ANNEX

CMS CONTRIBUTIONS TO THE DEVELOPMENT OF THE IPBES SECOND WORK PROGRAMME (2020-2030)

On 16 July 2018, the CMS Secretariat notified the members of the Scientific Council of the "*Call for requests, inputs and suggestions on short-term priorities and longer term strategic needs for the future work programme of IPBES*" issued on 11 July 2018 and asked them to participate in this consultation.

A reminder was sent at the beginning of September with a view to reiterate the importance of providing inputs to the process, including in the form of proposals for new assessments of interest to CMS to strengthen the interface between science and policy in relation to the conservation and sustainable use of migratory species.

As at 30 September 2018, which was the deadline set for these consultations, the Secretariat had received inputs from three members of the Scientific Council namely the Chair and the councilors of Uzbekistan and Tunisia.

The inputs from the councilors of Uzbekistan and Tunisia had a rather narrow scope both in term of geographic area and species covered being the Sociable Lapwing in Uzbekistan and Sahelo-Saharan antelopes (i.e the Addax and the Slender-Horned Gazelle) in Tunisia respectively. Both proposals are of great importance and urgency and mostly request interventions and concerted actions for the conservation of these species rather than focusing on assessment needs.

The Chair of the Council proposed an assessment of the halting the progressive desertification of the Sahel, through the establishment of green belts, and its effects on species conservation.

All three inputs have been captured to different extents in a proposal for an assessment on connectivity.

As a result of consultations with the Secretariats of the United Nations Convention to Combat Desertification (UNCCD) and of some of the biodiversity-related Conventions, it was agreed to work towards the development of a joint proposal meant to cover various aspects of connectivity conservation. This document includes the proposed input from CMS, focusing on migratory connectivity. The other conventions' secretariats are currently in the process of elaborating inputs relating to their own spheres of activity. The final comprehensive proposal will be submitted to the IPBES Secretariat later his year.

THEMATIC ASSESSMENT OF CONNECTIVITY

Connectivity conservation – CMS component

Introduction on Connectivity

The scientific concept of connectivity incorporates relationships between key ecological processes and the spatial pattern and scale of vegetation cover, not only in natural landscapes, but also in semi-natural and even highly modified landscapes (Forman 1995). The concept of connectivity has become increasingly important in the past three decades as a result of modification of ecosystems and subsequent declines in biodiversity resulting from a range of direct and/or indirect human influences including vegetation clearing (and resulting habitat loss), altered fire regimes, invasion by exotic species and climate change (Crooks and Sanjayan 2006; Fitzsimons et al. 2013a).Given the multiple and multifaceted meanings of connectivity, it is not surprising that while the concept is universally agreed to be important, it is often conceived very broadly, thereby rendering it difficult to use in practice and sparking much academic debate (for example, on the ecological value of wildlife corridors; see Simberloff et al. 1992; Beier and Noss 1998; Lindenmayer and Fischer 2007).

Connectivity conservation management is a strategic approach to address threats to biodiversity and to help link habitats across whole landscapes/seascapes, which can enable species and their ecosystems to move or adapt as conditions change. Connectivity conservation is a way of maintaining connections for nature by involving people. There are other forms of knowledge that are also important and can be included, such as the knowledge systems of indigenous peoples and other local communities (Pulsford, I., Lindenmayer, D., Wyborn, C., Lausche, B., Worboys, G. L., Vasilijević, M. and Lefroy, T. (2015) 'Connectivity conservation management', in G. L. Worboys, M. Lockwood, A. Kothari, S. Feary and I. Pulsford (eds) Protected Area Governance and Management, pp. 851–888, ANU Press, Canberra).

With regard to the nature context, connectivity consists of four interacting considerations: 1) landscape connectivity - physical connection of natural vegetation between two otherwise physically isolated, 2) ecological connectivity - connectedness of ecological processes across multiple scales including processes related to highly dispersive species, highly interactive species, disturbance regimes and hydro-ecological flows (Lindenmayer and Fischer 2006; Soulé et al. 2006; Mackey 2007; Mackey et al. 2013), 3) habitat connectivity - connectedness between patches of suitable habitat for an individual species, and 4) evolutionary process connectivity, including the degree of habitat fragmentation, the presence of remnant habitat stepping stones and opportunities to rehabilitate connections in the context of climate change and other threats (Pulsford, I., Lindenmayer, D., Wyborn, C., Lausche, B., Worboys, G. L., Vasilijević, M. and Lefroy, T. (2015) 'Connectivity conservation management', in G. L. Worboys, M. Lockwood, A. Kothari, S. Feary and I. Pulsford (eds) Protected Area Governance and Management, pp. 851–888, ANU Press, Canberra).

Migratory Connectivity

Migratory connectivity has been defined in several different ways (Table 1). Basically, the main difference in these definitions is that they consider migratory connectivity as a property of different entities: geographical areas, individuals or groups of individuals, populations, or even time periods. Importantly, the different perspectives on migratory connectivity may serve different purposes. For instance, considering connectivity as a property of geographical areas may matter for conservation purposes, as it allows identifying areas through which individuals move, and to

act to lessen the threats that may hamper survival in each of these areas. In contrast, considering connectivity as a property of individuals may matter for evolutionary or genetic studies of populations as well as for applicative purposes, for instance transmission of parasites and pathogens among individuals that mix at some stages of their annual life-cycle.

Table 1: Examples of different definitions of migratory connectivity present in literature (list not exhaustive).

Definition	Property of	Reference
The links between breeding and non-breeding areas due to the movement of migrants among them	Areas	(Webster et al. 2002)
The extent to which individuals from the same breeding area migrate in the same non-breeding area and vice versa	Individuals	(Webster et al. 2002)
The geographic linking of individuals or populations between different stages of the annual cycle	Individuals / Populations	(Marra et al. 2006)
Migratory connectivity refers to the degree to which two or more periods of the annual cycle are geographically linked	Periods	(Boulet and Norris 2006)
Migratory connectivity describes the degree to which individuals or populations are geographically arranged among two or more periods of the annual cycle	Individuals / Populations	(Boulet and Norris 2006)
Migratory connectivity describes the associations between breeding sites, stopovers and wintering grounds of groups of individuals	(Groups of) Individuals	(Veen 2013)
The geographic link between individuals or populations at different stages of their annual cycle	Individuals / Populations	(Rundel et al. 2013)

For the purpose of this document, we broadly consider migratory connectivity as describing the spatial and temporal linkages of individuals and populations between seasons or different stages of the migration cycles that result from migratory movement. This definition covers to some extent both the structural and functional aspects of the other types of nature connectivity.

The evolution of recent thinking on Migratory Connectivity issues has drawn particular attention to:

- the need to express conservation objectives in terms of whole migration systems, and in terms of what is needed for the functioning of the migration process itself, not just the status of populations or habitats;
- the opportunity to define actions addressed at the connections between places (or times);
- the opportunity to improve connectivity by correcting the most obvious instances of problematic discontinuity in migration systems, such as barriers to migration, fragmented resources, disrupted ecological processes, genetic isolation, altered behaviour patterns, disconnections in distribution caused by climate change or depletion of food or water resources, inconsistencies in management across and beyond national jurisdictions, and other factors;

- the need to work with a wide range of stakeholders in government authorities, local communities, the private sector and others at a variety of scales including the landscape and seascape scale to promote the restoration and management of habitats used by migratory species with particular regard to issues of connectivity;
- the importance of developing understanding about the links between connectivity and resilience.

Assessing migratory connectivity is fundamental to identify when and where in a cycle certain vital aspects (.e.g reproduction) are being affected. Such knowledge is fundamental to understanding how the events through such cycle interreact and so to identify how the events affect individuals and population in subsequent periods.

Migratory connectivity is key in any land-use and spatial planning as well as in the development of networks of sites or protected areas managed for conservation purposes.

Regional case study

The extension of ecological barriers within the Palaearctic-African migratory system is increasing; the Sahara is progressively extending to the south, due to desertification caused both by direct (e.g., destruction of vegetation due to direct use of timber) or indirect (e.g., growing temperatures as an effect of climate change) human impact. The extension of equatorial forests is decreasing as well, and their destruction is primarily affecting the boundaries of the forests, causing a southbound retreat of this highly vulnerable habitat. Hence, the overall distance between the northernmost limit of forests and the southern edge of the Sahara is also increasing.

The maximum amount of energy a bird can store (both in terms of fat and flight muscles enlarged before migration) has a physical limit related to aerodynamic and metabolic thresholds. This implies a limit also in the overall distance a migrant can fly across ecological barriers without being in need of refuelling.

The progressively increasing extension of the ecological barriers can lead to major physiological challenges for birds whose maximum possible flight range can quickly become insufficient to effectively cross the progressively extending barriers.

The actions undertaken to halt or reduce soil erosion through the planting of green belts especially within the Sahel can be monitored, in their effects on biodiversity conservation, by using birds as indicators of the outcomes of such initiatives.

Request to IPBES

Following CMS Resolution 12.26, IPBES could give special attention to:

- Evaluating the sufficiency and coherence of ecological networks in functional and qualitative terms as well as in terms of extent and distribution and to the desirability of sharing experiences and best practices on this issue;
- Assessing the effectiveness of the protection and management of the areas and networks.

Following CMS Decision 12.92 (Directed to the Scientific Council), IPBES could enhance the scientific understanding of connectivity issues in relation to migratory species through:

- Reviewing the scope for existing major databases to support relevant analyses and syntheses of information on connectivity, and identify options inter alia for ensuring sustainability and enhanced operability and coordination of such databases for this purpose;
- Investigating options for creating relevant data and knowledge holding capabilities and for enhancing analysis capabilities, in collaboration with suitably qualified institutions and processes;
- Investigating and report on the linkages between migratory species connectivity and ecosystem resilience;
- Having regard in particular to the Strategic Plan for Migratory Species, assessing the needs and developing focused objectives for new research on key connectivity issues, including but not limited to climate change, which affect the conservation status of each of the major taxonomic groups of migratory wild animals.

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