

# Introducing the progress monitoring tools of the EU Biodiversity Strategy for 2030

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## ARTICLE INFO

### Keywords:

EU Biodiversity Strategy for 2030

Progress monitoring tools

Knowledge Centre for Biodiversity

Evidence-based policymaking

Science-policy interface

Biodiversity policies

## ABSTRACT

The European Union's Biodiversity Strategy for 2030 (EU BDS) represents a pivotal step forward in the commitment to protect and restore biodiversity, not only within Europe but also at a global scale. In order to reinforce its implementation, an innovative biodiversity knowledge governance has been established. It includes, among other measures, a progress monitoring system that fosters transparency and can inform corrective action to be taken when progress is being reviewed. In this context, we introduce the official, publicly available, online tools at the core of the EU BDS progress monitoring system: the actions tracker and the dashboard. The actions tracker is specifically designed to track progress on the implementation of the more than a hundred actions stemming from the EU BDS, while the dashboard monitors progress across 16 targets using indicators. However, while the actions tracker is a mature tool, the work on the dashboard is still in progress, as indicators are missing for several targets. New scientific input is needed to propel policy tracking and ensure transparent and data-driven monitoring of the EU BDS targets. With this paper, we invite the scientific community to seize this opportunity to actively participate in the policy monitoring process.

## 1. Policy background and objective

As a central element of the EU Green Deal (European Commission, 2019), the European Commission adopted a new Biodiversity Strategy for 2030 (EU BDS, European Commission, 2020a) in May 2020, which led to the adoption of a resolution later endorsed by the European Parliament (European Parliament, 2021) and conclusions from the Council of the European Union (Council of the European Union, 2020). The EU BDS outlines an ambitious plan to protect and restore biodiversity in Europe and beyond by 2030. It represents the EU's cornerstone strategic document, envisioning a future in which biodiversity is valued, protected, restored, and utilized sustainably for the benefit of people, the planet, the climate, and the EU economy. The EU BDS also aims to establish an enhanced biodiversity governance framework capable of steering the implementation of EU biodiversity commitments at both national and international levels, while also strengthening the

enforcement of existing EU legislation.

The EU BDS is structured around four pillars, providing the framework for over 100 actions to be implemented and 17 targets to be reached by 2030. In summary, the first pillar focuses on protecting nature in the EU by creating a coherent and integrated network of protected areas and ensuring their effective management. The second pillar aims to restore nature in the EU by restoring biodiversity, reducing pressures on ecosystems, and ensuring their sustainable management. The third pillar emphasizes an enabling environment for transformative change by establishing a new and reinforced biodiversity governance framework, adopting an integrated whole-of-society approach to implementation, and bolstering knowledge, research, financing, and investments. The fourth and final cornerstone of the EU BDS focuses on the global dimension, deploying EU external actions to elevate biodiversity ambitions worldwide, mitigating the impact of trade, and supporting biodiversity conservation outside Europe.

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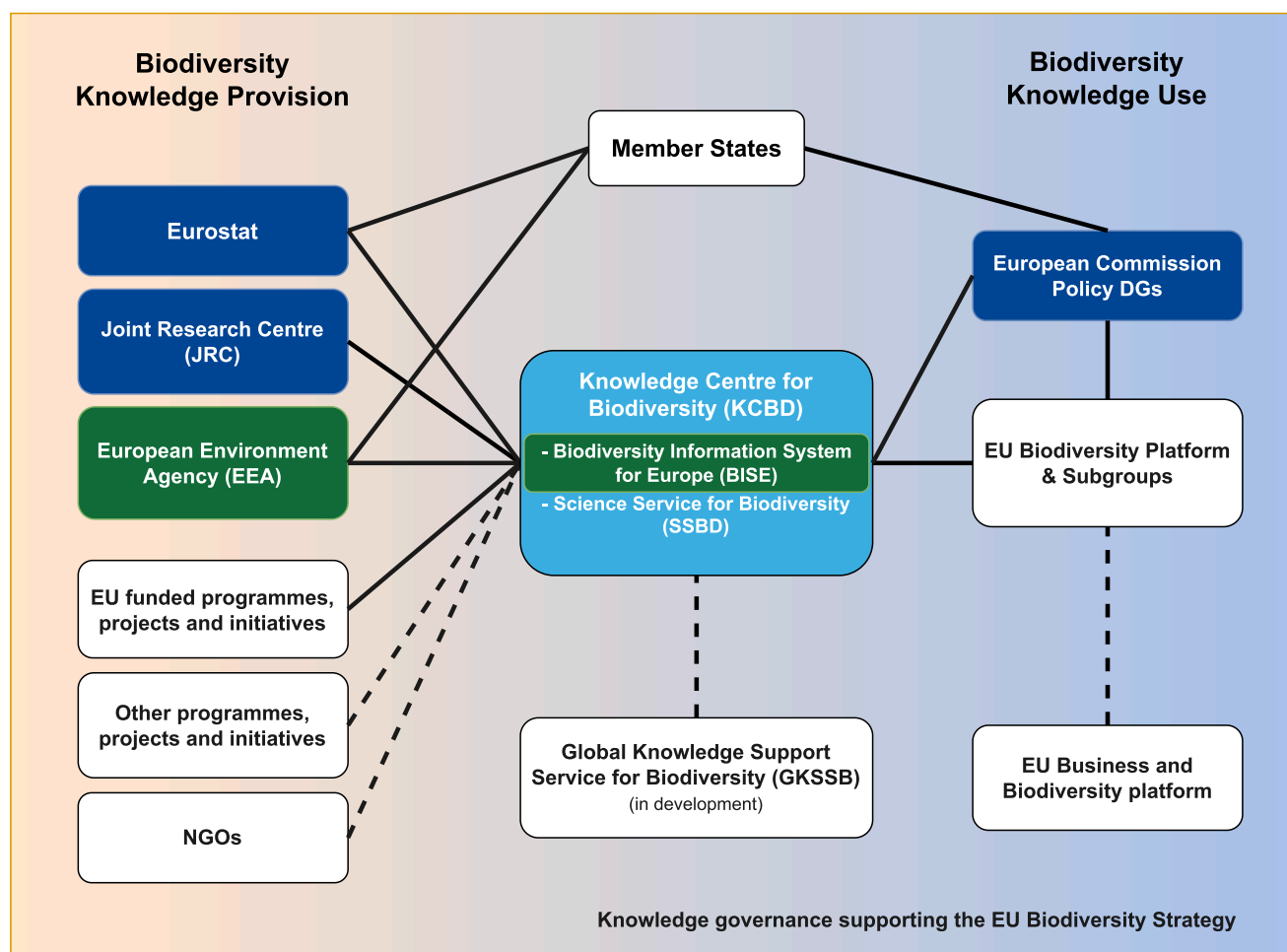
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<https://doi.org/10.1016/j.ecolind.2024.112147>

Received 26 March 2024; Received in revised form 13 May 2024; Accepted 15 May 2024

Available online 24 May 2024

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**Fig. 1.** Draft representation of the biodiversity knowledge governance under the EU Biodiversity Strategy for 2030. This draft figure was first discussed in the 3<sup>rd</sup> meeting of the EU Biodiversity Platform, subgroup on Monitoring and Assessment (document 2.4 available at <https://circabc.europa.eu/rest/download/86b49380-175b-42c1-ab1b-9751e67e3e36?ticket=>). The current representation corresponds to the version integrating feedback received following meetings of the EU Biodiversity Platform and its Monitoring and Assessment sub-group up to April 2024. An interactive online version of this figure, with some corrections and a multi-layered presentation, is still under preparation and will be published in [https://knowledge4policy.ec.europa.eu/biodiversity\\_en](https://knowledge4policy.ec.europa.eu/biodiversity_en). Note that BISE is hosted by the EEA, co-owned by the EEA and the European Commission, and that it is part of the wider Integrated Information System for Europe.

The EU BDS was designed to address the shortcomings of the previous strategy, which failed to achieve the headline target to halt and reverse biodiversity loss in the EU by 2020, and to contribute to averting global biodiversity loss (European Commission, 2020b). One of the key lessons learned from the evaluation of the previous EU Biodiversity Strategy to 2020 was the need to strengthen critical aspects of biodiversity governance, such as responsibility for implementation, monitoring, review, and evidence-based policy-making in support of well-designed measures for protection, restoration, sustainable use and the reduction of pressures on biodiversity (ECA, 2017; European Commission, 2022; Hermoso et al., 2022). To address these issues, an enhanced knowledge governance framework of the EU BDS for 2030 (Fig. 1) has been set up to:

- improve coordination of policy implementation among EU and national implementers, and stakeholders, including those working at the science-policy interface, facilitated by the new EU Biodiversity Platform<sup>1</sup> (the Commission expert group responsible for overseeing

the implementation of the EU BDS), and its sub-groups dealing with different biodiversity policy aspects;

- strengthen and clarify the science-policy interface, through the establishment of the Commission's Knowledge Centre for Biodiversity (KCBD) in close cooperation with the European Environment Agency (EEA);
- enhance the processes around progress-tracking, by developing transparent, public online tools under the coordination of the KCBD, to monitor implementation of the actions and the delivery of the targets, and to inform regular progress reporting and review;
- enhance scientific support to policy implementation through a new Science Service for Biodiversity that can support the KCBD to in engaging more effectively with the research and innovation networks funded by the EU.

The KCBD has developed tools that are already used by the European Commission to track progress in the implementation of the EU BDS. Although they are publicly available, what they are and how they work is not yet well-known by a wide audience, and in particular the scientific community. This reduces the potential benefit from these tools in informing a wider community of users about the EU BDS targets and actions, and may in turn hamper their understanding of biodiversity policy needs, and the use of all the relevant biodiversity knowledge for monitoring and implementing the EU BDS.

<sup>1</sup> For further information see <https://ec.europa.eu/transparency/expert-groups-register/screen/expert-groups/consult?lang=en&groupID=2210> and <https://circabc.europa.eu/faces/jsp/extension/wai/navigation/container.jsp>.

Therefore, the overall goal of this paper is to introduce the tools developed for tracking the implementation of the EU BDS as well as the underpinning related processes to the scientific community. Specifically, this paper highlights the current gaps of the EU BDS monitoring framework and how the scientific community could step in to help filling these gaps and therefore enhance the science-based tracking of EU BDS implementation. As the understanding of the processes behind the tools requires some knowledge about the main actors of EU biodiversity knowledge governance, this paper starts by introducing these actors (section 2) before presenting the two progress monitoring tools of the EU BDS (section 3) and concluding on achievements and perspectives regarding the monitoring of the EU BDS (section 4).

## 2. Main actors of EU biodiversity knowledge governance

### 2.1. The commission's knowledge centre for biodiversity (K CBD)

The European Commission established the K CBD<sup>2</sup> in October 2020 (European Commission, 2020c) with the mandate to support the implementation of the EU BDS and in particular the monitoring of progress towards its actions and targets. Additionally, the K CBD aims to foster cooperation and partnership between researchers and policy-makers, while supporting policy development with a strong scientific foundation. To this end, the K CBD identifies and filters relevant scientific information and makes it available in a concise, structured and tailored manner to support knowledge-for-policy needs. The K CBD is co-chaired by the European Commission's Joint Research Centre (JRC), which hosts its Secretariat, and the Directorate-General for the Environment. It operates under the guidance of a Steering Group, which currently includes eight services of the Commission (Research and Innovation, Eurostat, Agriculture and Rural Development, International Partnerships, Climate Action, Maritime Affairs and Fisheries, Health and Food Safety, and Financial Stability, Financial Services and Capital Markets Union) as well as the European Environment Agency (EEA).

Up to this point, the K CBD has developed two progress monitoring tools to oversee the implementation of the EU BDS: the actions tracker and the dashboard. These tools, especially the dashboard, draw upon a wide array of knowledge sources. Presently, the most important sources are the EEA<sup>3</sup>, including through its Biodiversity Information System for Europe (BISE)<sup>4</sup>, and the statistical office of the EU, Eurostat<sup>5</sup>. The K CBD also works closely with the Science Service for Biodiversity (SSBD), which is expected to play a substantial role as a major knowledge provider in the near future. The following sections provide more information about the two crucial knowledge sources that are BISE and SSBD.

### 2.2. The Biodiversity Information System for Europe (BISE)

The Biodiversity Information System for Europe (BISE) serves as an entry point for data and information on biodiversity in the EU. BISE consolidates an extensive repository of facts, figures, and data on biodiversity, ecosystem services, environmental insights, assessments, and research findings relevant to European and global biodiversity policies. This platform strengthens the knowledge base and provides vital support for decision-making on matters related to biodiversity. BISE is a collaborative effort jointly developed and managed by the EEA and the European Commission (specifically, its Directorate-General for the Environment). This collaborative partnership receives contributions

from the JRC and support from the European Topic Centre on Biodiversity and Ecosystems (ETC BE)<sup>6</sup>.

BISE is a valuable complement to the EU BDS dashboard in terms of providing information on progress towards the EU biodiversity objectives. One of BISE's prominent features is the availability of country-specific factsheets, which enable users to access detailed information about biodiversity features within individual countries. These factsheets facilitate cross-country comparisons and provide insights into the extent to which EU targets are being met at the level of Member States. Furthermore, BISE also encompasses information pertaining to other relevant legislation, such as the Nature Directives, the Invasive Alien Species Regulation, and the forthcoming Nature Restoration Law.

### 2.3. The Science Service for Biodiversity (SSBD)

The Science Service for Biodiversity (SSBD) will further support the work of the K CBD by strengthening the connection between science and policy. This enhanced, dynamic science-policy interface will have the task to engage in the design and implementation of biodiversity policies a broad scientific community that is involved in Horizon Europe (HE) – the EU's key funding programme for research and innovation – and beyond. As such, it should support the delivery on commitments related to biodiversity at the national, EU and international levels, by offering research-based assessments. The SSBD is presently under development by the BioAgora<sup>7</sup> HE research project.

### 2.4. The EU Biodiversity Platform (EUBP)

The EU Biodiversity Platform<sup>8</sup> (EUBP) (European Commission) is the European Commission's main Expert Group responsible for overseeing the coordinated implementation and governance of the EU BDS. Its mandate encompasses various aspects, including the coordination of implementation, progress monitoring, review and corrective measures, financing, multi-level governance, and the integration of biodiversity objectives into other policy areas. The EUBP consists of representatives from Member States' authorities dealing with nature and biodiversity policy, EU-level stakeholder organizations representing diverse interests such as environmental NGOs, landowners, sector associations, businesses, industries, and other relevant groups, the European Commission, and the EEA.

The EUBP has currently eight sub-groups that work on specific thematic areas:

- Birds and Habitats Directives (NADEG)
- Monitoring and Assessment (MA)
- Reporting under Nature Directives
- Pollinators
- Marine Issues under the Nature Directives (MEG)
- Invasive Alien Species (IAS)
- Forests and Nature
- Green Infrastructure and Restoration

The Monitoring and Assessment sub-group (EUBP-MA) primarily provides advice to the Commission and enables coordination between the Commission, the EEA, Member States' authorities, stakeholders and experts on knowledge-related topics to support the monitoring and implementation of the EU BDS. Among other tasks, it advises the Commission on the further development of the EU BDS progress

<sup>2</sup> [https://knowledge4policy.ec.europa.eu/biodiversity\\_en](https://knowledge4policy.ec.europa.eu/biodiversity_en).

<sup>3</sup> <https://www.eea.europa.eu/en>.

<sup>4</sup> <https://biodiversity.europa.eu/>.

<sup>5</sup> <https://ec.europa.eu/eurostat/web/main/home>.

<sup>6</sup> <https://www.eionet.europa.eu/etcs/etc-be#:~:text=The%20European%20Topic%20Centre%20Biodiversity,a%20Framework%20Partnership%20Agreement%20for>.

<sup>7</sup> <https://bioagora.eu/>.

<sup>8</sup> <https://ec.europa.eu/transparency/expert-groups-register/screen/expert-groups/consult?lang=en&groupID=2210>.

monitoring tools, which are now an integral part of the EU biodiversity knowledge governance. All documents and minutes of discussions within these groups are made publicly accessible on the CIRCABC<sup>9</sup> platform.

### 3. Progress monitoring tools of the EU Biodiversity Strategy

Two online progress monitoring tools have been developed by the KCBD, an actions tracker and a dashboard. These tools are used by the European Commission as a basis for regularly reporting on EU BDS progress to both the Council (specifically to the Environment Council) and the European Parliament. Importantly, these tools are publicly accessible via the KCBD website, thus providing a transparent overview of implementation efforts and progress made towards achieving the EU BDS objectives by 2030.

#### 3.1. Actions tracker

##### 3.1.1. Overview

The EU BDS actions tracker<sup>10</sup> is a tool designed to monitor the implementation of the more than a hundred actions outlined in the EU BDS. It consists of two parts. The first part presents a summary of the number of actions that have been completed, delayed, or are currently in progress, with the possibility to filter according to status or year of completion. A color-coded bar chart provides information about the status of actions, along with the number of actions in progress expected to be completed in the coming years, up to 2030. The second part itemizes the more than a 100 key actions to implement the EU BDS and highlights, for each action, its implementation status (completed, delayed, or in progress) and their (anticipated) completion dates (Fig. 2). Each listed action can be expanded to provide the following details: (i) the date of the last update, (ii) a summary of the aim of the action and how it has been or is intended to be implemented, (iii) links to deliverables or relevant resources, and (iv) information regarding the key institutions involved (acronyms are explained in Table S1 of the Supplementary Material), as well as the institution(s) leading the action (“chef de file”). Technically, the actions tracker is developed and maintained by the KCBD Secretariat, while the content for each action is regularly updated by the Commission services that are in charge of implementing the corresponding action.

##### 3.1.2. Operational aspects

The actions tracker is fully operational and is currently in use by Commission services to monitor progress related to the actions of the EU BDS. It is also consulted by stakeholders and Member States’ authorities dealing with different aspects of biodiversity policy. No significant technical developments are planned for the actions tracker at the moment, apart from enhancements in website accessibility and visualization. Content-wise, according to the latest update, about half of all actions have been completed, whereby several actions have faced delays (and others are ongoing until 2030). However, the content will continue to evolve over time as actions are implemented. It is anticipated that by the end of 2024, a further quarter of the actions will be completed, with the remaining actions expected to be implemented either by 2027 or by the target year of 2030. The Commission draws on the information provided in the actions tracker and the dashboard to report on implementation progress in different contexts.

<sup>9</sup> <https://circabc.europa.eu/ui/welcome>. This file sharing system is public and free for reading most of the groups’ files.

<sup>10</sup> <https://dopa.jrc.ec.europa.eu/kcbd/actions-tracker/>.

#### 3.2. Dashboard

##### 3.2.1. Overview

The EU BDS dashboard<sup>11</sup> is a monitoring tool designed to track the progress of 16 targets<sup>12</sup> outlined in the EU BDS using a set of indicators. The targets that encompass a very diverse scope are divided in sub-targets, each of them with their own indicator(s). In some instances, such as for the sub-target “legally protect a minimum of 30 % of the EU’s land area”, the dashboard already shows an indicator (i.e., terrestrial protected area coverage) which is considered sufficient to assess the progress. However, in other cases, like the target “reverse the decline of pollinators”, the dashboard currently shows a proxy indicator (i.e., the grassland butterfly index, covering only a few pollinators), which is a pertinent yet partial way to measure progress.

As targets are set at EU level, the indicators are derived from a variety of EU reporting schemes (e.g., protected areas coverage, based on data reported by Member States) or obtained from independent sources (e.g., the grassland butterfly index, based on citizen science and sourced from the European Butterfly Monitoring Scheme partnership established by Butterfly Conservation Europe<sup>13</sup>).

Up to now, many indicators included in the dashboard had not been specifically developed to monitor the EU BDS: they were identified from among pre-existing indicators used for the monitoring of other EU policies. The use of the same indicators across different EU policy monitoring schemes also aids in ensuring consistency and coherence in the assessment of EU progress. Technically, this consistency is achieved through direct access to data from the data provider via application programming interfaces (APIs, see below), which guarantees that the dashboard always shows the same information as the data provider (i.e., the most up-to-date validated information).

The dashboard is designed to assist policymakers, scientists, and various stakeholders in tracking EU progress to the EU BDS targets. It can serve as a foundation for identifying corrective actions when necessary. As for the actions tracker, technically, the dashboard is developed and maintained by the KCBD Secretariat (see Technical Appendix in Supplementary Material). However, contrary to the actions tracker, the content of the dashboard is also updated by the KCBD Secretariat, based on information provided so far by the EEA and Eurostat. It may include other data providers in the future.

##### 3.2.2. Operational aspects

The dashboard is a progress monitoring tool that is still in the process of being populated: it does not yet contain a complete set of indicators to inform all the targets. Currently, the dashboard contains 16 indicators that offer information on 8 out of 16 EU BDS targets (see Table 1). Each indicator displays values at EU level, and, when data are available, at Member State level. Depending on the nature of the target, different visualizations are employed. For (sub-)targets expressed as numerical goals to be reached by 2030 (e.g., “legally protect a minimum of 30 % of the EU’s land area”), progress is presented through a gauge chart, indicating both the value to be achieved by 2030 and the current value at the EU level (see Fig. 3). For (sub-)targets expressed as trends to be modified by 2030 (e.g., “reverse the decline of pollinators”), indicator values are depicted using a line plot illustrating the temporal trend. All visualization types uniformly convey the status or trend of the indicator.

Each indicator in the dashboard is described in a standardised

<sup>11</sup> <https://dopa.jrc.ec.europa.eu/kcbd/dashboard/>.

<sup>12</sup> The EU BDS lists 17 targets (referred as “key commitments”). One of them (“No chemical pesticides are used in sensitive areas such as EU urban green areas”) was meant to be implemented in the same Commission’s initiative (the proposal for a regulation on the sustainable use of plant protection products) that is already tracked by the actions tracker as action 17, and is therefore not tracked by the dashboard.

<sup>13</sup> <https://www.vlinderstichting.nl/butterfly-conservation-europe/>.



## COHERENT NETWORK OF PROTECTED AREAS

**Target 1 - Legally protect a minimum of 30% of the EU's land area and a minimum of 30% of the EU's sea area, and integrate ecological corridors, as part of a true Trans-European Nature Network.** 

**Target 2 - Strictly protect at least a third of the EU's protected areas, including all remaining EU primary and old-growth forests.** 

**Target 3 - Effectively manage all protected areas, defining clear conservation objectives and measures, and monitoring them appropriately.** 

+	1 - Commission guidance for identifying and designating additional protected areas, and appropriate management planning	COMPLETED	2021
+	2 - Complete the designation of Natura 2000 sites, including the necessary designations of marine sites	IN PROGRESS	2030
+	3 - Coordinate with Member States nature protection actions in the framework of the biogeographical regions and regional sea conventions	IN PROGRESS	2030

**Fig. 2.** Screenshot of the actions tracker showing a group of EU BDS targets-related actions, their status of implementation and the expected completion date. Further information is accessible through expandable text. The actions tracker can be accessed at <https://dopa.jrc.ec.europa.eu/kcbd/actions-tracker/>.

manner to ensure transparency and, as much as possible, replicability of the computation of the presented values. The description of each indicator comprises two main sections. The first provides an immediate summary below the indicator's name, offering essential information about the indicator's definition, unit of measurement, spatial coverage, update frequency, data producer, and data provider. The second section consists of further information that can be accessed by clicking on dedicated icons: indicator graphs (Fig. 3b), documentation (Fig. 3c), and datasets (Fig. 3d). The documentation section (Fig. 3c) includes a description of the methodology used to calculate the indicator, key references where it is described, and its main properties (for a detailed description of the fields, refer to Table S2 in the Supplementary Material). Importantly, it also provides information about other policies using the same indicator in their monitoring systems, which is a way to highlight the links between policies in terms of indicator use. The datasets section (Fig. 3d) supplies all the technical information about the data sources used for the indicator, including a link to the data provider's webpage for accessing the dataset.

Furthermore, the indicator values and a standardized API to access all the information (values, documentation, policies) shown in the dashboard for each indicator are accessible via dedicated icons (see Fig. 3e & f). The values shown in the dashboard are automatically collected via web services from the data provider, ensuring that the latest available updates are consistently presented. While the summary, documentation, and datasets sections are also based on input from the data provider, these parts are systematically reviewed by the KCBD Secretariat to ensure that all indicators used in the dashboard are described in a uniform manner. When relevant, an information button (see Fig. 3a) explains how to interpret the use of the indicator within the context of the EU BDS.

The highest priority for the future development of the dashboard is to identify and publish relevant indicators that can monitor progress for the 8 targets that lack indicators, with a special attention for (sub-)targets for which there is no identified candidate indicator (Table 1).

Indeed, while for some (sub-)targets (1.3, 1.4, 2.1, 2.2, 4.1 to 4.5, 5, 6.1, 6.2, 7, 8.2, 11, 12 and 13.2), indicators are already under consideration even if not published yet, for others, no indicators have been identified yet (3, 14, 15.2, 15.3 and 16). Filling the gaps in the dashboard is crucial to assess the headway made and to take corrective action when necessary. To reach that goal, the KCBD Secretariat will continue its diligent work of screening and analysing available indicators. These identified indicators will be presented to the groups responsible for implementing the EU BDS, ensuring an ongoing and comprehensive monitoring of the targets. The KCBD Secretariat welcomes proposals from the research community<sup>14</sup> for relevant and advanced indicators. Additionally, the SSBD, currently represented by BioAgora, has been invited to participate in the EUBP Expert Group and its subgroup on Monitoring and Assessment, to represent the broader scientific community. Adequate consultation mechanisms for individual researchers and for projects are still in the process of being developed; interested scientists can already join BioAgora's External Researchers and Stakeholders Network<sup>15</sup>. The SSBD will play a central role in assisting the KCBD in identifying necessary indicators and filling the existing gaps in the EU BDS progress monitoring system, although it may not become fully operational until the end of 2024.

As the EU and its Member States are Parties to the Convention on Biological Diversity<sup>16</sup> which adopted the Kunming-Montreal Global Biodiversity Framework<sup>17</sup> in December 2022, another crucial aspect for the future development of the dashboard will be the coherence in the use of indicators to track biodiversity targets at national, EU and global levels.

<sup>14</sup> You can contact the European Commission's Knowledge Centre for Biodiversity at [EC-Biodiversity-KC@ec.europa.eu](mailto:EC-Biodiversity-KC@ec.europa.eu).

<sup>15</sup> <https://bioagora.eu/stakeholders-network/>.

<sup>16</sup> <https://www.cbd.int/>.

<sup>17</sup> <https://www.cbd.int/doc/decisions/cop-15/cop-15-dec-04-en.pdf>.

**Table 1**

List of the EU BDS targets, sub-targets (if any), and the corresponding indicators in the dashboard and under consideration. Note that not all the targets have sub-targets. Indicators under consideration are those that have been identified but are not yet published in the dashboard and include placeholder indicators (in development but not mature yet), proposed indicators (those that have been already proposed to the EUBP Monitoring and Assessment sub-group but not yet selected), selected indicators (those that have been already proposed to the EUBP Monitoring and Assessment sub-group and consequently selected) and on hold indicators (those that have been already proposed to the EUBP Monitoring and Assessment sub-group but put on hold following the consultation process). For more details on the indicators already in the dashboard, see <https://dopa.jrc.ec.europa.eu/kcbd/dashboard/>; for more details on the selection process, see Box 1.

EU BDS targets	EU BDS sub-targets (if any)	Indicators in the dashboard	Indicators under consideration
1 – Legally protect a minimum of 30 % of the EU’s land area and a minimum of 30 % of the EU’s sea area, and integrate ecological corridors, as part of a true Trans-European Nature Network	1.1 – Legally protect a minimum of 30 % of the EU’s land area	Terrestrial protected area coverage Natura 2000 terrestrial protected area coverage Nationally designated terrestrial protected area coverage	
	1.2 – Legally protect a minimum of 30 % of the EU’s sea area	Marine protected area coverage Natura 2000 marine protected area coverage Nationally designated marine protected area coverage	
	1.3 – Build a truly coherent Trans-European Nature Network integrating ecological corridors, on land		<b>PROPOSED</b> – Natural area connectivity on land <b>PLACEHOLDER</b> – Representativeness of the protected areas network expressed as the mean target achievement (on land)
	1.4 – Build a truly coherent Trans-European Nature Network integrating ecological corridors, at sea		<b>PLACEHOLDER</b> – Representativeness of the protected areas network expressed as the mean target achievement (at sea)
2 – Strictly protect at least a third of the EU’s protected areas, including all remaining EU primary and old-growth forests	2.1 – Strictly protect at least a third of the EU’s protected areas		<b>PLACEHOLDER</b> – Indicator on strictly protected areas (several options under exploration)
	2.2 – Strictly protect all remaining EU primary and old-growth forests		<b>PLACEHOLDER</b> – Indicator on the percentage of remaining primary and old-growth forests under strict protection regime (under exploration)
3 – Effectively manage all protected areas, defining clear conservation objectives and measures, and monitoring them appropriately			
4 – Legally binding EU nature restoration targets to be proposed in 2021, subject to an impact assessment. By 2030, significant areas of degraded and carbon-rich ecosystems are restored. Habitats and species show no deterioration in conservation trends and status; and at least 30 % reach favourable conservation status or at least show a positive trend.	4.1 – Significant areas of degraded and carbon-rich ecosystems are restored		<b>PLACEHOLDER</b> (also valid for sub-targets 4.2 to 4.5) – Indicators from the Nature Restoration Law (to be further discussed once the negotiations are over)
	4.2 – Habitats show no deterioration in conservation trends and status		
	4.3 – Species show no deterioration in conservation trends and status	Common bird index by type of species	<b>PLACEHOLDER</b> – Red List Index at EU and/or Pan-European level
	4.4 – At least 30 % of habitats currently not in favourable conservation status reach favourable conservation status or at least show a positive trend		
	4.5 – At least 30 % of species currently not in favourable conservation status reach favourable conservation status or at least show a positive trend		
5 – The decline of pollinators is reversed		Grassland butterfly index	<b>PLACEHOLDER</b> – General trend of pollinators
	6 – The risk and use of chemical pesticides is reduced by 50 %, and the use of more hazardous pesticides is reduced by 50 %	6.1 – The risk and use of chemical pesticides is reduced by 50 % 6.2 – The use of more hazardous pesticides is reduced by 50 %	<b>SELECTED</b> – Use and risk of chemical pesticides <b>SELECTED</b> – Use of more hazardous pesticides

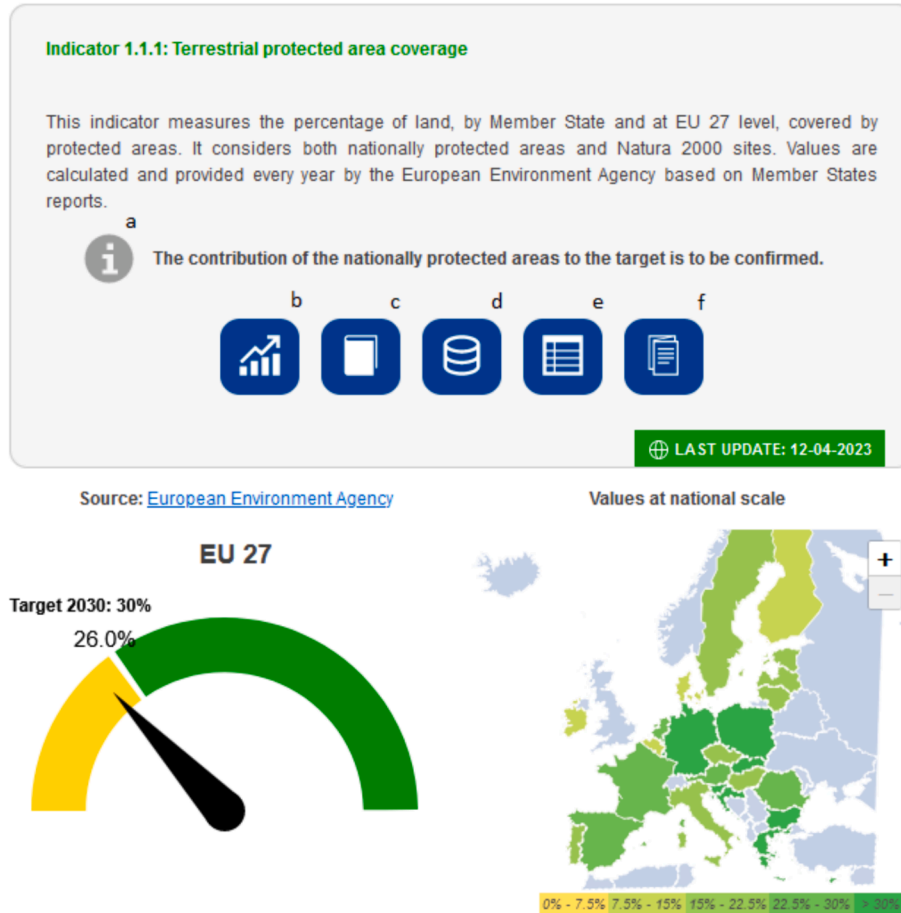
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Table 1 (continued)

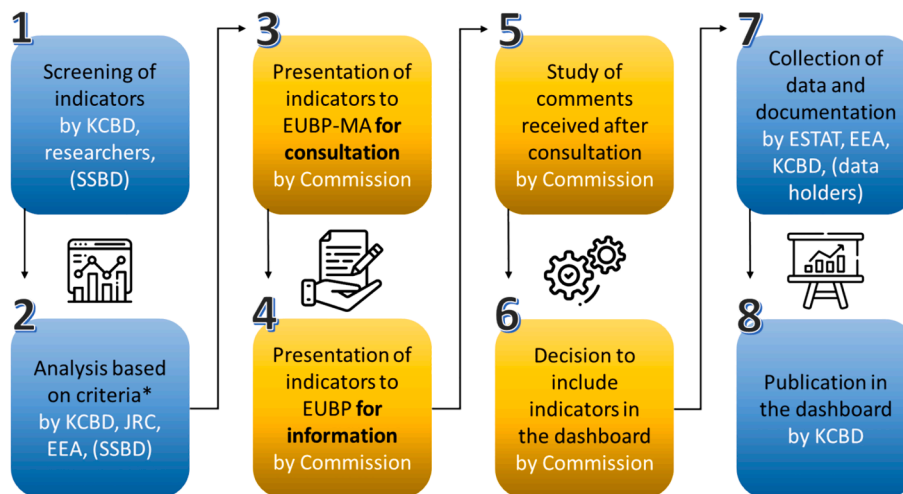
EU BDS targets	EU BDS sub-targets (if any)	Indicators in the dashboard	Indicators under consideration
7 – At least 10 % of agricultural area is under high-diversity landscape features			<b>SELECTED</b> – Share of agricultural area covered with landscape features <b>PROPOSED</b> – Woody landscape features on agricultural land
8 – At least 25 % of agricultural land is under organic farming management, and the uptake of agro-ecological practices is significantly increased	8.1 – At least 25 % of agricultural land is under organic farming management 8.2 – The uptake of agro-ecological practices is significantly increased	Area under organic farming	<b>SELECTED</b> – Trends in the uptake of agro-ecological practices
9 – Three billion additional trees are planted in the EU, in full respect of ecological principles		Number of trees planted in the EU as part of the 3 Billion Trees Pledge	
10 – Significant progress in the remediation of contaminated soil sites		Increase in the number of remediated sites	
11 – At least 25,000 km of free-flowing rivers are restored			<b>PLACEHOLDER</b> – Indicator for river connectivity
12 – There is a 50 % reduction in the number of Red List species threatened by invasive alien species			<b>PLACEHOLDER</b> – Change in the number of native species assessed as threatened within the Red List and reported as affected by invasive alien species
13 – The losses of nutrients from fertilisers are reduced by 50 %, resulting in the reduction of the use of fertilisers by at least 20 %	13.1 – The losses of nutrients from fertilisers are reduced by 50 %	Change in the concentration of nitrate in groundwater Change in the concentration of nitrate in rivers Change in the concentration of phosphate in rivers Change in the concentration of total phosphorous in lakes	
	13.2 – The use of fertilisers is reduced by at least 20 %		<b>ON HOLD</b> – Consumption of inorganic fertilisers
14 – Cities with at least 20,000 inhabitants have an ambitious Urban Greening Plan			
15 – The negative impacts on sensitive species and habitats, including on the seabed through fishing and extraction activities, are substantially reduced to achieve good environmental status	15.1 – The negative impacts on sensitive species through fishing and extraction activities are substantially reduced 15.2 – The negative impacts on sensitive habitats, including on the seabed through fishing and extraction activities, are substantially reduced 15.3 – Good environmental status is achieved	Proportion of fish stocks sustainably exploited	
16 – The by-catch of species is eliminated or reduced to a level that allows species recovery and conservation			

**Target 1: Legally protect a minimum of 30% of the EU's land area and a minimum of 30% of the EU's sea area, and integrate ecological corridors, as part of a true Trans-European Nature Network.** 

**Subtarget 1.1: Legally protect a minimum of 30% of the EU's land area**



**Fig. 3.** Screenshot showing how indicators are visualised in the dashboard and which are the information sections provided: a) additional information, b) graphs, c) documentation, d) datasets, e) values, f) API. The dashboard can be accessed at <https://dopa.jrc.ec.europa.eu/kcbd/dashboard/>.



**Fig. 4.** Diagram representing the process to identify and select indicators for the dashboard. Blue boxes represent technical steps and yellow boxes policy steps. In parenthesis are future expected inputs. Steps 7 and 8 only occur if the Commission decides to include the indicators in the dashboard. \* refers to the criteria described in Box 1. The icons from this figure come from [Flaticon.com](https://www.flaticon.com/). (For interpretation of the references to color in this figure legend, the reader is referred to the web version of this article.)



**Box 1**

Identification, selection and addition of new indicators to the dashboard

In order to include an indicator to the dashboard, it must meet the following criteria:

1. Policy relevance: the indicator must be pertinent for monitoring one of the (sub-)targets of the EU BDS across all EU.
2. Data availability: indicator values must be accessible and collectible on a regular basis, at least at the EU level.
3. Scientific quality: the indicator should be validated, meaning it has been published in a peer-reviewed journal or a scientific/technical report, or submitted to a review for the EEA's Eionet network, and the calculation method must be well-documented.

While the publication of the indicator in a peer-reviewed journal and the public availability of the code to calculate it are additional criteria for scientific quality, they are not mandatory for inclusion in the dashboard. Nevertheless, information on these two criteria is clearly indicated in the documentation for the indicators that are currently included or will be added to the dashboard.

The process for including a new indicator in the dashboard starts with a list of candidate indicators that meet, or are expected to meet, the three criteria mentioned above (see Fig. 4). This list is regularly updated by the KCBD Secretariat, based on input from EEA, Eurostat, the JRC, and ongoing scrutiny of scientific developments. Twice a year, the KCBD Secretariat assesses these candidate indicators and suggests a shortlist of the most relevant and mature ones to be added to the dashboard. The European Commission first consults the EUBP-MA on this shortlist of indicators. This shortlist of indicators is also presented to the EUBP, only for information. Based on the comments received, the European Commission decides whether or not the indicator will be included in the dashboard. The KCBD Secretariat then begins the process of collecting indicator values and documentation in collaboration with data providers and publishes the indicators in the dashboard.

The overall process of including a newly identified indicator to the dashboard may take several years due to the following reasons:

- the indicator (or the data required to construct it) is still in development, despite its relevance for monitoring the EU BDS;
- the indicator is not yet available from data providers in a format suitable for the dashboard;
- the indicator is not yet adequately documented;
- the indicator has not yet undergone EUBP-MA consultation.

#### 4. Concluding remarks

Channelling biodiversity knowledge from science to concrete use in biodiversity policy requires a two-ways communication process between scientists and policymakers to better understand each other and facilitate the matching of policy needs and research outcomes. According to Devictor and Meinard (2020), one way to better empower such biodiversity knowledge is for scientists to take the policy processes as they are, even if they appear strong and resistant rather than faithful and transparent attempts to solve the biodiversity crisis. However, this remains hard to achieve if scientists are not aware of such policy processes, which are undoubtedly sometimes very complex. By presenting the progress monitoring tools of the EU BDS and the policy processes behind them “as they are” to the scientific community, this paper contributes to overcome this issue for the specific case of the progress monitoring of the EU BDS. The two EU BDS progress monitoring tools, the actions tracker and the dashboard, are both publicly available to transparently track the progress in implementing the EU BDS. As such, these progress monitoring tools already support the collaboration between scientists and policymakers. Yet, while the actions tracker does not need additional input from the scientific community, the dashboard does. Further developing indicators to fill the dashboard's gaps is an excellent opportunity to strengthen the connexion between scientists and policymakers around concrete policy needs to support the implementation of the EU BDS.

#### Declaration of Generative AI and AI-assisted technologies in the writing process

During the preparation of this work, the authors used ChatGPT /OpenAI in order to improve text quality. After using this tool/service, the authors reviewed and edited the content as needed and take full responsibility for the content of the publication.

#### Funding

This study and the development and maintenance of the EC Knowledge Centre for Biodiversity were supported mainly by the institutional activities of the Directorate D (Sustainable Resources) at the Joint Research Centre of the European Commission.

#### CRedit authorship contribution statement

**Martina Marei Viti:** Writing – review & editing, Writing – original draft, Visualization, Conceptualization. **Georgios Gkimitsas:** Software. **Camino Liqueste:** Writing – review & editing, Writing – original draft, Visualization, Supervision, Conceptualization. **Grégoire Dubois:** Writing – review & editing, Writing – original draft, Supervision, Conceptualization. **Janica Borg:** Writing – review & editing, Writing – original draft. **Silvia Dalla Costa:** Writing – review & editing, Writing – original draft. **Anne Teller:** Writing – review & editing. **Rayka Hauser:** Writing – review & editing. **Marine Robuchon:** Writing – review & editing, Writing – original draft, Visualization, Supervision, Conceptualization.

#### Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

#### Data availability

No data was used for the research described in the article.

#### Acknowledgements

The authors express their gratitude to the experts who played a pivotal role in crafting the indicators. The authors also thank Ekkehard Petri (ESTAT) for facilitating the integration of ESTAT indicators in the

dashboard, as well as Dimitrios Goutis (external consultant) and Diego Juffe-Bignoli (freelance consultant at Biodiversity Decisions) for their work on Fig. 1. Additionally, the authors appreciate the valuable inputs of Commission's officers during the conceptualization phase of the dashboard and the actions tracker, and their consistent utilization as a means of transparently communicating progress in the implementation of the EU Biodiversity Strategy for 2030.

## Appendix A. Supplementary data

Supplementary data to this article can be found online at <https://doi.org/10.1016/j.ecolind.2024.112147>.

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