Convention on the Conservation of Migratory Species of Wild Animals

25 October 2022

NOTIFICATION TO THE PARTIES

WEBINAR ON ECOLOGICAL CONNECTIVITY – INSIGHTS FOR POST-2020 INDICATORS (31 OCTOBER 2022)

The Secretariat of the Convention on the Conservation of Migratory Species of Wild Animals (CMS) is pleased to inform you about the upcoming "*Webinar on Ecological Connectivity – Insights for post-2020 indicators*", which will be held on 31 October 2022 from 09:30 to 11:00 EDT / 13:30 to 15:00 GMT via the Zoom platform.

This webinar is being jointly convened by the CMS Secretariat, the United Nations Environment Programme World Conservation Monitoring Programme (UNEP-WCMC) and the Secretariat of the Convention on Biological Diversity (CBD).

The webinar aims to achieve the following outcomes:
- To build understanding of the conceptual issues in defining and measuring connectivity in the post-2020 global biodiversity framework and in national policy processes;
- To improve awareness of current baselines, and progress for maintaining, enhancing and restoring ecological connectivity in relation to the post-2020 global biodiversity framework;
- To share information about the proposed indicators that are already suggested for inclusion in the draft monitoring framework, additional connectivity indicators that are currently available and published but not proposed in the draft framework and potential/future indicators that are currently under development.

The Secretariat encourages Parties and partner organizations to register for the webinar as soon as possible. The registration link and further information about the webinar are contained in the CBD Notification 2022-063.

The background document of the webinar is enclosed to this notification.

For further information, please contact the Laura Cerasi, Fundraising and Partnerships Officer, CMS Secretariat, e-mail: laura.cerasi@un.org.

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Ecological connectivity – Insights for post-2020 indicators

Background Document

Executive summary

Ecological connectivity is defined as **the unimpeded movement of species and the flow of natural processes that sustain life on Earth** (CMS, 2020). It is a fundamental requirement for functioning ecosystems and for migratory species.

Parties to the CBD have previously recognised the importance of connectivity in Aichi Target 11 of the Strategic Plan for Biodiversity 2011-2020 and now throughout the current post-2020 global biodiversity framework.

This document summarizes outcomes from an expert online workshop convened in April 2022 to discuss the relevant indicators for measuring ecological connectivity across the post-2020 global biodiversity framework. The workshop was convened by the Center for Large Landscape Conservation (CLLC) and the United Nations Environment Programme World Conservation Monitoring Centre (UNEP-WCMC), and Secretariat of the Convention on the Conservation of Migratory Species of Wild Animals (CMS). It involved 34 experts from around the world who contributed towards clarifying terms and providing an organizing framework for better accounting for and measuring ecological connectivity. At the time of the workshop, participants had a previous version of the draft framework available to them and were able to consider indicators for Goal A, Targets 1, 2 and 3, and other targets that may address connectivity.

The experts expressed strong support for a headline indicator to measure ecological connectivity for all respective goals and targets and proposed the following text: "*Status and trends in ecological connectivity: structural, functional, and migratory connectivity across terrestrial, marine, and inland aquatic/freshwater ecosystems*". This is needed because current indicators largely focus on ecosystem integrity (particularly for Goal A) or protected area connectivity (Target 3), and do not cover key aspects of connectivity including measures of species movement including migratory systems.

The workshop participants delivered the following key messages:

1. There was consensus that current formulations of proposed indicators across headline, component and complementary indicators do not cover key aspects of connectivity. For example, important gaps include in relation to migratory species, and accounting for flyways and marine ecosystems.

2. The workshop participants proposed a comprehensive headline indicator could be developed by COP-16 and would be expressed as follows: *"Status and trends in ecological connectivity: structural, functional, and migratory connectivity across terrestrial, marine, and inland aquatic/freshwater ecosystems".* The indicator should be developed drawing on available data from component and complementary indicators from relevant goals and targets.

3. In the interim, it is suggested that the currently proposed indicators be supplemented with additional indicators to fill some of the current gaps. Table 1 and Annex 1 show the indicators that have been identified that measure connectivity and can contribute towards overall

Introduction

The importance of ecological connectivity to achieving enhanced biodiversity conservation outcomes is strongly reflected within the draft post-2020 global biodiversity framework, which is expected to be finalised and adopted at CBD COP15 Part 2 in December 2022.

Within the draft post-2020 global biodiversity framework[1], among key elements, ecological connectivity underpins the text of Goal A which seeks to ensure "*the integrity, connectivity and resilience of natural ecosystems ….*". Although multiple actions are needed, increasing the connectivity and integrity of natural systems is recognized as a key mechanism to achieve Goal A.

In relation to the incorporation of connectivity in the draft targets, draft Target 1, seeks to improve spatial planning to enhance ecological connectivity and deliver conservation outcomes. Draft Target 2 applies restoration to enhance connectivity. Draft Target 3 seeks to expand area-based conservation that is well-connected. Given these specific draft formulations and critical contributions it is important to understand how ecological connectivity might be measured in the proposed monitoring framework for the post-2020 global biodiversity framework[2].

To address this, an expert workshop was held virtually on 20-21 April 2022 to discuss indicators that could be used for consistent measurement and reporting of elements of ecological connectivity in the relevant goals and targets of the post-2020 global biodiversity framework. The workshop was convened by the Center for Large Landscape Conservation (CLLC) and the United Nations Environment Programme World Conservation Monitoring Centre (UNEP-WCMC) and Secretariat of the Convention on the Conservation of Migratory Species of Wild Animals (CMS). It brought together 34 experts (See Annex 2), including from the Secretariat of the Convention on Biological Diversity (CBD) and experts actively engaged in creating and applying science-based indicators for measuring ecological connectivity. Financial support was provided by WWF Belgium and the Bezos Earth Fund. The IUCN World Commission on Protected Areas Connectivity Conservation Specialist Group and the CMS Secretariat provided additional technical support.

Ahead of the expert workshop, indicators of most relevance to connectivity were identified from the list of proposed indicators compiled during part II of the twenty-fourth meeting of the Subsidiary Body on Scientific Technical and Technological Advice, in Appendix II to document CBD/SBSTTA/24/2. Additional and potential/future indicators were also identified from existing literature and expert opinion. These are summarised in Table 1, categorised into three groups:

1. **Proposed** indicators that are already suggested for inclusion in the draft monitoring framework;

2. **Additional** indicators that are currently available and published but not proposed in the draft monitoring framework; and

3. **Potential**/Future indicators that are currently under development.

The key objective was to generate a better understanding of i) what each indicator measures, ii) their benefits and their limitations and iii) recommendations for refinements and improvements to deliver and use them.

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[1] Recommendation WG2020 4/1, adopted by the Open-ended working group on the post-2020 global biodiversity framework. Available at https://www.cbd.int/doc/recommendations/wg2020-04/wg2020-04-rec-01-en.pdf
[2] Recommendation SBSTTA 24/2, adopted by the Subsidiary Body on Scientific Technical and Technological Advice on the proposed monitoring framework for the post-2020 global biodiversity framework. Available at https://www.cbd.int/doc/recommendations/sbstta-24/sbstta-24-rec-02-en.pdf

Table 1. Proposed, additional, and potential/ future indicators for ecological connectivity as they relate to draft Goal A and draft Targets 1, 2, and 3. Indicators preceded by an '*' were considered by workshop participants to be of relevance for multiple goals and targets, such as in draft Goal A and draft Target 2, and those preceded with ** were considered not to be a useful indicator of connectivity.

	Proposed Indicators	Additional Indicators	Potential/ Future Indicators
Draft Goal A	*Species Habitat Index* (SHI) - Conservation status of migratory species, as a proxy indicator of connectivity *Ecosystem Integrity Index (EII)*** *Forest Landscape Integrity Index (FLII)* *Bioclimatic Ecosystem Resilience Index* (BERI) *Ecosystem Intactness Index (EII)* *Biodiversity Habitat Index (BHI)*		*Trends in ecosystem and habitat fragmentation*
Draft Target 1	—	—	*Number of National Biodiversity Strategies and Action Plans including provisions for improving ecological connectivity in spatial planning* *Number of national laws, regulations, and policies promoting ecological connectivity in spatial planning* *Number of international projects promoting ecological connectivity in spatial planning*
Draft Target 2	*Forest Landscape Integrity Index (FLII)* *Free-flowing rivers (FFR)* *Bioclimatic Ecosystem Resilience Index (BERI)* - Maintenance and restoration of connectivity of natural ecosystems		—
Draft Target 3	*Protected-Connected Index (ProtConn)* *Protected Area Representativeness and Connectedness Index (PARC)*	*Structural connectivity provided by intact lands (ConnIntact)* *Protected Area Isolation Index (PAI)* *Protected Areas Network metric (ProNet)*	*Extent to which protected areas and other effective area-based conservation measures (OECMs) cover Key Biodiversity Areas that are important for migratory species* *Condition of KBAs that are important for migratory species*

Following presentation of indicators outlined in Table 1, the workshop discussed how each indicator can be used to measure connectivity and its applicability to the draft Goal A and relevant targets. A

summary of the key knowledge gaps and future needs for indicator development is provided in Annex 1.

The vision is to develop a logical nested framework of indicators that measure connectivity across the goals and targets, with a headline indicator being supported by component and complementary indicators. A comprehensive headline indicator could be developed by COP-16 through collaboration among the experts in attendance and other interested experts and institutions, subject to resources. However, a phased approach to reporting would be required acknowledging that capacity development will be needed before all Parties can report against the proposed headline indicator.

Key messages from the expert workshop to better account for ecological connectivity in the post-2020 global biodiversity monitoring framework

Acknowledging that institutional and national level capacity will need to be supported for the development and use of connectivity indicators, the workshop delivered the following key messages:

1. There was consensus that current formulations of proposed indicators across headline, component and complementary indicators do not cover key aspects of connectivity. For example, important gaps include in relation to migratory species, and accounting for flyways and marine realms.

2. The workshop participants proposed a comprehensive headline indicator could be developed by COP-16 and would be expressed as follows: *"Status and trends in ecological connectivity: structural, functional, and migratory connectivity across terrestrial, marine, and inland aquatic/freshwater ecosystems".* The indicator should be developed drawing on available data from component and complementary indicators from relevant goals and targets.

3. In the interim, it is suggested that the currently proposed indicators be supplemented with additional indicators to fill some of the current gaps. Table 1 and Annex 1 show the indicators that have been identified that measure connectivity and can contribute towards overall measurements of the Goals and Targets.

Annex 1 –Additional details of the applications, data sources, and suitability of proposed, additional, and potential connectivity indicators discussed.

Indicator	Associated goals and targets	Realm	Ecological level (what to connect)	Data (what to connect)	Connectivity type	Data (resistance surface, matrix)	Computation needs	Computation comments	Currently available or to be developed
A.0.2 Species Habitat Index (SHI)	Proposed headline indictor for Goal A	All	Species (and their functional and structural attributes)	Individual locations (30m - 1km pixels)	Functional	Land cover, species habitat	High	Products and capacity support provided through GEO BON, BON in a Box Yale University (Map of Life) and GEO BON.	Available
A.2.1 "CMS connectivity indicator (CMS)"	Proposed component indictor for Goal A	All	Species group	Habitat types	Functional - movement		Unknown	Species/guild level, movement locations	To be developed
A.3.1 Ecosystem Integrity Index (EII)	Proposed component indictor for Goal A	Terrestrial	Ecosystems	Habitat types	Unknown			Not applicable	Available
a.26. Forest Landscape Integrity Index (FLII)	Proposed complementary indicator for Goal A and Target 2	Terrestrial	Forest	Habitat types	Proximity - matrix	Forest extent (global tree cover >20%), Openstreet Map, Forest activity type	Moderate	300 m resolution forest, human pressures, proximity w/in 20-40 km	Available
a.30. Bioclimatic Ecosystem Resilience Index (BERI)	Proposed complementary indicator for Goal A and Target 2	Terrestrial	Ecosystems (persistence of overall species diversity under climate change)	Individual locations (<1km grid cells)	Functional matrix - dispersal and compositional turnover under climate change	CSIRO's global habitat condition time series	High	30-arcsecond (<1 km) resolution; Uses 'petals' to greatly reduce computation time with very little loss of rigour	Available

Indicator	Associated goals and targets	Realm	Ecological level (what to connect)	Data (what to connect)	Connectivity type	Data (resistance surface, matrix)	Computation needs	Computation comments	Currently available or to be developed
a.32. Ecosystem Intactness Index (EII')	Proposed complementary indicator for Goal A	Terrestrial	Ecosystems	Ecoregions	Proximity - matrix	Human footprint (2009)	Moderate	1 km resolution, radius of 26.5 km	Available
a.28 Biodiversity Habitat Index (BHI)	Proposed complementary indicator for Goal A	Terrestrial	Persistence of overall species diversity of ecosystems across all biomes.	Individual locations (<1km grid cells)	Functional matrix (at community-level rather than species-specific)	CSIRO's global habitat condition time series, or any other condition/intactness/integrity surface globally or nationally	High	30-arcsecond (<1 km) resolution; Uses 'petals' for to greatly reduce computation time with very little loss of rigour	Available
Trends in ecosystem and habitat fragmentation	Potential/future indicator for Goal A	Not specified	Not specified	Habitat types	Unknown	---			Available
Number of National Biodiversity Strategies and Action Plans including provisions for improving ecological connectivity in spatial planning	Additional not in framework, Target 1	~~	~~		Unknown	---	~~	~~	To be developed
Number of national laws, regulations, and policies promoting ecological connectivity in spatial planning	Additional not in framework, Target 1	~~	~~		Unknown	---	~~	~~	To be developed
Number of international projects promoting ecological connectivity in spatial planning	Additional not in framework, Target 1	~~	~~		Unknown	---	~~	~~	To be developed

Indicator	Associated goals and targets	Realm	Ecological level (what to connect)	Data (what to connect)	Connectivity type	Data (resistance surface, matrix)	Computation needs	Computation comments	Currently available or to be developed
t.2.9 Free-flowing rivers	Proposed complementary indicator for Target 2	Freshwater	Riverine	Habitat types	Structural - binary	---	High	Uses free-flowing index, data on reservoirs (GRaND)	Available
3.14. Protected-Connected Index "ProtConn"	Proposed complementary indicator for Target 3	Terrestrial	Country	WDPA	Structural - binary	---	High	PAs >1 km2, euclidean distance	
3.9 Protected Area Representativeness and Connectedness Index (PARC)	Proposed complementary indicator for Target 3	Terrestrial	Landscape (ecological representation of overall species diversity, adjusted for effects of connectivity between PAs and habitat in surrounding landscape)	Individual protected grid cells (<1km resolution)	Functional matrix (at community-level rather than species-specific)	WDPA, CSIRO's global habitat condition time series	High	30-arcsecond (<1 km) resolution; Uses 'petals' to reduce computation time	Available
Structural connectivity provided by intact lands (ConnIntact) (Ward et al. 2020)	Additional not in framework, Target 3	Terrestrial	Landscape	Individual locations	Structural - binary	Human footprint 2009	Moderate	Not specified	Available
Protected Area Isolation ndex (PAI) (Brennan et al. 2022)	Additional not in framework, Target 3	Terrestrial	Species group	WDPA	Functional - movement	Human footprint 2009, MoveBank (mammals)	High	Running Circuitscape, 70 km^2 resolution for PAs >35 km^2.	Available

Indicator	Associated goals and targets	Realm	Ecological level (what to connect)	Data (what to connect)	Connectivity type	Data (resistance surface, matrix)	Computation needs	Computation comments	Currently available or to be developed
Protected Areas Network metric (ProNet) (Theobold et al. 2022)2	Additional not in framework , Target 3	Not specified	Country	WDPA	Structural - matrix	Human modification (2017)	Moderate	300 m resolution, simple metric calculation	Available
Extent to which protected areas and other effective area-based conservation measures (OECMs) cover Key Biodiversity Areas that are important for migratory species	Potential, Target 3	All	Species group	WDPA	Structural - binary	KBAs	Moderate	Simple overlay analysis	
Condition of KBAs that are important for migratory species	Potential, Target 3	All	Species group	Habitat types	Unknown	KBAs	Moderate	Simple overlay analysis	
IUCN Green List	Potential, Target 3	Not applicable everywhere, as it is a site-based voluntary standard	Ecosystems	WDPA	Unknown	Green list		Not spatially explicit.	

Annex 1 -Participants List

Name	Organization
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