

# Report on the uptake of knowledge gaps identified in IPBES assessments by Biodiversa+ programmes and projects



# Document Information

<b>Deliverable title:</b>	Report on the uptake of knowledge gaps identified in IPBES assessments by Biodiversa+ programmes and projects
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<b>Citation:</b>	Danner, Marie-Claire, Report on the uptake of knowledge gaps identified in IPBES assessments by Biodiversa+ programmes and projects, Biodiversa+
<b>Deliverable number:</b>	D5.5
<b>Work package:</b>	5
<b>Lead partner:</b>	FRB
<b>Due date of deliverable:</b>	September 2023
<b>Submission date:</b>	September 2023
<b>Dissemination Level</b>	Confidential
<b>Reviewed by</b>	

Version	Date	Modified by	Modification reasons

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## What is Biodiversa+

Biodiversa+ is the new European co-funded biodiversity partnership supporting excellent research on biodiversity with an impact for policy and society. It was jointly developed by BiodivERsA and the European Commission (DG Research & Innovation and DG Environment) and was officially launched on 1 October 2021.

Biodiversa+ is part of the European Biodiversity Strategy for 2030 that aims to put Europe's biodiversity on a path to recovery by 2030.

The Partnership aims to connect science, policy, and practice for transformative change. It currently gathers more than 80 research programmers and funders and environmental policy actors from 40 European and associated countries to work on 5 main objectives:

1. Plan and support research and innovation on biodiversity through a shared strategy, annual joint calls for research projects and capacity-building activities
2. Set up a network of harmonised schemes to improve monitoring of biodiversity and ecosystem services across Europe
3. Contribute to high-end knowledge for deploying Nature-based Solutions and valuation of biodiversity in the private sector
4. Ensure efficient science-based support for policy-making and implementation in Europe
5. Strengthen the relevance and impact of pan-European research on biodiversity in a global context

More information at: <https://www.biodiversa.eu/>

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# Acronyms

<b>DOI</b>	Digital Object Identifier
<b>EU</b>	European Union
<b>IPBES</b>	Intergovernmental Science-policy Platform on Biodiversity and Ecosystem Services
<b>NB</b>	Number
<b>SRIA</b>	Strategic Research and Innovation Agenda
<b>UN</b>	United Nations

# Executive Summary

Multiple knowledge gaps have been identified in the existing assessments produced by the Intergovernmental Science-policy Platform on Biodiversity and Ecosystem Services (IPBES). This report aims to find (i) if they were considered when writing the Strategic Research and Innovation Agenda of the Partnership, (ii) if they were identified when writing a call for research and finally (iii) if they were identified by researchers when writing up of their research project or taken into consideration later in the life of the project. We found a limited amount of concrete uptake of knowledge gaps listed in IPBES reports in Biodiversa+ documents, but we also point out that we may be missing several ways in which IPBES products influence the Partnership's programmes and funding opportunities.

The report highlights that we should be conservative with these results because of the lack of guidelines on how to cite knowledge gaps listed in IPBES reports. Knowledge gaps are listed in tables in the IPBES summaries for policymakers but unless they are explicitly cited in a Biodiversa+ document as a knowledge gap from the assessment with the citation of the assessment, they may not be identified. Because there is no systematic way of referencing knowledge gaps, it is difficult to have a clear idea about their uptake.

The report therefore identifies actions that can help IPBES to monitor the uptake of gaps by external organizations and how they could contribute to filling the gaps identified in their reports, such as:

- Having a separate reference with a separate Digital Object Identifier (DOI) for the knowledge gap table for each assessment and encouraging to cite this reference
- Explicitly asking to cite the assessment report when people would like to refer to a knowledge gap, by making it clear in the title of the knowledge gaps' table and on the front page of the full report as well as the front page of the summary for policymaker
- Promoting the importance of properly citing the assessment report and the knowledge gaps directly on the IPBES website, social media, presentations, etc. and during the dialogues with programmers and funders
- Updating the list of knowledge gaps on the IPBES website

Programmers and funders should also explicitly cite IPBES assessments and the knowledge gaps when being used in the writing of calls and ask for the applicants to also explicitly cite the gaps and/or the assessment they refer to when submitting a proposal. Even if some calls are not centred around knowledge gaps but cite IPBES products, they may trigger researchers to get interested and cite more IPBES products in their proposals.

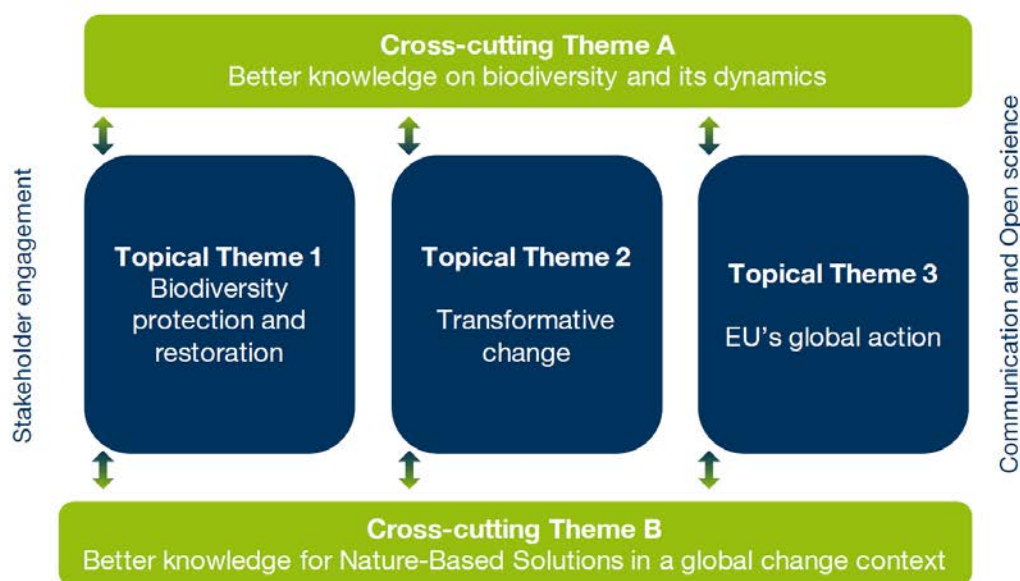
Finally, this report also points out that on top of IPBES products and knowledge gaps in developing Biodiversa+ programmes and funding opportunities, Biodiversa+ research projects and outputs can also feed IPBES assessments.



# 1. Introduction

The European Biodiversity Partnership, Biodiversa+, is planning to implement an ambitious program contributing by 2028 to the objective that “by 2030, nature in Europe is back on a path of recovery”, and “by 2050 people are living in harmony with Nature”. More particularly, the Partnership is putting Research & Innovation at the heart of the implementation of the European Union (EU) Biodiversity Strategy 2030 seeking to reverse biodiversity loss, by increasing the production of knowledge on biodiversity, reinforcing biodiversity monitoring across Europe, developing Nature-based Solutions, and providing science support to policy. Noticeably, Biodiversa+ supports research and innovation by launching annual thematic joint calls for research. Through its calls, Biodiversa+ supports excellent research that can demonstrate relevance for society and policy.

Biodiversa+ elaborates a Strategic Research and Innovation Agenda (SRIA) to present the long-term strategic vision of the European Biodiversity Partnership. Multi-annual Flagship Programmes, aligned with the SRIA, are launched (1-2 per year) tackling thematic issues through a wide array of activities, including joint calls, activities related to biodiversity monitoring across borders, activities to cover the research and innovation interface or the transfer of research results to reinforce the impact of the funded projects.



**Figure 1:** Overview of the topical and cross-cutting themes that structure the SRIA for Biodiversa+

The SRIA identifies three Topical Themes and associated knowledge needs, and two Cross-cutting Themes dealing with general issues that are relevant to all the Topical Themes (Figure 1). The themes are identified by Biodiversa+ members as they closely align with the core themes of the EU Biodiversity Strategy to 2030, are action oriented, ground breaking for science and considered as urgent for policy and management at the European and international levels. They do not necessarily get translated into specific Flagship Programs and/or calls for projects.

IPBES is an independent intergovernmental body established by States 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. The work of IPBES can be broadly grouped into four complementary areas:

- Assessments: On specific themes (e.g., “Sustainable use of wild species”); methodological issues (e.g., “Scenarios and Modelling”); and at both the regional and global levels (e.g., “Global Assessment of Biodiversity and Ecosystem Services”)
- Policy Support: Identifying policy-relevant tools and methodologies, facilitating their use, and catalyzing their further development
- Building Capacity & Knowledge: Identifying and meeting the priority capacity as well as knowledge and data needs
- Communications & Outreach: Ensuring the widest reach and impact of IPBES work

The function on knowledge consists in strengthening the knowledge foundations and promoting the generation of new knowledge on biodiversity and ecosystem services. To do so, the task force on knowledge (hosted by Biodiversa+) is mandated to catalyse the generation of new knowledge by making the knowledge gaps identified through IPBES assessments known and promoting their uptake by relevant organizations that programme and fund biodiversity research. Knowledge gaps are defined by IPBES<sup>1</sup> as pieces of knowledge, information or data that are absent or insufficient to fulfil the mandate of an assessment. The term “knowledge gaps” includes the following elements, all of which will be flagged in the gaps’ identification process:

- Knowledge gaps referring to research gaps (e.g., conceptual gaps, relationship knowledge gaps, methodology gaps);
- Data gaps (e.g., spatial, temporal, taxonomic, functional, habitat, social sciences, economics);
- Indigenous and local knowledge mobilization gaps, where indigenous and local knowledge can be assumed to exist but is not available to assessment authors.

They are identified by experts writing the assessments when doing a literature review on the assessment’s topic. The task force on knowledge the experts by promoting the consistent and systematic identification of knowledge gaps across all chapters of each assessment and across assessments. The experts can present the knowledge gaps in an IPBES assessment in different ways: a section at the end of each chapter, as key messages in the chapter executive summaries and as a table in the summary for policymakers.

Multiple knowledge gaps have been identified in the existing IPBES assessments and this report aims at finding (i) if they were considered when writing the SRIA of the Partnership, (ii) if they were identified when writing a call for research and finally (iii) if they were identified by researchers when writing up of their research project or taken into consideration later in the life of the project.

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<sup>1</sup> IPBES (2023) Guidelines to support assessment experts in the knowledge gaps’ identification process. Accessed on September 18<sup>th</sup> 2023 at [ipbes.net](https://www.biodiversa.eu)



## 2. Methods and Results

We searched for elements related to IPBES knowledge gaps in a selection of Biodiversa+ documents related to projects proposals and research programming, from 2017 to 2013. A total of 296 documents were selected and searched (Table 1).

**Table 1:** Biodiversa+ documents that were searched for references to the uptake of IPBES knowledge gaps. Note that within the propositions received when applying to a call for research, only the funded propositions were analysed.

Theme	Name/Theme	Document	Nb
Call	BiodivScen (2017-2018)	Call_BiodivScen	1
		Brochure_BiodivScen	1
		Propositions_BiodivScen_Nameoftheproject	21
		Propositions_BiodivScen_Nameoftheproject_appendix (21 elements)	21
		Midtermreport_BiodivScen_Nameoftheproject	21
		Finalreport_BiodivScen_Nameoftheproject	21
		Dialogue_KG_BiodivScen_ppt	1
Call	BiodivHealth (2018-2019)	Call_BiodivHealth	1
		Brochure_BiodivHealth	1
		Propositions_BiodivHealth_Nameoftheproject	10
		Propositions_BiodivHealth_Nameoftheproject_appendix	10
		Midtermreport_BiodivHealth_Nameoftheproject	10
Call	BiodivClim (2019-2020)	Call_BiodivClim	1
		Brochure_BiodivClim	1
		Propositions_BiodivClim_Nameoftheproject	20
		Midtermreport_BiodivClim_Nameoftheproject	20
Call	BiodivRestore (2020-2021)	Call_BiodivRestore	1
		Brochure_BiodivRestore	1
		Propositions_BiodivRestore_Nameoftheproject	22
		Propositions_BiodivRestore_Nameoftheproject_appendix	30
Call	BiodivProtect (2021-2022)	Call_BiodivProtect	1
		Brochure_BiodivProtect	1
		Propositions_BiodivProtect_Nameoftheproject	36
		Propositions_BiodivProtect_Nameoftheproject_appendix	36
Call	BiodivMon (2022-2023)	D2.1 Biodiversity monitoring knowledge gaps and research & innovation priorities (March 2022)	1
		D2.4 Report of the use of biodiversity monitoring data in private decision making (March 2023)	1
		D2.8 Biodiversa+ strategic biodiversity monitoring governance document (Phase 1) (May 2023)	1
		D2.5 Shared goals and priorities for biodiversity monitoring within Biodiversa+ (June 2023)	1
Call	NBS (2023-2024)	D4.2 Scoping review: what is the state of knowledge on the role of biodiversity in the design, delivery, and benefits of Nature-Based Solutions? (May 2023)	1
Call	Societal Transformation (2024)	D4.1 Biodiversa+ Dialogue on Transformative Change for biodiversity (September 2022)	1
Programming	Programming	Strategic Research & Innovation Agenda (2021)	1

We searched for 23 keywords related to IPBES knowledge gaps in these documents using the open-source software R (R studio, version 4.3.1) and the R package “pdftools”<sup>2</sup> and got a total of 4870 hits (Table 2). The code used allowed us to extract all the keywords as well as the sentence before and after the keywords so we could read the context in which the keyword was used.

**Table 2 :** Keywords related to the uptake of IPBES knowledge gaps and number of times they were found (hit) in all the searched documents

Keyword	Hits
values	1042
gap	893
ipbes	628
transformative change	275
pollination	370
knowledge gap	272
lack of	244
invasive alien species	251
nexus	145
sustainable use	127
unknown	128
biodiversity and climate change	66
global assessment	96
knowledge need	56
scenarios and models	78
land degradation	55
regional assessment	39
research need	25
research gap	29
intergovernmental science-policy platform on biodiversity and ecosystem services	22
remains unclear	16
biodiversity and pandemics	4
business and biodiversity	9
<b>TOTAL</b>	<b>4870</b>

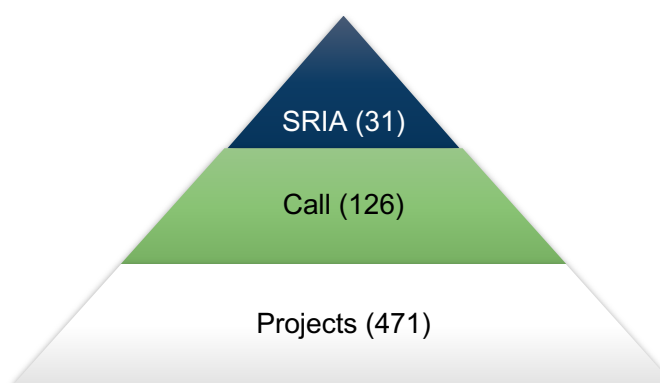
After a first careful screening of around 1500 hits and seeing that there was a limited number of them that were actually related to the uptake of knowledge gaps identified by IPBES, we did two other searches within the 4870 hits, searching for “ipbes” and “gap”.

The search for “ipbes” gave 628 hits, most of them in the documents related to the call “BiodivScen” (Table 3). Most of the hits were found at the level of the project (proposition, mid-term report or final report), and less at the level of the call (call text, brochure, Biodiversa+ deliverable, presentation) or the strategic document (SRIA) (Figure 1).

<sup>2</sup> Ooms J, 2023, pdftools: Text Extraction, Rendering and Converting of PDF Documents. R package version 3.3.3, <https://CRAN.R-project.org/package=pdftools>

**Table 3 and Figure 2:** On the left, the number of hits for the keyword “ipbes” per theme. The details of the documents in which the keyword was found are in Annex, Table A1. On the right is, a representation of the number of hits depending on the level of the doc (1=SRIA, 2=Call, 3=Project).

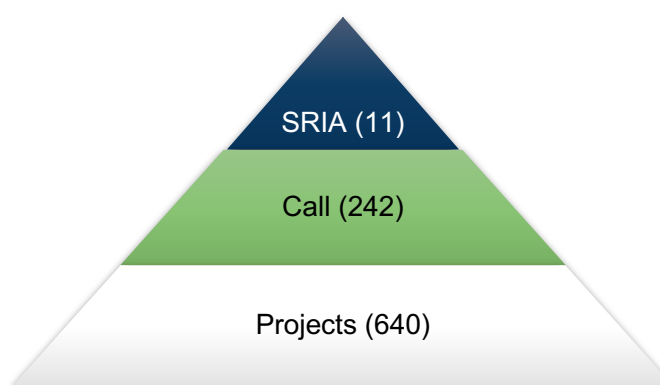
Theme	Nb
BiodivScen	263
BiodivProtect	109
BiodivClim	80
BiodivHealth	45
BiodivRestore	38
SRIA	31
Societal transformation	30
NBS	25
BiodivMon	7
<b>TOTAL</b>	<b>628</b>



The search for “gap” gave 893 hits, most of them also in the documents related to the call “BiodivScen” (Table 4). As with the keyword “ipbes”, most of the hits were found at the level of the project (proposition, mid-term report or final report), and less at the level of the call (call text, brochure, Biodiversa+ deliverable, presentation) or the strategic document (SRIA) (Figure 2).

**Table 4 and Figure 3:** On the left, the number of hits for the keyword “gap” per theme. The details of the documents in which the keyword was found is in Annex, Table A2. On the right is, a representation of the number of hits depending on the level of the document (1=SRIA, 2=Call, 3=Project).

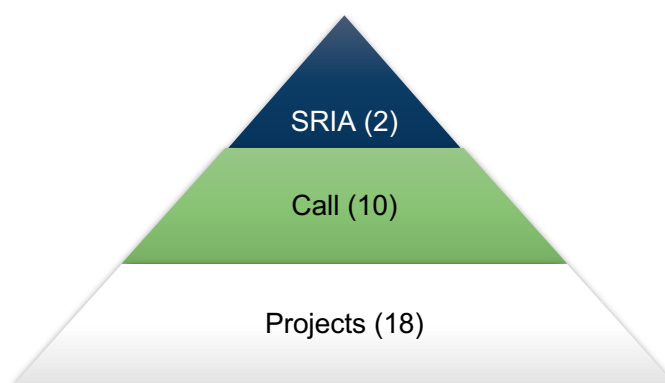
Theme	Nb
BiodivScen	289
BiodivProtect	207
BiodivMon	126
BiodivRestore	98
BiodivClim	77
BiodivHealth	37
NBS	26
Societal transformation	22
SRIA	11
<b>TOTAL</b>	<b>893</b>



All hits for the keywords “ipbes” and “gap” were carefully read to make sure that the documents were referring to the uptake of IPBES knowledge gaps. A first thorough read reduced the number of hits to 66 and a second reading directly in the documents in which these hits were found reduced the list to 30 hits in total. Most of them were again in the documents related to the call “BiodivScen” (Table 5). Most of the hits were also found at the level of the project (proposition, mid-term report or final report), and less at the level of the call (call text, brochure, Biodiversa+ deliverable, presentation) or the strategic document (SRIA) (Figure 3).

**Table 5:** Number of hits per theme for the keywords “ipbes” and “gap” after screening the context in the documents and making sure that they were related to the uptake of IPBES knowledge gaps. They are ordered from the theme with the highest number to the lowest. There were 30 hits in total. The sentence or paragraph in which the keyword was found for each hit are in Annex, Table A3.

Theme_name	Theme_nb	Document_name	Document_nb
BiodivScen	11	Brochure_BiodivScen.pdf	2
		Dialogue_KG_BiodivScen_ppt.pdf	1
		Finalreport_BiodivScen_FutureWeb.pdf	1
		Finalreport_BiodivScen_OBServ.pdf	1
		Propositions_BiodivScen_AlienScenarios_appendix.pdf	1
		Propositions_BiodivScen_Envision_appendix.pdf	1
		Propositions_BiodivScen_FutureWeb_appendix.pdf	1
		Propositions_BiodivScen_Land2Sea_appendix.pdf	1
		Propositions_BiodivScen_Reef-futures_appendix.pdf	1
		Propositions_BiodivScen_Sombee_appendix.pdf	1
BiodivClim	7	Call_BiodivClim.pdf	1
		Midtermreport_BiodivClim_MICROSERVICES.pdf	2
		Propositions_BiodivClim_MICROSERVICES.pdf	1
		Propositions_BiodivClim_MICROSERVICES_appendix.pdf	2
		Propositions_BiodivClim_PlantCline_appendix.pdf	1
BiodivMon	3	Call_BiodivMon.pdf	1
		D2.1-Report-on-biodiversity_monitoring-knowledge-gaps-VF.pdf	2
Societal Transformation	3	D4.1-Report-transformative-change-dialogue.pdf	3
BiodivHealth	2	Propositions_BiodivHealth_BioRodDis_appendix.pdf	1
		Propositions_BiodivHealth_Voodoo_appendix.pdf	1
SRIA	2	Strategic Research & Innovation Agenda.pdf	2
BiodivProtect	1	Propositions_BiodivProtect_Become_appendix.pdf	1
BiodivRestore	1	Propositions_BiodivRestore_Transloc_appendix.pdf	1



**Figure 4:** Representation of the number of hits for the keywords “ipbes” and “gap” after screening the context in the documents and making sure that they were related to the uptake of IPBES knowledge gaps, depending on the level of the document (1=SRIA, 2=Call, 3=Project).

## 3. Discussion

### 3.1. Uptake of knowledge gaps identified by IPBES in Biodiversa+ programmes and funding

Our analyses show that on the 296 documents searched, only 23 documents directly refer to the uptake of knowledge gaps listed in IPBES reports (Table 5). However, we should be conservative with these results as the method used may have missed some references. Indeed, there are no guidelines on how to cite knowledge gaps listed in IPBES reports therefore some may have been cited in the documents analysed but would have escaped the search.

IPBES has been working in the recent years to promote a consistent and systematic identification of knowledge gaps in IPBES reports but not all reports have the same way of presenting them which make the task more difficult to cite them. In order to facilitate their uptake, knowledge gaps have been presented in the format of a table since the approval of the regional assessments, and they have been presented as such as an appendix of the summary of the policymakers for the Global Assessment<sup>3</sup> approved in 2019, the Sustainable Use of Wild Species<sup>4</sup> and Values<sup>5</sup> Assessments approved in 2022 and the Invasive Alien Species Assessment<sup>6</sup> approved in 2023. They can also be in a section at the end of a chapter or as key messages in the chapter executive summaries. And unless they are explicitly cited in a Biodiversa+ document as a knowledge gap from the assessment with the citation of the assessment, they may not be identified.

For example, the project's proposal of MICROSERVICES, funded as part of the call BiovClim, was easily identified as an example of the uptake of an IPBES knowledge gap because they explicitly cite “However, as highlighted by the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES) and the scientific community, the importance of microbial diversity is underrepresented in the ongoing debates about climate change, global biodiversity loss and conservation policy.” (See also Annex, Table A3). This directly refers to a data gap from IPBES Global Assessment: “Data on extinction risks and population trends, especially for insects, parasites and fungal and microbial”.

Some projects may also refer to knowledge gaps identified by IPBES reports but without clearly referring exactly to which IPBES report or which gap. For example, the project BECOME, funded as part of the call BiodivProtect, explicitly cites knowledge gaps identified in IPBES reports in its proposal though it is not clear from which report exactly: “Our research is articulated around

<sup>3</sup> IPBES (2019): Global assessment report on biodiversity and ecosystem services of the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services. E. S. Brondizio, J. Settele, S. Díaz, and H. T. Ngo (editors). IPBES secretariat, Bonn, Germany. 1148 pages. <https://doi.org/10.5281/zenodo.3831673>

<sup>4</sup> IPBES (2022). Summary for Policymakers of the Thematic Assessment Report on the Sustainable Use of Wild Species of the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services. Fromentin, J. M., Emery, M. R., Donaldson, J., Danner, M. C., Hallosserie, A., Kielling, D., Balachander, G., Barron, E. S., Chaudhary, R. P., Gasalla, M., Halmy, M., Hicks, C., Park, M. S., Parlee, B., Rice, J., Ticktin, T., and Tittensor, D. (eds.). IPBES secretariat, Bonn, Germany. DOI: <https://doi.org/10.5281/zenodo.6425599>

<sup>5</sup> IPBES (2022). Summary for Policymakers of the Methodological Assessment Report on the Diverse Values and Valuation of Nature of the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services. Pascual, U., Balvanera, P., Christie, M., Baptiste, B., González-Jiménez, D., Anderson, C. B., Athayde, S., Chaplin-Kramer, R., Jacobs, S., Kelemen, E., Kumar, R., Lazos, E., Martin, A., Mwampamba, T. H., Nakangu, B., O'Farrell, P., Raymond, C. M., Subramanian, S. M., Termansen, M., Van Noordwijk, M., and Vatn, A. (eds.). IPBES secretariat, Bonn, Germany. DOI: <https://doi.org/10.5281/zenodo.6522392>

<sup>6</sup> IPBES (2023). Summary for Policymakers of the Thematic Assessment Report on Invasive Alien Species and their Control of the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services. Roy, H. E., Pauchard, A., Stoett, P., Renard Truong, T., Bacher, S., Galil, B. S., Hulme, P. E., Ikeda, T., Sankaran, K. V., McGeoch, M. A., Meyerson, L. A., Nuñez, M. A., Ordóñez, A., Rahlo, S. J., Schwindt, E., Seebens, H., Sheppard, A. W., and Vandvik, V. (eds.). IPBES secretariat, Bonn, Germany. <https://doi.org/10.5281/zenodo.7430692>

knowledge gaps identified by the International Platform for Biodiversity and Ecosystem Services (IPBES).” In the case of the project TRANSLOC, funded as part of the call BiodivRestore, they cite a research need identified in the Global Assessment that is not explicitly listed in the assessment’s knowledge gap table: “Together with the outputs of WP 8, this will fully contribute to identifying leverage points for multi-actor governance interventions as recommended by IPBES Global Assessment.”

IPBES does a lot of work to promote the generation of new knowledge using the list of knowledge gaps identified in IPBES reports. Firstly, by encouraging the experts to present in similar ways the gaps they will have identified in their assessments and secondly, by engaging in a dialogue with external organizations that programme and fund new knowledge generation. However, there are no systematic ways of referencing knowledge gaps so it is difficult to have a clear idea about their uptake. IPBES is already working on better ways for uptake thanks to the technical support unit on knowledge but they could go one step further by (for example):

- Having a separate reference with a separate DOI for the knowledge gap table for each assessment and encouraging to cite this reference by explicitly asking to do it in the title of the table as well as on the front page of the full report and of the summary for policymaker
- Explicitly asking to cite the assessment report when people would like to refer to a knowledge gap, by making it clear in the title of the table as well as on the front page of the full report and of the summary for policymaker
- Promoting the importance of properly citing the assessment report and the knowledge gaps directly on the IPBES website, social media, presentations, etc. and during the dialogues with programmers and funders
- Continuing the work of the task force on knowledge and data to support the experts in the process of knowledge gap identification when writing an assessment and promote the uptake of identified knowledge needs by relevant external organizations and initiatives
- Updating the list of knowledge gaps at <https://www.ipbes.net/knowledge-gaps>

These actions can help IPBES monitor the uptake of gaps by external organizations and how this contributes to filling the gaps identified in their reports.

Programmers and funders should also explicitly cite IPBES assessments and the knowledge gaps when being used in the writing of calls for research and ask for the applicants to also explicitly cite the gaps and/or the assessment they refer to when submitting a proposal.

For example, the Partnership has used knowledge gaps to prepare the BiodivScen call for proposal that was launched in 2017-2018 with the Belmont Forum. The call’s description explicitly refers to the IPBES Methodological Assessment of Scenarios and Models of Biodiversity and Ecosystem Services<sup>7</sup>: “The assessment also finds that “several barriers have impeded widespread and productive use of scenarios and models of biodiversity and ecosystem services in policymaking and decision-making” and cites several knowledge gaps. As shown in the analysis, this resulted in most of the references to “ipbes”, and “gap” and checked references to IPBES knowledge gap, to

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<sup>7</sup> IPBES (2016): The methodological assessment report on scenarios and models of biodiversity and ecosystem services. S. Ferrier, K. N. Ninan, P. Leadley, R. Alkemade, L. A. Acosta, H. R. Akçakaya, L. Brotons, W. W. L. Cheung, V. Christensen, K. A. Harhash, J. Kabubo-Mariara, C. Lundquist, M. Obersteiner, H. M. Pereira, G. Peterson, R. Pichs-Madruga, N. Ravindranath, C. Rondinini and B. A. Wintle (eds.). Secretariat of the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services, Bonn, Germany. 348 pages. <https://doi.org/10.5281/zenodo.3235428>



be from documents related to the BiodivScen call for proposals. Because the call referenced knowledge gaps and research priorities from the IPBES report, most of the project proposals also made the effort to properly reference these knowledge gaps. They also referenced them in the mid-term reports and their final reports (Annex, Table A2). There were fewer references to “ipbes”, “gap” or “knowledge gap” in the propositions answering calls for proposals that made a less clear connection or that did not directly reference knowledge gaps listed in IPBES reports, and even less or none in mid-term and final reports (Annex, Tables A2 and A3).

BiodivScen is therefore a good case study on the uptake of knowledge gaps identified by IPBES and should be identified as such by IPBES when monitoring the impact of knowledge generation catalysis efforts to effectively fill identified gaps. Projects funded under the BiodivScen call were able to contribute to the generation of new knowledge based on gaps identified in the IPBES Methodological Assessment of Scenarios and Models of Biodiversity and Ecosystem Services in several ways:

- Knowledge underpinning the development of models and scenarios
  - New high-resolution models to compare and compromise the impact of sectoral and land use practices on biodiversity and ecosystems
  - New knowledge on multiple organism groups and their structural and functional diversity to develop inclusive, representative, and collective governance models for different ecosystems
  - The first quantitative models projecting species numbers for biological invasions at global and continental scales.
- Methods underpinning the development of models and scenarios
  - Active contributions from stakeholders via agent-based models and multi-stakeholder platforms to design and implement research activities collectively,
  - Assessment of biodiversity indicators, land use drivers and other anthropogenic drivers at global scale to produce models and decision support tools at micro scale,
  - New models that are making trade-offs both -within and between different scenarios- visible to enable exploratory scenarios.
- Data availability
  - New datasets created in ecosystems where lack of data has been a challenge previously such as tropical agroecosystems, vineyard agroecosystems, arctic ecosystems, and forest ecosystems among others
  - Several close collaborations with local communities for gathering the missing data
- Building capacities
  - Capacity building in biodiversity data collection and analysis in low income country settings with farmers and non-profits
  - Developing connections with indigenous monitoring communities in arctic regions for harmonising data
  - Setting up networks for collective design of models and transformative learning in different ecosystems.

- Communicating on scenarios and uncertainty
  - Participatory scenario development in low-income country rural settings by communicating uncertainty and different biodiversity scenarios
  - Efforts to deal with uncertainty in creative learning by combining the techniques of scenario visioning, back-casting milestones and monitoring biodiversity trends together to enable ecosystem managers to learn, adapt and anticipate scenarios

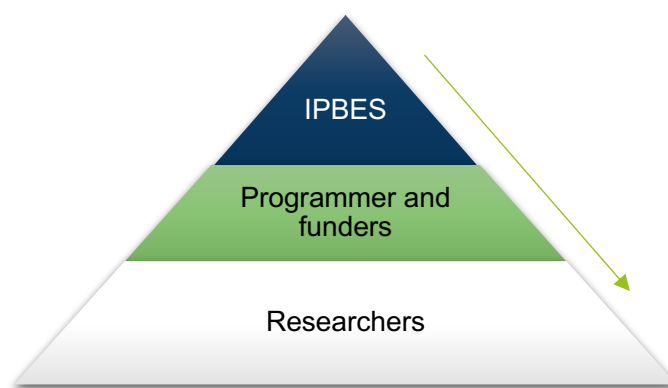
BiodivScen projects were also able to identify new emerging issues that can be used in IPBES future reports:

- Continue connecting climate and biodiversity model scenarios
  - Increasing impact of extreme weather events on local communities, particularly relevant for the Global South
  - Increased human activity in sensitive ecosystems like the Arctic may increase the number/magnitude of stressors in these areas, challenging the baselines' relevance
- Data management bottlenecks in general and specific areas
  - Sharing data across countries on sensitive areas
  - Expansion of reference databases (e.g., genomic)
  - Managing (legally, technically and financially) large data and meeting FAIR principles
  - Further advancing local, Indigenous knowledge, values and perspectives into biodiversity scenarios and models to close the data gaps
- New understandings in knowledge systems and multiple values
  - Limitation in the extent of knowledge about the properties of nature and of its components
  - Taking multiple values of nature into account in scenarios and models
  - Co-development of new indicators that can represent relational values of nature
- Increasing impact of socio-economic factors and political shifts
  - Adapting scenarios to recent global and regional crises and shift towards self-interest of nation states, and potentially less concern and decline in collective action towards global biodiversity objectives
  - Better integrating the difference between goals and on-the-ground realities in the global south in scenario studies
  - Enhanced global dialogue to establish equitable partnerships of researchers and practitioners
  - Investigate ways to mainstream biodiversity questions accounting for the adaptation capacity of societies to global changes and associated risks.

It is therefore important that the propositions made above to IPBES for better citations of the knowledge gaps listed in IPBES reports are also considered by the programmers and funders

when relevant. By directly referencing knowledge gaps identified by IPBES, the programmers and funders will clearly promote the uptake of knowledge gaps by the experts in their projects. Moreover, by explicitly citing IPBES knowledge gaps in its call, Biodiversa+ made more researchers aware of them and this could also have impacts on projects that were not funded but may be funded in the future or on future research projects.

An interesting representation of the uptake of knowledge gaps is therefore with a pyramid: gaps identified by IPBES are passed on to programmers and funders so they end up reaching researchers, the direct producers of new knowledge (Figure 4). Similarly, we found that because Biodiversa+ SRIA directly referenced IPBES knowledge gaps (“The IPBES Global Assessment revealed that action at the level of direct drivers of nature decline, although necessary, is not sufficient to prevent further biodiversity degradation.” and “Recent flagship reports, such as the IPBES Global Assessment (2019) and the UN’s Global Biodiversity Outlook 5 report outline the need for transformative change to halt nature’s accelerating decline. There is, however, insufficient knowledge on the potential and challenges arising from transitions focused on biodiversity.”), this percolated in some of the Partnership’s joint call for research and on the proposed research projects themselves (Figure 3).



**Figure 5:** Representation of how knowledge gaps identified in IPBES assessment percolates to researchers and the generation of new knowledge.

The importance and usefulness of using knowledge gaps identified by IPBES is clear in Biodiversa+ strategy as also shown with the upcoming call on societal transformation. Indeed, during the dialogue event on “transformative change & biodiversity”<sup>8</sup> organised by Biodiversa+ in June 2022, 31 participants, including researchers, policy-makers and stakeholders, identified that (Annex, Table A3):

- “A comprehensive synthesis of existing knowledge on transformative change would be necessary before launching any call for proposals for either Biodiversa+ or future Horizon Europe work programmes 2025-27, such as the IPBES assessment on transformative change currently undertaken.”
- “Biodiversa+ programmes could uptake research gaps identified by IPBES.”
- “[Biodiversa+ can] interact with knowledge gaps/research needs from the IPBES Transformative Change Assessment which is ongoing”

<sup>8</sup> D4.1 Usable report on the first consultation and / or dialogue conducted, summarising identified needs and possible follow-up activities by Biodiversa+

The call for proposal will be launched in 2024 and, if time permits, could reference knowledge gaps identified in the transformative change assessment that is planned to be approved in December 2014 during IPBES 11<sup>th</sup> Plenary. If time does not allow the assessment to be approved before the call is launched, it is recommended to at least refer to gaps related to transformative change cited in the last four assessments (Global, Sustainable Use of Wild Species, Values and Invasive Alien Species). This will promote the uptake of IPBES knowledge gaps and the generation of new knowledge, identified as the most important and/or urgent by experts and governments.

### 3.2. Use of IPBES products in developing Biodiversa+ programmes and funding opportunities

An important point from this report is how much IPBES is cited in the 296 documents searched. The search generated 628 hits, most of them in documents related to the BiodivScen call for proposals (for the reasons mentioned above), but also in the other calls and the SRIA. Most of them were found in the project's proposals (Annex, Table 1), showing the growing importance of IPBES in biodiversity research. Even if some calls are not centered around knowledge gaps, they do cite IPBES products a lot and this certainly triggers researchers to get interested and cite more IPBES products in their proposals too.

It is therefore important to properly cite IPBES when referring to it. Citations should be referencing the report and not IPBES in general and IPBES should continue working on a better referencing of its products (the systematic use of a DOI, the use of a CC-BY license, import products on Zenodo, etc.). As for the knowledge gaps, IPBES should promote the importance of proper citations on their website, social media, presentations, etc. and during plenary.

### 3.3. Generation of new knowledge by Biodiversa+ projects for use in future IPBES products

Finally, this report also points out that on top of using IPBES products and knowledge gaps in developing Biodiversa+ programmes and funding opportunities, Biodiversa+ research projects and outputs can also feed IPBES assessments. Indeed, since the creation of IPBES, Biodiversa+ has collaborated with IPBES across its functions and has been among others, i) producing factsheets based on the results of Biodiversa+ projects to be used in IPBES assessment and ii) communicating about the review of IPBES products to Biodiversa+ partners and experts.

For example, Biodiversa+ provided the authors of the Europe and Central Asia assessment (finalised in 2018) with factsheets based on results from its funded projects and as a result, 9 projects fed the assessment, with at least 11 references. The factsheets were appreciated by the authors at the time. Factsheets were also developed based on the results from BiodivHealth projects to feed the Nexus assessment that is planned to be finalized in 2024 and shared with the authors in mid-2023.

IPBES recently launched a new assessment on invasive alien species, one of the five major direct drivers of biodiversity loss globally, and the Partnership had identified early on the need to characterise the impacts of biological invaders. The call BiodivInvasives was launched in 2013 which resulted in the selection of 9 projects and 25 scientific and peer-reviewed publications resulting from those projects that were used in the assessment, demonstrating their relevance and

quality for the comprehensive work undertaken by IPBES. We should also note that experts involved in those projects were also chosen to be authors in the assessment.

Biodiversa+ experts (i.e., experts who have been involved in projects funded by the Partnership) are made aware of IPBES calls for reviews and calls for experts for IPBES products *via* the Partnerships' communication channels. The Partnership also organizes webinars to explain IPBES calls for experts, presenting the assessment and the process on how to become an expert, which supports European experts in becoming authors of IPBES assessments and enhance the possible diffusion of Biodiversa+ results (i.e., authors may cite their work funded under the Partnership as they were chosen for their expertise on a specific topic).

Moreover, the importance of feeding IPBES assessment is recognized by Biodiversa+ in the research calls, as specified in the texts for the BiodivHealth and BiodivProtect calls: "In addition, Biodiversa+ will help selected projects to make use of relevant knowledge transfer platforms (e.g., IPBES, OPPLA, MAES, BISE, GBIF, etc.) ...". During the dialogue event on "transformative change & biodiversity" organised by Biodiversa+ in June 2022, it was also identified that: "Biodiversa+ programmes could uptake research gaps identified by IPBES (downstream), but also provide an input to IPBES assessments (upstream) by producing a knowledge synthesis for the IPBES Transformative Change Assessment due in 2024."

# Annexes

**Table A1.** Number of hits in each of the search documents for the keyword “ipbes”, from the theme with the highest number to the lowest. There were 628 hits in total.

Theme_name	Theme_nb	Document_name	Document_nb
BiodivScen	<b>263</b>	Brochure_BiodivScen.pdf	8
		Call_BiodivScen.pdf	3
		Dialogue_KG_BiodivScen_ppt.pdf	12
		Finalreport_BiodivScen_AlienScenarios.pdf	10
		Finalreport_BiodivScen_Arctic-Biodiver.pdf	1
		Finalreport_BiodivScen_BioDivSupport.pdf	1
		Finalreport_BiodivScen_ENVISION.pdf	7
		Finalreport_BiodivScen_FutureWeb.pdf	6
		Finalreport_BiodivScen_InvasiBES.pdf	11
		Finalreport_BiodivScen_Land2Sea.pdf	2
		Finalreport_BiodivScen_LimnoScenEs.pdf	2
		Finalreport_BiodivScen_OBServ.pdf	2
		Finalreport_BiodivScen_SOMBEE.pdf	8
		Midtermreport_BiodivScen_AlienScenarios.pdf	1
		Midtermreport_BiodivScen_ARCTIC-BIODIVER.pdf	2
		Midtermreport_BiodivScen_ENVISION.pdf	11
		Midtermreport_BiodivScen_InvasiBES.pdf	10
		Midtermreport_BiodivScen_Land2Sea.pdf	3
		Midtermreport_BiodivScen_LimnoScenES.pdf	1
		Midtermreport_BiodivScen_SOMBEE.pdf	2
		Propositions_BiodivScen_AlienScenarios.pdf	2
		Propositions_BiodivScen_AlienScenarios_appendix.pdf	12
		Propositions_BiodivScen_BiodivSupport_appendix.pdf	2
		Propositions_BiodivScen_Bioesshealth_appendix.pdf	2
		Propositions_BiodivScen_Bonds_appendix.pdf	2
		Propositions_BiodivScen_Envision.pdf	3
		Propositions_BiodivScen_Envision_appendix.pdf	15
		Propositions_BiodivScen_Fate.pdf	1
		Propositions_BiodivScen_Fate_appendix.pdf	27
		Propositions_BiodivScen_FutureWeb.pdf	8
		Propositions_BiodivScen_FutureWeb_appendix.pdf	25
		Propositions_BiodivScen_InvasiBES_appendix.pdf	5
		Propositions_BiodivScen_Land2Sea.pdf	1
		Propositions_BiodivScen_Land2Sea_appendix.pdf	16
		Propositions_BiodivScen_Limnoscenes_appendix.pdf	3
		Propositions_BiodivScen_OBServ.pdf	2
		Propositions_BiodivScen_OBServ_appendix.pdf	3
		Propositions_BiodivScen_Reef-futures_appendix.pdf	7
		Propositions_BiodivScen_Salbes.pdf	1
		Propositions_BiodivScen_Salbes_appendix.pdf	1



BiodivProtect	109	Propositions_BiodivScen_Sombee.pdf	3
		Propositions_BiodivScen_Sombee_appendix.pdf	19
		Brochure_BiodivProtect.pdf	6
		Call_Protect.pdf	10
		Propositions_BiodivProtect_Alpmema.pdf	3
		Propositions_BiodivProtect_Alpmema_appendix.pdf	1
		Propositions_BiodivProtect_Become.pdf	5
		Propositions_BiodivProtect_Become_appendix.pdf	3
		Propositions_BiodivProtect_BridgingValues.pdf	10
		Propositions_BiodivProtect_BridgingValues_appendix.pdf	15
		Propositions_BiodivProtect_ConservES.pdf	1
		Propositions_BiodivProtect_ConservES_appendix.pdf	1
		Propositions_BiodivProtect_DarCo_appendix.pdf	1
		Propositions_BiodivProtect_Detect2Protect_appendix.pdf	2
		Propositions_BiodivProtect_Divin-P_appendix.pdf	2
		Propositions_BiodivProtect_Funaction.pdf	1
		Propositions_BiodivProtect_FuncNet_appendix.pdf	1
		Propositions_BiodivProtect_GaP_appendix.pdf	4
		Propositions_BiodivProtect_GreeNet_appendix.pdf	4
		Propositions_BiodivProtect_Inspire.pdf	1
		Propositions_BiodivProtect_Inspire_appendix.pdf	1
		Propositions_BiodivProtect_Integrativ.pdf	1
		Propositions_BiodivProtect_Integrativ_appendix.pdf	2
		Propositions_BiodivProtect_MOVE.pdf	3
		Propositions_BiodivProtect_Pareus_appendix.pdf	5
		Propositions_BiodivProtect_Prioritlce_appendix.pdf	2
		Propositions_BiodivProtect_ProPartS.pdf	2
		Propositions_BiodivProtect_ProPartS_appendix.pdf	1
		Propositions_BiodivProtect_Pteri-Med_appendix.pdf	1
		Propositions_BiodivProtect_Reconnect.pdf	5
		Propositions_BiodivProtect_Reconnect_appendix.pdf	5
		Propositions_BiodivProtect_RecoSal_appendix.pdf	1
		Propositions_BiodivProtect_Spear.pdf	2
		Propositions_BiodivProtect_Spear_appendix.pdf	4
		Propositions_BiodivProtect_SponBiodiv_appendix.pdf	1
		Propositions_BiodivProtect_TransNature_appendix.pdf	2
BiodivClim	80	Brochure_BiodivClim.pdf	2
		Call_BiodivClim.pdf	11
		Midtermreport_BiodivClim_MICROSERVICES.pdf	6
		Midtermreport_BiodivClim_RangeX.pdf	9
		Propositions_BiodivClim_ASICS.pdf	3
		Propositions_BiodivClim_CLAMBIO_appendix.pdf	2
		Propositions_BiodivClim_EASMO_appendix.pdf	2
		Propositions_BiodivClim_EPPIC.pdf	2
		Propositions_BiodivClim_Feedbacks.pdf	5
		Propositions_BiodivClim_Feedbacks_appendix.pdf	5

		Propositions _BiodivClim_FutureArticLives_appendix.pdf	2
		Propositions _BiodivClim_Genclim_appendix.pdf	1
		Propositions _BiodivClim_MICROSERVICES.pdf	1
		Propositions _BiodivClim_MICROSERVICES_appendix.pdf	4
		Propositions _BiodivClim_NAPERDIV_appendix.pdf	2
		Propositions _BiodivClim_NordSalt.pdf	4
		Propositions _BiodivClim_NordSalt_appendix.pdf	5
		Propositions _BiodivClim_PlantCline_appendix.pdf	1
		Propositions _BiodivClim_PRINCESS.pdf	1
		Propositions _BiodivClim_PRINCESS_appendix.pdf	2
		Propositions _BiodivClim_RangeX.pdf	5
		Propositions _BiodivClim_RangeX_appendix.pdf	5
BiodivHealth	45	Brochure_BiodivHealth.pdf	1
		Call_BiodivHealth.pdf	2
		Midtermreport_BiodivHealth_DiMoC.pdf	4
		Propositions _BiodivHealth_BiodivAfreid_appendix.pdf	1
		Propositions _BiodivHealth_BioRodDis.pdf	2
		Propositions _BiodivHealth_BioRodDis_appendix.pdf	2
		Propositions _BiodivHealth_DiMoc_appendix.pdf	6
		Propositions _BiodivHealth_DrForest.pdf	1
		Propositions _BiodivHealth_metroDiver.pdf	3
		Propositions _BiodivHealth_metroDiver_appendix.pdf	3
		Propositions _BiodivHealth_Voodoo.pdf	8
		Propositions _BiodivHealth_Voodoo_appendix.pdf	12
BiodivRestore	38	Brochure_BiodivRestore.pdf	4
		Brochure_BiodivScen.pdf	1
		Call_BiodivRestore.pdf	4
		Propositions _BiodivRestore_BioConsent_appendix.pdf	2
		Propositions _BiodivRestore_BioTrade.pdf	1
		Propositions _BiodivRestore_BioTrade_appendix.pdf	6
		Propositions _BiodivRestore_Emrys-R_appendix1.pdf	1
		Propositions _BiodivRestore_FishME_appendix1.pdf	1
		Propositions _BiodivRestore_Freshh_appendix.pdf	1
		Propositions _BiodivRestore_FreshRestore.pdf	1
		Propositions _BiodivRestore_InterRest.pdf	1
		Propositions _BiodivRestore_MPA4Sustainability.pdf	1
		Propositions _BiodivRestore_Narrow.pdf	4
		Propositions _BiodivRestore_Narrow_appendix.pdf	1
		Propositions _BiodivRestore_Respond_appendix.pdf	4
		Propositions _BiodivRestore_Restoreseas_appendix.pdf	2
		Propositions _BiodivRestore_Transloc_appendix.pdf	3
SRIA	31	Strategic Research & Innovation Agenda.pdf	31
Societal Transformation	30	D4.1-Report-transformative-change-dialogue.pdf	30
NBS	25	D4.2-Desk-study-NBS.pdf	25
BiodivMon	7	Call_BiodivMon.pdf	6
		D2.8-Biodiversity-monitoring-strategic-Phase-I-report.pdf	1

**Table A2.** Number of hits in each of the search documents for the keyword “gap”, from the theme with the highest number to the lowest. There was a total of 893 hits.

Theme_name	Theme_nb	Document_name	Document_nb
BiodivScen	289	Brochure_BiodivScen.pdf	10
		Call_BiodivScen.pdf	2
		Dialogue_KG_BiodivScen_ppt.pdf	3
		Finalreport_BidodivScen_ACCES.pdf	3
		Finalreport_BidodivScen_AlienScenarios.pdf	4
		Finalreport_BidodivScen_Arctic-Biodiver.pdf	6
		Finalreport_BidodivScen_BioDivSupport.pdf	16
		Finalreport_BidodivScen_BIOESSHEALTH.pdf	3
		Finalreport_BidodivScen_BONDS.pdf	19
		Finalreport_BidodivScen_ENVISION.pdf	6
		Finalreport_BidodivScen_FARMS4Biodiversity.pdf	10
		Finalreport_BidodivScen_FATE.pdf	6
		Finalreport_BidodivScen_FutureBirdsScenarios.pdf	4
		Finalreport_BidodivScen_FutureWeb.pdf	3
		Finalreport_BidodivScen_GloBAM.pdf	4
		Finalreport_BidodivScen_InvasiBES.pdf	12
		Finalreport_BidodivScen_Land2Sea.pdf	8
		Finalreport_BidodivScen_LimnoScenEs.pdf	2
		Finalreport_BidodivScen_OBServ.pdf	6
		Finalreport_BidodivScen_REEF-FUTURES.pdf	3
		Finalreport_BidodivScen_SALBES.pdf	2
		Finalreport_BidodivScen_SECBIVIT.pdf	5
		Finalreport_BidodivScen_SOMBEE.pdf	8
		Finalreport_BidodivScen_WILDHEALTH.pdf	2
		Midtermreport_BiodivClim_ASICS.pdf	1
		Midtermreport_BiodivClim_MICROSERVICES.pdf	1
		Midtermreport_BiodivClim_NAPERDIV.pdf	1
		Midtermreport_BiodivClim_RangeX.pdf	1
		Midtermreport_BiodivClim_SustainCocoa.pdf	2
		Midtermreport_BiodivHealth_DiMoC.pdf	2
		Midtermreport_BiodivHealth_FunProd.pdf	2
		Midtermreport_BiodivHealth_METRODIVER.pdf	1
		Midtermreport_BiodivHealth_SuppressSOIL.pdf	1
		Midtermreport_BiodivScen_AlienScenarios.pdf	1
		Midtermreport_BiodivScen_ARCTIC-BIODIVER.pdf	3
		Midtermreport_BiodivScen_BIOESSHEALTH.pdf	1
		Midtermreport_BiodivScen_ENVISION.pdf	3
		Midtermreport_BiodivScen_FARMS4Biodiversity.pdf	1
		Midtermreport_BiodivScen_FATE.pdf	4
		Midtermreport_BiodivScen_FutureBirdScenarios.pdf	2
		Midtermreport_BiodivScen_FutureWeb.pdf	1
		Midtermreport_BiodivScen_InvasiBES.pdf	1

		Midtermreport_BiodivScen_Land2Sea.pdf	4
		Midtermreport_BiodivScen_LimnoScenES.pdf	1
		Midtermreport_BiodivScen_REEFFUTURES.pdf	5
		Propositions_BiodivScen_AlienScenarios_appendix.pdf	8
		Propositions_BiodivScen_ArticBiodiver_appendix.pdf	5
		Propositions_BiodivScen_BiodivSupport.pdf	1
		Propositions_BiodivScen_BiodivSupport_appendix.pdf	2
		Propositions_BiodivScen_Bioesshealth.pdf	1
		Propositions_BiodivScen_Bioesshealth_appendix.pdf	10
		Propositions_BiodivScen_Bonds_appendix.pdf	2
		Propositions_BiodivScen_Envision.pdf	3
		Propositions_BiodivScen_Envision_appendix.pdf	4
		Propositions_BiodivScen_Farms4Biodiversity.pdf	1
		Propositions_BiodivScen_Farms4Biodiversity_appendix.pdf	8
		Propositions_BiodivScen_Fate_appendix.pdf	5
		Propositions_BiodivScen_FutureBirdScenarios_appendix.pdf	2
		Propositions_BiodivScen_FutureWeb.pdf	1
		Propositions_BiodivScen_FutureWeb_appendix.pdf	1
		Propositions_BiodivScen_Globam_appendix.pdf	1
		Propositions_BiodivScen_InvasiBES_appendix.pdf	2
		Propositions_BiodivScen_Land2Sea.pdf	4
		Propositions_BiodivScen_Land2Sea_appendix.pdf	10
		Propositions_BiodivScen_Limnoscenes_appendix.pdf	1
		Propositions_BiodivScen_OBServ_appendix.pdf	4
		Propositions_BiodivScen_Reef-futures.pdf	4
		Propositions_BiodivScen_Reef-futures_appendix.pdf	11
		Propositions_BiodivScen_Salbes_appendix.pdf	8
		Propositions_BiodivScen_SecBivit.pdf	1
		Propositions_BiodivScen_SecBivit_appendix.pdf	3
BiodivProtect	<b>207</b>	Brochure_BiodivProtect.pdf	16
		Call_Protect.pdf	4
		Propositions_BiodivProtect_Alpmema.pdf	2
		Propositions_BiodivProtect_Alpmema_appendix.pdf	1
		Propositions_BiodivProtect_Become_appendix.pdf	3
		Propositions_BiodivProtect_BioJust_appendix.pdf	1
		Propositions_BiodivProtect_ClimateInvasives.pdf	1
		Propositions_BiodivProtect_ClimateInvasives_appendix.pdf	1
		Propositions_BiodivProtect_ConservES_appendix.pdf	1
		Propositions_BiodivProtect_DarCo.pdf	3
		Propositions_BiodivProtect_DarCo_appendix.pdf	6
		Propositions_BiodivProtect_Detect2Protect_appendix.pdf	1
		Propositions_BiodivProtect_Divin-P.pdf	1
		Propositions_BiodivProtect_Divin-P_appendix.pdf	1
		Propositions_BiodivProtect_Europam_appendix.pdf	1
		Propositions_BiodivProtect_Eurosyng.pdf	2
		Propositions_BiodivProtect_Eurosyng_appendix.pdf	2

		Propositions_BiodivProtect_eWhale.pdf	3
		Propositions_BiodivProtect_eWhale_appendix.pdf	1
		Propositions_BiodivProtect_Forescue_appendix.pdf	1
		Propositions_BiodivProtect_Funaction.pdf	1
		Propositions_BiodivProtect_Funaction_appendix.pdf	2
		Propositions_BiodivProtect_FuncNet_appendix.pdf	2
		Propositions_BiodivProtect_G4B.pdf	2
		Propositions_BiodivProtect_G4B_appendix.pdf	3
		Propositions_BiodivProtect_GaP.pdf	10
		Propositions_BiodivProtect_GaP_appendix.pdf	34
		Propositions_BiodivProtect_GreeNet.pdf	1
		Propositions_BiodivProtect_GreeNet_appendix.pdf	1
		Propositions_BiodivProtect_Inspire.pdf	3
		Propositions_BiodivProtect_Inspire_appendix.pdf	8
		Propositions_BiodivProtect_Integrativ.pdf	2
		Propositions_BiodivProtect_Integrativ_appendix.pdf	4
		Propositions_BiodivProtect_MicroEco.pdf	1
		Propositions_BiodivProtect_MicroEco_appendix.pdf	1
		Propositions_BiodivProtect_MOVE.pdf	2
		Propositions_BiodivProtect_MurFor.pdf	3
		Propositions_BiodivProtect_MurFor_appendix.pdf	9
		Propositions_BiodivProtect_Pareus_appendix.pdf	3
		Propositions_BiodivProtect_Prioritlce.pdf	1
		Propositions_BiodivProtect_Prioritlce_appendix.pdf	5
		Propositions_BiodivProtect_ProPartS_appendix.pdf	3
		Propositions_BiodivProtect_Pteri-Med.pdf	2
		Propositions_BiodivProtect_Reconnect_appendix.pdf	2
		Propositions_BiodivProtect_RecoSal_appendix.pdf	2
		Propositions_BiodivProtect_Riparianet.pdf	5
		Propositions_BiodivProtect_Riparianet_appendix.pdf	8
		Propositions_BiodivProtect_Spear.pdf	3
		Propositions_BiodivProtect_Spear_appendix.pdf	8
		Propositions_BiodivProtect_SponBiodiv.pdf	2
		Propositions_BiodivProtect_SponBiodiv_appendix.pdf	7
		Propositions_BiodivProtect_TransNature.pdf	3
		Propositions_BiodivProtect_TransNature_appendix.pdf	1
		Propositions_BiodivProtect_TransWild.pdf	1
		Propositions_BiodivProtect_TransWild_appendix.pdf	4
		Propositions_BiodivProtect_Wolfness_appendix.pdf	6
BiodivMon	126	Call_BiodivMon.pdf	12
		D2.1-Report-on-biodiversity_monitoring-knowledge-gaps-VF.pdf	96
		D2.4-Use-biodiversity-monitoring-data-private-decision-making.pdf	1
		D2.5-Shared goals and priorities for biodiversity monitoring within Biodiversa+.pdf	10
		D2.8-Biodiversity-monitoring-strategic-Phase-I-report.pdf	7
BiodivRestore	98	Brochure_BiodivRestore.pdf	8
		Call_BiodivRestore.pdf	5

		Propositions _BiodivRestore_BiNatUr.pdf	2
		Propositions _BiodivRestore_BiNatUr_appendix.pdf	1
		Propositions _BiodivRestore_BioConsent.pdf	8
		Propositions _BiodivRestore_BioConsent_appendix.pdf	2
		Propositions _BiodivRestore_BioTrade_appendix.pdf	1
		Propositions _BiodivRestore_COAST_appendix.pdf	2
		Propositions _BiodivRestore_COSAR_appendix1.pdf	1
		Propositions _BiodivRestore_DeepRest.pdf	1
		Propositions _BiodivRestore_DeepRest_appendix1.pdf	2
		Propositions _BiodivRestore_Emys-R.pdf	3
		Propositions _BiodivRestore_FishME.pdf	1
		Propositions _BiodivRestore_FishME_appendix1.pdf	5
		Propositions _BiodivRestore_ForestFisher.pdf	7
		Propositions _BiodivRestore_ForestFisher_appendix1.pdf	4
		Propositions _BiodivRestore_Freshh_appendix.pdf	1
		Propositions _BiodivRestore_FreshRestore.pdf	2
		Propositions _BiodivRestore_FreshRestore_appendix.pdf	9
		Propositions _BiodivRestore_InterRest.pdf	2
		Propositions _BiodivRestore_MPA4Sustainability_appendix.pdf	2
		Propositions _BiodivRestore_Narrow_appendix.pdf	1
		Propositions _BiodivRestore_Niches.pdf	1
		Propositions _BiodivRestore_Niches_appendix1.pdf	3
		Propositions _BiodivRestore_Respond.pdf	2
		Propositions _BiodivRestore_Respond_appendix.pdf	10
		Propositions _BiodivRestore_Restoreseas.pdf	2
		Propositions _BiodivRestore_Restoreseas_appendix.pdf	2
		Propositions _BiodivRestore_ReVersal.pdf	1
		Propositions _BiodivRestore_ReVersal_appendix.pdf	1
		Propositions _BiodivRestore_Transloc.pdf	3
		Propositions _BiodivRestore_Transloc_appendix.pdf	3
BiodivClim	77	Brochure_BiodivClim.pdf	2
		Call_BiodivClim.pdf	5
		Propositions _BiodivClim_ASICS.pdf	1
		Propositions _BiodivClim_Baltvib_appendix.pdf	3
		Propositions _BiodivClim_Biofair_appendix.pdf	1
		Propositions _BiodivClim_CLAMBIO.pdf	2
		Propositions _BiodivClim_CLAMBIO_appendix.pdf	15
		Propositions _BiodivClim_EASMO.pdf	2
		Propositions _BiodivClim_EASMO_appendix.pdf	4
		Propositions _BiodivClim_EPPIC_appendix.pdf	1
		Propositions _BiodivClim_Feedbacks_appendix.pdf	6
		Propositions _BiodivClim_FUNPOTENTIAL_appendix.pdf	1
		Propositions _BiodivClim_FutureArticLives_appendix.pdf	1
		Propositions _BiodivClim_Genclim.pdf	1
		Propositions _BiodivClim_Genclim_appendix.pdf	2
		Propositions _BiodivClim_MICROSERVICES.pdf	1



		Propositions _BiodivClim_MICROSERVICES_appendix.pdf	1
		Propositions _BiodivClim_MixForChange_appendix.pdf	2
		Propositions _BiodivClim_NAPERDIV_appendix.pdf	3
		Propositions _BiodivClim_NordSalt_appendix.pdf	3
		Propositions _BiodivClim_PlantCline_appendix.pdf	6
		Propositions _BiodivClim_PRINCESS_appendix.pdf	3
		Propositions _BiodivClim_RangeX_appendix.pdf	1
		Propositions _BiodivClim_RESTORE_appendix.pdf	1
		Propositions _BiodivClim_sustaincocoa.pdf	1
		Propositions _BiodivClim_sustaincocoa_appendix.pdf	8
BiodivHealth	<b>37</b>	Brochure_BiodivHealth.pdf	5
		Call_BiodivHealth.pdf	3
		Propositions _BiodivHealth_AntiVersa.pdf	1
		Propositions _BiodivHealth_BioRodDis_appendix.pdf	5
		Propositions _BiodivHealth_DiMoc_appendix.pdf	1
		Propositions _BiodivHealth_DrForest.pdf	5
		Propositions _BiodivHealth_FunProd_appendix.pdf	3
		Propositions _BiodivHealth_metroDiver.pdf	1
		Propositions _BiodivHealth_metroDiver_appendix.pdf	5
		Propositions _BiodivHealth_SupressSOIL.pdf	2
		Propositions _BiodivHealth_SupressSOIL_appendix.pdf	3
		Propositions _BiodivHealth_Voodoo.pdf	1
		Propositions _BiodivHealth_Voodoo_appendix.pdf	2
NBS	<b>26</b>	D4.2-Desk-study-NBS.pdf	26
Societal transformation	<b>22</b>	D4.1-Report-transformative-change-dialogue.pdf	22
SRIA	<b>11</b>	Strategic Research & Innovation Agenda.pdf	11

**Table A3.** Detailed sentence or paragraph for each of the 30 hits for the keywords “ipbes” and “gap” after screening the context in the documents and making sure that they were related to the uptake of IPBES knowledge gaps. In italic and blue are specifications about the references cited.

Theme	document	keyword	context
<b>BiodivClim</b>	Call_BiodivClim.pdf	ipbes	Actions to achieve the SDGs should, as far as possible, be designed and implemented in an integrated manner. This is particularly important in cases where interactions are very strong, such as for challenges related to climate change and biodiversity, as also stressed in the recent IPBES Global Assessment report [5]
<b>BiodivClim</b>	Midtermreport_BiodivClim_MICROSERVICES.pdf	ipbes	However, as the IPBES claims, the consequences of climate change on soil microbes and the ecosystem services that they deliver as well as the feedback of microbial communities to climate change, are far from being understood.
<b>BiodivClim</b>	Midtermreport_BiodivClim_MICROSERVICES.pdf	ipbes	Data on population trends and loss risks are largely missing for microbial diversity [Díaz et al. 2019, IPBES 2019], especially for those organisms directly associated with crops.
<b>BiodivClim</b>	Propositions_BiodivClim_MICROSERVICES.pdf	ipbes	However, as highlighted by the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES) and the scientific community, the importance of microbial diversity is underrepresented in the ongoing debates about climate change, global biodiversity loss and conservation policy.
<b>BiodivClim</b>	Propositions_BiodivClim_MICROSERVICES_appendix.pdf	research gap	MICROSERVICES will combine excellent research with a targeted communication strategy and actions to 1) fill research gaps on microbial diversity pointed out by the IPBES and, 2) introduce soil microbial diversity in ongoing policy debates in areas such as climate action (post Paris Agreement), sustainable and resilient agriculture (national Common Agricultural Policy strategic plans), achievement of sustainability goals (Aichi Biodiversity Targets and SDGs), and biodiversity protection (post-2020 Global Biodiversity Framework, EU Pollinator Initiative).
<b>BiodivClim</b>	Propositions_BiodivClim_MICROSERVICES_appendix.pdf	ipbes	However, as the IPBES claims, the consequences of climate change on soil microbes and the ecosystem services that they deliver as well as the feedbacks of microbial communities to climate change, are far from being understood. Data on population trends and loss risks are largely missing for microbial diversity [3,4], especially for those organisms directly associated with crops. <i>[4] = IPBES (2019) Global Assessment</i>
<b>BiodivClim</b>	Propositions_BiodivClim_PlantCline_appendix.pdf	ipbes	Crop wild relatives (CWR) are plant species that are closely related to crops. They are the repositories of genetic variation available for breeding improved crop varieties that are resistant to different stressors and can cope with climate change. The need to identify and harness CWR resources has been recognized by IPBES (Hunter & Heywood 2010).
<b>BiodivHealth</b>	Propositions_BiodivHealth_BioRodDis_appendix.pdf	ipbes	There is a need for information to support further policy decisions and actions, as advocated in recent assessment on biodiversity written by IPBES or Ostfeldt (2017).
<b>BiodivHealth</b>	Propositions_BiodivHealth_Voodoo_appendix.pdf	ipbes	In 2016, the Intergovernmental Science-Policy Platform on Biodiversity & Ecosystem Services (IPBES) stated in its global assessment of pollinators, pollination and food production [...] Importantly, the role of pathogens in wild pollinator losses (in addition to losses of managed <i>A. mellifera</i> ) was highlighted by IPBES as being potentially profound, but largely unexplored.
<b>BiodivMon</b>	Call_BiodivMon.pdf	ipbes	Literature reviews on biodiversity changes and recent assessments have revealed that information on biodiversity trends is biased towards some taxonomic groups and environments, and that important dimensions of biodiversity, e.g., genetic and functional diversity, remain to be properly studied (IPBES 2018, FAO 2020). <i>Ref=ECA Assessment</i>

Report on the uptake of knowledge gaps identified in IPBES assessments by Biodiversa+ programmes and projects

<b>BiodivMon</b>	D2.1-Report-on-biodiversity_monitoring-knowledge-gaps-VF.pdf	knowledge gap	The SRIA in section A.1. indicates as a major knowledge gap the need to characterise the threats of biodiversity in a global context including climate change, land use change, overexploitation, pollution, (re)emerging pathogens and biological invasions.
<b>BiodivMon</b>	D2.1-Report-on-biodiversity_monitoring-knowledge-gaps-VF.pdf	knowledge gap	For biodiversity monitoring based on the biodiversa+ sria and survey results sent to the experts ahead of the workshop, a pre- grouping of the knowledge gaps/ research and innovation priorities was made
<b>BiodivProte ct</b>	Propositions_BiodivProte ct_Become_appendix.pdf	ipbes	Our research is articulated around knowledge gaps identified by the International Platform for Biodiversity and Ecosystem Services (IPBES) [27]. <a href="#">[27] = R.K. Yin, Case Study Research and Applications: Design and Methods, SAGE Publications, 2017.</a>
<b>BiodivRestore</b>	Propositions_BiodivRestore_Transloc_appendix.pdf	ipbes	Together with the outputs of WP 8, this will fully contribute to identifying leverage points for multi actor governance interventions as recommended by IPBES. <a href="#">IPBES (2019) Global Assessment</a>
<b>BiodivScen</b>	Brochure_BiodivScen.pdf	ipbes	With regards to the content of the funded projects, they implement the recommendations made by the IPBESin its methodological assessment on scenarios and models of biodiversity and ecosystem services (notably by developing multiscale and multidriver scenarios, taking into account uncertainty in the developed scenarios, etc.).
<b>BiodivScen</b>	Brochure_BiodivScen.pdf	ipbes	In this respect, it is expected that the funded projects will develop scenarios that could fill in the knowledge gaps identified by IPBES and feed future IPBES assessments and that are appropriate to support decision making, thus contributing to policy-interfacing.
<b>BiodivScen</b>	Dialogue_KG_BiodivScen_ppt.pdf	ipbes	Some IPBES gaps that helped frame the BiodivScen action. <a href="#">Ref = IPBES methodological assessment on scenarios and models</a>
<b>BiodivScen</b>	Finalreport_BidodivScen_FutureWeb.pdf	ipbes	The IPBES scenarios and modelling expert group attended project meetings to discuss the integration of the FutureWebs project with the Nature Futures Framework being developed by IPBES. A presentation of the developed framework was made at a workshop of the IPBES scenarios task force as the approach developed in FutureWeb was one of the first implementations of the NFF in quantitative modelling. The approach was very much appreciated and taken up by the IPBES scenarios task force.
<b>BiodivScen</b>	Finalreport_BidodivScen_OBServ.pdf	ipbes	Over 75% percent of the world's food crops are dependent on pollinators to at least some degree (IPBES 2017). However, the precise degree of pollinator contribution to crop yield and the relative contributions of honey bees and wild insects are uncertain because there is a large variability in crop types, pollinator communities, agricultural practices and environmental contexts.
<b>BiodivScen</b>	Propositions_BiodivScen_AlienScenarios_appendix.pdf	gap	The unabated rise in alien species numbers and their impacts on nature and human livelihood have been a growing global concern, which resulted in new regulations and initiatives attempting to tackle the alien species challenge (e.g. the new EU regulation or the likely forthcoming IPBES thematic assessment of invasive alien species, IPBES 2016). Given the substantial impacts of biological invasions (e.g. Vilá et al. 2011, Bradshaw et al. 2016), this lack of long-term projections of biological invasions and their impacts is considered an important knowledge gap (IPBES, 2016). AlienScenarios will address these questions and will thus provide results of utmost importance for environmental planning and policy advice (e.g. IPBES, 2016; Essential Biodiversity Variables in GEOBON, Latombe et al. 2017). <a href="#">IPBES, 2016 = Methodological Assessment Scenarios and models</a>
<b>BiodivScen</b>	Propositions_BiodivScen_Envision_appendix.pdf	ipbes	While the importance of weaving multiple forms and systems of knowledge into decision-making on biodiversity and ecosystem services is acknowledged (e.g., in IPBES, Tengö et al., 2017) a critical knowledge gap concerns how to mobilise and synthesise knowledge across multiple systems in a way that is respectful of a diversity of visions for PA management.



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<b>BiodivScen</b>	Propositions_BiodivScen_FutureWeb_appendix.pdf	ipbes	Predicting the response of biodiversity to global change has thus become an active field of research, with strong expectations from international programs like IPBES (1). The methodological assessment report on scenarios and models of biodiversity and ecosystem services from IPBES (1) concluded that (1) scenarios and models can contribute significantly to policy support, even though several barriers have impeded their widespread use to date, and (2) many relevant methods and tools are available but they should be matched carefully with the needs of any given assessment or decision-support activity, and applied with care, taking into account uncertainties and unpredictability associated with model-based projections. Thus, the development of models able to predict a more comprehensive picture of the future of biodiversity ('biodiversity models') and to provide more reliable scenarios of biodiversity and ecosystem service is now a critical endeavor for the scientific community (2). <i>IPBES = Methodological Assessment Scenarios and models</i>
<b>BiodivScen</b>	Propositions_BiodivScen_Land2Sea_appendix.pdf	knowledge gap	The work conducted in this work package will be closely aligned with the interdisciplinary and inclusive approaches taken in IPBES (Diaz et al. 2015, Diaz et al 2018) and will seek to fill knowledge gaps on ecological basis of cultural services (Rodrigues et al 2017). <i>Rodrigues also cite the IPBES Conceptual Framework</i>
<b>BiodivScen</b>	Propositions_BiodivScen_Reef-futures_appendix.pdf	ipbes	However, they have not been fully integrated into current attempts to estimate ecosystem services that have instead focused mainly on provisioning or regulation. Recognized as major challenge, the integration of CES into large-scale assessments of biodiversity is largely overlooked and is now considered as a main objective for the IPBES (10). <i>REF = Diaz (2018) Assessing nature's contributions to people</i>
<b>BiodivScen</b>	Propositions_BiodivScen_Sombee_appendix.pdf	ipbes	To increase scenarios impacts on policies and trigger appropriate management responses, IPBES (2016) has strongly encouraged to develop capacities in quantifying the uncertainty linked to future projections of biodiversity. <i>IPBES, 2016 = Methodological Assessment Scenarios and models</i>
<b>Societal Transformation</b>	D4.1-Report-transformative-change-dialogue.pdf	transformative change	According to the participants, a comprehensive synthesis of existing knowledge on transformative change would be necessary before launching any call for proposals for either Biodiversa+ or future Horizon Europe work programmes 2025-27, such as the IPBES assessment on transformative change currently undertaken.
<b>Societal Transformation</b>	D4.1-Report-transformative-change-dialogue.pdf	ipbes	Biodiversa+ programmes could uptake research gaps identified by IPBES (downstream), but also provide an input to IPBES assessments (upstream) by producing a knowledge synthesis for the IPBES Transformative Change Assessment due in 2024, but also by participating in its organisation, as it has been done for the ongoing Nexus assessment.
<b>Societal Transformation</b>	D4.1-Report-transformative-change-dialogue.pdf	transformative change	Interact with knowledge gaps/ research needs from the IPBES Transformative Change Assessment which is ongoing, incorporate Biodiversa+ outcomes in IPBES context, assessments and workshop reports (e.g., on values, transformative change, nexus) as well as e.g., the World Ocean Assessments: uptake of research gaps, input in the assessment process, science-policy interfaces.
<b>SRIA</b>	Strategic Research & Innovation Agenda.pdf	ipbes	The IPBES Global Assessment revealed that action at the level of direct drivers of nature decline, although necessary, is not sufficient to prevent further biodiversity degradation.
<b>SRIA</b>	Strategic Research & Innovation Agenda.pdf	ipbes	Recent flagship reports, such as the IPBES Global Assessment (2019) and the UN's Global Biodiversity Outlook 5 report outline the need for transformative change to halt nature's accelerating decline. There is, however, insufficient knowledge on the potential and challenges arising from transitions focused on biodiversity.