

DATA MANAGEMENT POLICY

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DEFINITIONS

- (a) **Data:** *Data* in a general sense are individual units of information obtained from observations or measurements and forms the basis of monitoring, *research*, assessments and analysis. Data may be categorized according to the following aspects:
- Thematic (socioeconomic, ecological, landscape, sociological, etc.);
 - Geographical (global, regional, sub-regional, local);
 - Systematic (taxonomy), descriptive or trait-based;
 - Material from indigenous people and local communities (IPLC);
- Data* can be of any nature, including, among others, spatial or non-spatial, qualitative or quantitative, descriptive, and from all scientific disciplines. This includes material from indigenous people and local communities (IPLC);
- (b) **External data:** *External data* are original data as defined above, information, or *knowledge* which have been generated outside of IPBES and *IPBES products* and are available and published in peer-reviewed journals, grey literature or other sources or available as IPLC. Original data should be citable via a stable digital object identifier (DOI) or other identifiers (e.g. ISBN). These products of external entities are typically the input for *research* within IPBES. IPBES is not responsible for any archiving of these products;
- (c) **Knowledge:** *Knowledge* is the understanding gained through experience, reasoning, interpretation, perception, intuition, and learning that is developed as a result of information use and processing. In the context of this policy, *knowledge* is the description of the process used to analyse, integrate, collect or process in any way *external data*.
- (d) **IPBES products:** Factual records (numerical scores, textual records, images, and sounds) produced or 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 documents, spreadsheets, databases, maps, statistics, laboratory notebooks, field notebooks, diaries, questionnaires, transcriptions, audio files, video, photographs, images, protein sequences or genetics, artefacts, samples, models, algorithms, scripts, log files, simulation software, methodologies and workflows, operating procedures, standards and protocols and any new products developed in the future. *Knowledge* and the data generated by applying this *knowledge* to *external data* are referred to as *IPBES products*.
- (e) **Links and references:** Links, for example, those in the form of DOI, and bibliographical references provide access to the data and metadata supporting IPBES deliverables. In order to guarantee long-term access to that data, IPBES will need to keep an accurate, up-to-date and accessible list of references and links to products of external entities, *external data*, *knowledge* and *IPBES products*.
- (f) **Research:** *Research* refers to all activities within IPBES which collect, measure, aggregate, process, integrate, or analyse in any way existing data from original research, published in peer-reviewed literature or grey literature, or new generated data, within an assessment, a *technical support unit* or *task force*. This also includes the development of indicators and archetype scenarios to be used in multiple assessments. No original research is conducted through IPBES processes. The term “*research*” is only used for the purposes of this policy to refer to the process of preparation of *IPBES products* in line with the procedures for the preparation of Platform deliverables as set out in annex I to decision IPBES-3/3 and other relevant decisions by the IPBES Plenary.
- (g) **Expert:** Any person conducting *research* in the context of IPBES, in particular, its assessments and *task forces*. This includes assessment *experts* and *task force* members as well as all other persons in the IPBES context conducting *research*;
- (h) **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*.
- (i) **Generated data management:** The management and handling of *IPBES products* in an organized manner to fulfil the requirements of this Data Management policy;
- (j) **Data management plan:** A *data management plan* is a formal document containing information concerning the handling of data during and after the finalizing of the *research project*. It describes:
- The data that will be created;
 - The standards used to describe the data (metadata);

- The ownership of the data;
- Access to the data;
- The duration which the data will be preserved (and/or made accessible); and
- The facilities and equipment necessary to disseminate, share, and/or preserve the data;

It should contain all information so that the *expert* can follow the principles.

- (k) **FAIR data principles:** A set of guiding principles to make data Findable, Accessible, Interoperable, and Reusable (FAIR). See the *FAIR data principals* for specifications <https://www.force11.org/group/fairgroup/fairprinciples>);
- (l) **Milestone:** A significant step towards the completion of the overall goal of a *research project* which warrants the suitability for 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*.
- (m) **Plenary:** The decision-making body of IPBES comprising of representatives of members of IPBES.
- (n) **Secretariat:** The *secretariat* of the Platform;
- (o) **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.
- (p) **Bureau:** a subsidiary body established by the *Plenary* which carries out the governance functions of the Platform. It is made up of representatives nominated from each of the United Nations regions and is chaired by the Chair of IPBES
- (q) **Task Force:** working group of domain experts established by the Plenary to implement the Platform's work programme
- (r) **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.

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. In particular, it builds on its activity 1: 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 (paragraphs (c) and (e) of section III of the data and information management plan):

- **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 plan will, first, aim for open, permanent access to data and information sources for its deliverables (e.g., in the scientific literature) with minimal restrictions; second, enforce the use of common and accessible file formats in the Platform's deliverables; third, emphasize the need to communicate the availability of data and information; and, fourth, facilitate multilingual discovery and sharing of data and information. The Platform acknowledges that making data and information available online may not always mean it is accessible to member States due to political, technical, and economical or any other reasons. Therefore, making data and information available in other formats will be crucial for ensuring true accessibility of the data and information produced by the Platform;
- **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 and properly attributed. 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. This cultural change is already happening in various scientific disciplines such as astronomy, neurobiology, molecular genetics, and oceanography, among others. 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.

Objectives

To fulfil its function to generate transparent assessments, IPBES is committed to implementing data management procedures that are discipline-appropriate, proportionate, practical, cost-effective and sustainable, and supportive of its objectives.

The data management policy is intended to be the primary reference document for IPBES data management. It serves to ensure that data is managed correctly and consistently, and is maintained to the highest possible standard.

The data management policy has the following objectives:

- (a) To ensure that *data* produced during IPBES *research* activities, within assessments as well as assessment overarching follows the *FAIR data principles*;
- (b) To provide a framework for all IPBES entities, including *technical support units* and *experts* to fulfil their responsibilities with respect to storage and retention of *knowledge* and *generated data* as well as final assessments;
- (c) To guide the *experts* to fulfil their responsibilities to develop one or more *data management plans* which fulfil the requirements of this policy and other partners;
- (d) To provide a suggested workflow for long term storage and archival of *IPBES products* to the *experts*;
- (e) To promote the usage of open-source software to enable users to recreate and use *IPBES products* without limitations.

General Principles

IPBES products should be managed following the *FAIR data principles* throughout the research cycle as part of IPBES' commitment to accessibility and open science (see above).

IPBES products which follow the *FAIR* principle 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, and duties of confidentiality as well as other legal obligations to which IPBES have 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.

IPBES is committed to providing guidance to all *experts* associated with IPBES to ensure that all *data* resulting from *research* associated with IPBES follows the *FAIR data principles*.

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 management and *FAIR* data standards.

Exceptions and deviations to this policy have to be agreed upon in the *Data Management Plan* in writing and shared with the *secretariat* and knowledge and data *technical support unit*.

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 management policy is mandatory for IPBES *experts*.

The *technical support units* will ensure that *experts* follow the policy. Compliance will be monitored by the knowledge and data *technical support unit*. 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 knowledge and data *technical support unit*, the development and maintenance of the guidelines, tutorials, workflows, and templates 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* (for metadata requirements of *IPBES products* see Appendix IV);
- Will add specific and consistent keywords to *data management plans* (e.g. chapter, assessment, figure) to make the data findable and identifiable;

(c) Task force on knowledge and data

- Will provide guidelines and templates for data management, and guide the development and maintenance of that, as well as *data management plans* and advise the knowledge and data *technical support unit* in questions regarding *data management* and *data management plans* as outlined in the section on provisions on data management planning;
- Review the policy at least every 2 years;
- Will review the guidelines, tutorials, workflows, and templates related to this policy on a yearly basis to identify gaps and implement new developments;

(d) Knowledge and data technical support unit

- Will provide support, advice, and participate in efforts from the *task force* on knowledge and data to develop guidelines and templates for *data management* and *data management plans*;
- Will collect the DOI of the *data management plans* from associated *technical support units*;
- Will make sure that the *technical support units* fulfil their responsibilities as outlined in this policy and the *data management plans* and will collect the metadata of the *IPBES products* from the technical support units, so that it can be accessible and searchable via the IPBES website;
- Will provide assistance in making sure that the *data management plans* 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 templates (*data management plan*) to enable IPBES to implement this policy;

(e) Technical Support Units

- Will collect the *data management plans* from their *experts*;
- Will provide assistance in making sure that the *data management plans* adhere to this policy;
- Will provide DOI for each *data management plan*
- Will make sure that the *experts* fulfil their responsibilities as outlined in this policy and in the *data management plans* 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 knowledge and data *technical support unit*, and in cooperation with the *secretariat*, guidelines, tutorials, workflows, and templates (*data management plan*) to enable IPBES to implement this policy;

(f) Experts

- Will prepare *data management plans* for their IPBES related research. These *data management plans* should be available at the latest at the first *milestone*. The *data management plans* should follow the template in Appendix I;
- Are responsible for fulfilling the requirements as outlined in the *data management plans*;
- Are responsible for reporting issues on the implementation of the *data management plans* to the associated *technical support unit*.

PROVISIONS ON DATA MANAGEMENT PLANNING

- (a) A *data management plan* is expected for each IPBES *research project*. This can be achieved by a single *data management plan* for a *research project* or by an individual *data management plan* for each research aspect within a *research project*;
- (b) The *data management plan* should comply with this data management policy. If this is not possible, the exceptions need to be specified in the *data management plan* itself and be acknowledged by the knowledge and data *technical support unit*. It is the responsibility of the *expert* to ensure that the *data management plan* is created, recorded by the associated *technical support unit*, adhered to and updated as necessary throughout the *research project* life cycle;
- (c) The knowledge and data *technical support unit* provides support, and where appropriate guidelines and templates (*data management plan*), to the *experts* to make sure that *FAIR data principles* are followed for *data management* and form the basis of the *data management plans*. This includes the use of open formats suitable for *data* long term storage and retrieval (see Appendix II);
- (d) The IPBES *secretariat* provides information about recommended long-term, and to the extent possible certified, open data repositories which provide DOIs (see Appendix III);

PROVISIONS ON ACCESS TO IPBES PRODUCTS

- (a) IPBES products should be archived including a DOI for each *milestone* of an IPBES *research project*;
- (b) IPBES products in or associated with an assessment or other IPBES product should be made openly accessible in a form that follows this policy and the *data management plan* at the latest one calendar month after the approval of the assessment by the *Plenary*. *Data* related to *milestones* should also be made accessible, as far as confidentiality rules allow for this;
- (c) Applicable ethical, privacy and confidentiality requirements need to be followed and *generated data* should be, if deemed necessary, anonymized before archival;
- (d) The management, handling, and delivery of the materials from IPLC have to adhere to the application of free, prior and informed consent (see Appendix V), 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 generated data 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 knowledge and data *technical support unit*.

APPENDIXES

- I. Data management plan – template**
- II. File format guidelines**
- III. Recommended repositories**
- IV. Metadata requirements**
- V. Management, Handling, and Delivery of Materials from IPLC**

APPENDIX I: Data Management Plan - Template

Here is a draft of a template for IPBES Data Management Plan.

This is a working document and will be further developed.

To get the latest version of this appendix visit <http://dx.doi.org/10.5281/zenodo.3551079>

Institution	
IPBES	
Responsibilities	
Person in charge of the work:	
Data management contact:	<input type="checkbox"/> Assessment TSU, specify name: <input type="checkbox"/> Knowledge and Data TSU
1. Description of the data	
1.1 Type of study Summarise the type of study (or studies) for which the data are being collected. e.g. the chapter in the assessment, the section in a chapter in an assessment, a TF or TSU IPBES product	
1.2 External data used Describe the types of external data to be used, if possible including DOI. DOI needs to be specified in the metadata as well. e.g.: quantitative, qualitative; generated from surveys, clinical measurements, interviews, medical records, electronic health records, administrative records, genotypic data, images, tissue samples, experimental records/reports/designs / clinical validation. Estimated volume? Static or frequently updated? Data formats? refer to appendix II Procedures for ensuring data quality (QA/QC)	
1.3 Describe the processing that will be done to the external data	
1.4 Describe the products obtained from the processing from the external data Describe the kind of product you expect to obtain from the processing of the external data, including its format. e.g. data which is used in a map, ...	
2. Data collection / generation	
3. Data management, documentation, and curation	
Keep this section concise and accessible to readers who are not data-management experts. Focus on principles, systems and major standards. Focus on the main kind(s) of study data. Give brief examples and avoid long lists.	
3.1 Managing, storing and curating active research data. Briefly describe how data, during the research process, will be stored, backed-up, managed and curated in the short to medium term. Specify any agreed or other formal data standards used (with URL references)..	
3.2 Metadata standards and data documentation <input type="checkbox"/> Metadata follows the IPBES metadata scheme. If not. please justify. Documentation of the workflow of the analysis is <input type="checkbox"/> Documented in code <input type="checkbox"/> Code is documented in a separate document, named (please fill in the name here)..... <input type="checkbox"/> other info.....	
What metadata is produced about the data generated from the research? For example descriptions of data	

that enable research data to be used by others outside of your own team. This may include documenting the methods used to generate the data, analytical and procedural information, capturing instrument metadata alongside data, documenting the provenance of data and their coding, detailed descriptions for variables, records, etc.

Who will be responsible for creating the metadata?

3.3 Data preservation strategy and standards

Data preservation and long term storage will follow the IPBES Data Management Policy and done through the Secretariat. If deviations from this procedure are necessary, please justify why.

Who will be responsible for answering any questions regarding the data on the long term?

4. Data anonymization

4.1 Data anonymization

If data anonymization is necessary, please explain why and to what degree.

4.2 Non anonymized data

Is Non anonymized data available? If yes, under which conditions and where.

5. Data sharing and access

Zenodo - if other necessary, please explain why.

5.1 Suitability for sharing

All Products from IPBES have to be suitable for sharing and reproducible. If this is not the case, please justify why not.

5.2 The study team's exclusive use of the data

Generally, the products should be accessible latest after completion. If an embargo is needed for e.g. completion of thesis or publication of papers, please state it here.

5.3 Restrictions or delays to sharing, with planned actions to limit such restrictions

Restriction to data sharing may be due to participant confidentiality, consent agreements or IPR. Strategies to limit restrictions may include data being anonymized or aggregated; gaining participant consent for data sharing; gaining copyright permissions. For prospective studies, consent procedures should include provision for data sharing to maximize the value of the data for wider research use, while providing adequate safeguards for participants. As part of the consent process, proposed procedures for data sharing should be set out clearly and current and potential future risks associated with this explained to research participants.

5.4 Regulation of responsibilities of users

Indicate whether external users are (will be) bound by a data sharing agreement. If so what are the main terms of this agreement.

6. Relevant institutional, departmental or study policies on data sharing and data security

For your institution please detail below such internal policies and procedures that are relevant to this data management plan.

Please also provide pdf versions of the listed policies

Policy	URL or Reference
Data Management Policy & Procedures	link to DM Policy link to guidelines

7. Author of this Data Management Plan (Name and contact details)

APPENDIX II: File Format Guidelines

File formats play an important role in *FAIR data principles* (www.go-fair.org/fair-principles/). Data can be findable and accessible, but still not reusable and interoperable if the data formats do not follow open data standards. Data formats should be open and non-proprietary so that they do not depend on specific non-open software to be read and, if possible, be human-readable (i.e. text files in contrast to binary files). Text files should be in UTF-8 encoding.

Compiling an exhaustive list of formats for all file types is a task which exceeds the scope of this policy. Therefore, we supply a list of guidelines that are in line with the aims of this policy. We encourage the use of the formats recommended in the links below:

- National Archives (<https://www.archives.gov/preservation/formats>) the guidelines of the National Archives. Very detailed
- ETH Library (<https://documentation.library.ethz.ch/display/DD/File+formats+for+archiving>) for a nice and concise summary of file formats
- Best File Formats for Archiving (<https://suchanek.name/texts/archiving/>) for a comprehensive article.

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APPENDIX III: Recommended Repositories

The repository for long term storage of all IPBES products, including milestones, is Zenodo (<https://zenodo.org/>).

- The IPBES secretariat has created under the username **ipbessecretariat** a number of communities that are listed under the main Zenodo community: <https://zenodo.org/communities/ipbes/>
- Only communities curated by **ipbessecretariat** are official IPBES repositories.
- Submissions to these communities will be verified and curated by the **ipbessecretariat**

For all active research data and code documentation, IPBES recommends GitHub.

- IPBES on GitHub: <https://github.com/ipbes>

Enquiries should be directed to ipbes.support@ipbes.net

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APPENDIX IV: Metadata Requirements

Metadata should be prepared in English and follow a developed metadata scheme. This scheme will include

- bibliographic metadata (similar to datacite <https://schema.datacite.org/meta/kernel-4.3/>) including
 - ORCID (<https://orcid.org>) of the expert
 - ROR (<https://ror.org/about/>) of the Institution of the expert
- DOI of the *data* it refers to
- DOI or equivalent persistent identifier of the *external data*
- *IPBES Product* related metadata (For example, assessment-related data, chapter related data, figure, map, and table metadata and additional keywords as specified by the *technical support units* in coordination with the knowledge and data *technical support unit*.)

Additional metadata which is deemed necessary by the data and knowledge *technical support unit* / task force, the assessment *technical support unit*, or the *expert* can be added.

Metadata should be as descriptive as possible and in compliance with the FAIR principles (<https://www.go-fair.org/fair-principles/>).

- Title
- DOI
- Description/Abstract
- Keywords
- Data Authors/Data Source
- Metadata author
- Creation date, version
- Geographical coverage
- Temporal coverage
- Taxonomic coverage
- Quality Assurance/Quality Control (QA/QC) procedures
- Data files/format
- Metadata author
- Contact person
- IPBES product information

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APPENDIX V: Management, Handling, and Delivery of Materials from IPLC

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Within the framework of IPBES, principles of Free Prior Informed Consent (FPIC) applies to research or knowledge-related interactions and activities involving indigenous peoples and local communities (IPLC). Given that the dialogue process includes discussion of indigenous knowledge of biodiversity and ecosystems, there may be information which the knowledge holders or their organizations or respective communities consider sensitive, private, or holding value for themselves which they do not want to share publicly through publications or via any other media formats without formal consent.

To ensure that information and materials is shared in an appropriate way during an activity, and that information and materials produced after, are used in ways that respects FPIC, the following applies:

1. Guardianship – participants who represent organizations and communities
 - Participants who represent organizations or communities should act as the guardians of the use of the knowledge and materials from their respective organizations or communities that is shared during or after an activity. Any use of their organizations' or communities' knowledge should be discussed and approved by the guardians, as legitimate representatives of their organizations or communities.
 - Guardians are expected to contact their respective organizations and communities when they need advice. Guardians are also expected to seek consent from their organizations or communities when they consider that this is required.
2. During an activity
 - The FPIC rights of the indigenous people in an activity should be discussed at the beginning of an activity, e.g. a workshop or call for contributions, until participants feel comfortable and well informed about their rights and the process, including the eventual planned use and distribution of information. This discussion may be revisited during the activity, and should be revisited at the end of the activity once participants have engaged in the dialogue process.
 - Participants do not have to answer any questions that they do not want to answer, and do not need to participate in any part of the activity in which they do not wish to participate;
 - At any point, any participant can decide that they do not want particular information to be documented or shared outside of the activity. Participants should inform organizers and other participants of this. Organizers and participants should ensure that the information is not recorded.
 - Permission for photographs must be agreed prior to photos being taken and participants have the right not to be photographed. Organizers will take note of this.
3. After an activity
 - Participants maintain intellectual property rights over all information collected from them about themselves or their communities, including photographs.
 - Permission should be obtained before any photograph of a participant is used or distributed in any form.
 - Copies of all information collected should be provided to the participants for approval.
 - Any materials developed for IPBES products using the information provided by participants should be shared with the participants for prior approval and consent.
 - The information collected during an activity should not be used for any purposes other than those stated above unless permission is sought and given by participants.
 - Participants can decline to consent or withdraw their knowledge or information from the process at any time, and records of that information should be deleted if requested by the participant.