivery Protocol of the Assessment Drafts
The technical support unit on knowledge and data in collaboration with secretariat created a delivery protocol to serve as a reference document for technical support units when submitting milestone drafts of assessments. The protocol was prepared based on the requirements articulated in the IPBES data and knowledge management policy and the technical guidelines.
The IPBES delivery protocol of the assessment drafts can be found on Zenodo:
https://doi.org/10.5281/zenodo.5509137

Appendix III

DRAFT IPBES Long-term Vision on Data and Knowledge Management

https://doi.org/10.5281/zenodo.5513473

Preamble

The Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES) Plenary extended the mandate of the task force on knowledge and data for the implementation of objective 3 (a) of the IPBES work programme up to 2030, regarding advanced work on knowledge and data (decision IPBES-7/1, section IV). The task force was mandated to oversee and take part in the implementation of objective 3 (a) of the work programme and act in accordance with relevant decisions by the Plenary and its subsidiary bodies. The Plenary, at its 8th session approved the interim workplan of the task force on knowledge and data for the intersessional period 2021–2022 (decision IPBES/8/11, section IV), which includes the development of a long-term vision on data management (IPBES/8/INF/12). Pursuant to that work plan, the IPBES task force on knowledge and data prepared a long-term vision document on knowledge and data management and delivery, in line with the approved IPBES rolling work programme. The document describes a draft for an overarching vision supported by two essential tracks for knowledge and data management and delivery with corresponding targets outlining possible paths to reaching the vision. The vision would be reviewed every two years to evaluate progress towards achieving the targets, to identify obstacles, and, if necessary, to revise accordingly.

I. Introduction

Purpose and scope

The Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES) aims to strengthen the science-policy interface for biodiversity and ecosystem services for the conservation and sustainable use of biodiversity, long-term human well-being and sustainable development (UNEP/IPBES.MI/2/9, annex I, appendix I, sect. I). To accomplish this overall objective, IPBES has four functions (IPBES 7-/1, annex I, sect. I):

(a) Identify and prioritise key scientific information needed for policymakers at appropriate scales and to catalyse efforts to generate new knowledge by engaging in dialogue with key scientific organisations, policymakers and funding organisations, but not to directly undertake new research;

(b) To perform regular and timely assessments of knowledge on biodiversity and ecosystem services and their interlinkages, which should include comprehensive global, regional and, as necessary, subregional assessments and thematic issues at appropriate scales and new topics identified by science and as decided upon by the Plenary;

(c) To support policy formulation and implementation by identifying policy-relevant tools and methodologies, such as those arising from assessments, to enable decision makers to gain access to those tools and methodologies and, where necessary, to promote and catalyse their further development;

(d) To prioritise key capacity-building needs to improve the science-policy interface at appropriate levels and then provide and call for financial and other support for the highest-priority needs related directly to its activities, as decided by the Plenary, and to catalyse financing for such capacity-building activities by providing a forum with conventional and potential sources of funding.

II. Vision and aims

The IPBES long-term vision on data and knowledge management is that **by 2030, IPBES has strengthened the open and transparent transfer of knowledge and data between science, policy and society regarding biodiversity and ecosystem services, for the benefit of all.** Thus, it is envisioned that data, processes, and workflows supporting the Platform in fulfilling its objective are fully compliant with the FAIR and CARE principles to improve the quality of its products and benefits to all.

Pursuing this vision will improve collaboration, working effectiveness and efficiency while strengthening the impact of the IPBES products on transferring knowledge between science, policy, and society. The following three aims act as the basis to move towards the vision:

1. Ensure IPBES products and their underlying knowledge and data follow the FAIR and CARE principles;

2. Strengthen and institutionalise connections within IPBES concerning knowledge and data, including between all of the task forces;

3. Strengthen engagement with all relevant stakeholders in regards to knowledge and data, including indigenous peoples and local communities, to increase the scientific credibility and uptake of IPBES products.

III. Roadmap up to 2030

The roadmap up to 2030 is structured around the following two tracks to support the implementation of the necessary steps to move the Platform towards the long-term vision. Each track covers an essential aspect of data and knowledge management, and is accompanied by specific targets to improve the transparency and accessibility of IPBES products. Working in these tracks to reach their targets will ensure that IPBES accomplishes the three aims within the long-term vision.

A- Tracks of the roadmap

1. Data and knowledge management within IPBES

By 2030, IPBES will have in place a knowledge base for all used and generated datasets including identified knowledge gaps. The knowledge base will document workflows, variables, and indicators used in producing IPBES products to ensure transparency. At its core, all data and knowledge to which the knowledge base refers to will follow the standards outlined in the IPBES data and knowledge management policy, with the fundamental goal being the improvement of data traceability, accountability, transparency, interoperability, reproducibility, and its ethical and responsible use. Adherence to broad worldwide interoperability standards will facilitate data and knowledge discovery and retrieval, including machine to machine data extraction, as well as data and knowledge citation through persistent attribution identifiers, ensuring credit to the authors

and traceability of the use of the products. At the same time, IPBES will implement the data and knowledge management policy which includes both the FAIR and CARE principles. These principles promote sound data management and inclusivity, and encourage collective benefit from IPBES products. IPBES members and stakeholders, including IPLCs and other interested parties, can use and access IPBES products and the knowledge and data gathered or documented during their production and consequently derive benefit from them. While IPBES products also rely extensively on external data and knowledge, including ILK, the management of these external data fall outside of IPBES' scope. However, IPBES will provide guidelines and encourage the use of external data which follow FAIR, CARE and other principles included in the IPBES data and knowledge management policy.

2. Delivery and monitoring of IPBES products

By 2030, IPBES will leverage a data delivery platform that provides easy access to IPBES products, data generated during the production of those products and well-curated connections with external datasets used in those products. The information thus delivered will follow IPBES data standards outlined in the data and knowledge management policy. Real-time reporting and monitoring will provide statistics on IPBES products' usage, and continued adherence to the IPBES data and knowledge management policy. Connections between products and datasets within IPBES will be published and maintained in order to improve access to IPBES products based on interlinkages between IPBES products and supporting knowledge and data. Similar connections between IPBES products and external documents such as national environmental policies, private-sector standards, and external data, knowledge, and standards providers will be identified and published. IPBES will implement tools for monitoring the availability of underlying external datasets, compliance with the data and knowledge management policy, and the automatic update of graphics, tables, and other visualisations that rely on data that can be dynamically updated. IPBES product usage, including identified knowledge gaps, will be tracked in a manner available to all IPBES members and stakeholders, IPLCs and other interested parties. Also, versioning of final IPBES products will be implemented to allow updates of the assessments and other products based on data that is delivered continuously, aligned with the concept of "living or dynamic documents". At the same time, IPBES will make sure that its final products which include ILK aspects are shared with indigenous peoples and local communities to enhance dialogue and distribution of benefits. Finally, by 2030 IPBES will have online training material demonstrating how to access, navigate and utilise IPBES products, data and associated knowledge, as well as channels to receive feedback from stakeholders.

B- Targets of the roadmap

The targets for IPBES data and knowledge management and delivery up to the year 2030 are provided below in line with the six objectives of the IPBES rolling work programme up to 2030: 1) Assessing knowledge, 2) building capacity, 3) strengthening knowledge foundations, 4) supporting policy, 5) communicating and engaging and 6) improving platform effectiveness.

Track 1: Data and knowledge management within IPBES

Target 1.1:   By 2023, setup a public bibliographic library for underlying bibliographic records of the IPBES products - *supporting Objectives 1 and 3 of the rolling work programme up to 2030 of IPBES*

Target 1.2:   Starting in 2024, every two years revise the IPBES data and knowledge management policy and support its implementation across the Platform - *supporting Objective 3 of the rolling work programme up to 2030 of IPBES*

Target 1.3:   By 2025, all IPBES products adhere to the CARE principles (Collective Benefit, Authority to Control, Responsibility, and Ethics) - *supporting Objectives 3 and 5 of the rolling work programme up to 2030 of IPBES*

Target 1.4: By 2026, establish a knowledge base, to ensure that all underlying resources used in IPBES products are publicly findable and accessible - *supporting Objective 3 of the rolling work programme up to 2030 of IPBES*

Target 1.5:   By 2027, all IPBES products adhere to the FAIR principles (Findable, Accessible, Interoperable, and Reusable) - *supporting Objective 3 of the rolling work programme up to 2030 of IPBES*

Track 2: Delivery and monitoring of IPBES products

Target 2.1:   By 2025, disseminate knowledge gaps identified in IPBES products in a structured format with persistent identifiers for each gap to enable future monitoring. - *supporting Objective 3 of the rolling work programme up to 2030 of IPBES*

Target 2.2: By 2025, explicitly link policy tools and methodologies to relevant IPBES products via computational techniques - *supporting Objectives 3 and 4 of the rolling work programme up to 2030 of IPBES*

Target 2.3: By 2025, develop a roadmap to improve the necessary capacities of stakeholders concerning access to the IPBES data and knowledge - *supporting Objectives 2, 3, and 5 of the rolling work programme up to 2030 of IPBES*

Target 2.4: By 2025, ensure that data and knowledge gathered and documented during the production of IPBES products are openly available and accessible to their holders and providers - *supporting Objectives 2, 3, and 5 of the rolling work programme up to 2030 of IPBES*

Target 2.5: By 2027, track the degree to which external data sources adhere to data management and governance principles as outlined in the IPBES data and knowledge management policy to encourage open science - *supporting Objective 3 of the rolling work programme up to 2030 of IPBES*

Target 2.6: By 2027, monitor the use and identify potential gaps in tools and methodologies for the delivery of IPBES products to decision-makers - *supporting Objectives 4 and 6 of the rolling work programme up to 2030 of IPBES*

Target 2.7: By 2027, collect feedback from IPBES members and stakeholders, IPLCs and other interested parties, on IPBES products with the goal of improving IPBES product quality, reach and impact - *supporting Objectives 5 and 6 of the rolling work programme up to 2030 of IPBES*

Target 2.8: By 2030, create a technical platform to dynamically update selected aspects of IPBES products according to the availability of new resources - *supporting Objectives 1 and 3 of the rolling work programme up to 2030 of IPBES*

Target 2.9: By 2030, develop a tracking system to map the use of IPBES products in national, regional and global policies as well as in scientific publications - *supporting Objectives 3 and 4 of the rolling work programme up to 2030 of IPBES*

Definitions

- **Bureau**: A subsidiary body established by the Plenary which carries out administrative functions. It is made up of representatives nominated from each of the United Nations regions and is chaired by the Chair of IPBES.

- **CARE Principles for Indigenous Data Governance (short: CARE principles)**: A set of guiding principles for indigenous data governance focusing on appropriate use and reuse of indigenous data and knowledge. See here[11] for specifications. CARE is people and purpose oriented and includes the principles of Collective Benefit, Authority to Control, Responsibility and Ethics. These guiding principles should also be applied to the management of *knowledge*.

- **Citations and references**: A *citation* within an *IPBES product* refers to the source of information to the *data* and metadata supporting IPBES deliverables, and addresses where the information came from. A *reference* includes adequate details about the source of the information making it findable and traceable.

- **Collective benefit:** Benefits for all. These are, in the context of this policy, direct benefits resulting from use of and access to *IPBES products*, and *knowledge and data* gathered or documented during their production. To this end*, IPBES products* and *knowledge and data* should, to the maximum extent possible, be openly available and designed so they are accessible to all, to allow scientists, IPBES members, IPLCs and others to use them and consequently derive benefit from them.

- **Data** and **knowledge**: In many cases, *data* can not be interpreted without *knowledge* and must be seen as an item together with *knowledge*. *Data* and *knowledge* form a continuous spectrum and must not be separated from each other. In a general sense, they consist of individual units of information, which are obtained from observations, measurements, experiences, value systems, etc. They form the basis of monitoring, *research*, assessments, and analysis.

  Data can be of any nature, including among others, spatial or non-spatial, qualitative or quantitative, descriptive, and from all scientific disciplines. This includes information from indigenous peoples and local communities (IPLC);

  Knowledge is the understanding gained through experience, reasoning, interpretation, perception, intuition, and learning that is developed as a result of information use and processing. *Knowledge* is often essential in the interpretation and understanding of associated *data*.

- **External data and knowledge (hereafter "external data")**: *External data* is *data* and *knowledge* which has been generated outside of IPBES and *IPBES products,* and is available and published in peer-reviewed journals, grey literature or other sources or available as indigenous and local knowledge (ILK). These products of external entities are typically the input for *research* within IPBES. IPBES is not responsible for any preservation of these products; however if the Platform documents any existing knowledge, IPBES is responsible for preserving the documentation upon agreement with the knowledge holders such as IPLCs in the case of ILK.

- **FAIR data principles (short: FAIR principles)**: A set of guiding principles to make *data* Findable, Accessible, Interoperable, and Reusable (FAIR). See here[12] for specifications. These guiding principles should also be applied to the management of *knowledge*.

- **Indigenous and local knowledge (ILK) systems:** As noted in the IPBES core glossary; "indigenous and local knowledge systems are social and ecological knowledge practices and beliefs pertaining to the relationship of living beings, including people, with one another and with their environments." See https://www.ipbes.net/glossary/indigenous-local-knowledge-systems

- **Indigenous peoples and local communities (IPLCs):** As noted in the IPBES core glossary; "indigenous peoples and local communities (IPLCs) are, typically, ethnic groups who are descended from and identify with the original inhabitants of a given region, in contrast to groups that have settled, occupied or colonized the area more recently." See https://www.ipbes.net/glossary/indigenous-peoples-local-communities.

- **IPBES products**: Factual records produced by and within IPBES which can be used as primary sources for scientific research and which are required to validate its results. They vary according to the area of *knowledge* and may be contained in textual, non-textual, digital or physical formats including documents, spreadsheets, databases, maps, statistics, diaries, questionnaires, transcriptions, audio files, video, photographs, images, models, algorithms, scripts, log files, simulation software, methodologies and *workflows*, operating procedures, standards, protocols and any new products developed in the future in digital or physical formats. *Knowledge* and the data generated by applying this *knowledge* to *external data* are referred to as *IPBES products*.

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[11] https://www.gida-global.org/care

[12] https://www.go-fair.org/fair-principles/

- **Multidisciplinary Expert Panel (MEP)**: A subsidiary body established by the IPBES *Plenary* which oversees the scientific and technical functions of the Platform. These scientific and technical functions are listed in the document "Functions, operating principles and institutional arrangements of IPBES" adopted during IPBES-2 [13] .

- **Plenary**: The decision-making body of IPBES comprising representatives of members of IPBES.

- **Secretariat**: The *secretariat* of the Platform.

- **Stakeholders in IPBES (short: stakeholders)**: In the context of the work programme and the IPBES stakeholder engagement policy as set out in decision IPBES-3/4, *stakeholders* act as both contributors and end-users of the Platform and are individual scientists or knowledge holders, and also institutions, organizations or groups working in the field of biodiversity (See IPBES/3/16), which: Contribute to the activities of the work programme through their experience, expertise, knowledge, data, information and capacity-building experience; Use or benefit from the outcomes of the work programme; Encourage and support the participation of scientists and knowledge holders in the work of the Platform.

- **Task force**: A working group of domain *experts*, established by the Plenary, to carry out tasks as defined in the terms of reference in the Platform's rolling work programme.

- **Workflow**: A repeatable set of steps involved in achieving a goal. Individual steps could be '*data and knowledge* gathering', '*data* filtering', '*data* preparation', '*data and knowledge* analysis', and '*data and knowledge* visualisation'. An analytical workflow, for example, represents the transformations made to *data* along the scientific process, including *data* sources, scripts and software used.

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[13]
https://ipbes.net/sites/default/files/downloads/functions_operating_principles_and_institutional_arrangements_of_ipbes_2012.pdf