IDENTIFYING KNOWLEDGE GAPS WITH ADJACENCY MATRICES: THE CASE OF GBF

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RESEARCH PROBLEM

We lack knowledge regarding the consistency of the Global Biodiversity Framework (GBF) – a document aimed at leveraging biodiversity-oriented actions.

The Kunming-Montreal Global Biodiversity Framework is currently the most important programming document in the field of biodiversity, enhancing research and policy actions. It consists of various types of texts, i.e., theory of change, mission, vision, goals, and targets.

OBJECTIVE - EXPLORATION

To check the consistency of GBF, by mapping the Theory of Change, Mission, Vision, and Goals, and identifying significant sources of knowledge gaps

DEFINITION

Knowledge gap - lack of necessary knowledge about phenomena represented by concepts and their relations.

RESEARCH QUESTIONS

1. What is the semantics and structure of the Theory of Change, Mission, Vision, and Goals in GBF?
2. How may semantic and structural features of GBF affect consistency?
3. How do the semantics and structure of GBF inform our capacity for identification of knowledge gaps?

METHODS USED

- Text analysis
- Cognitive mapping (Axelrod 1976)
- Graph analysis
- *Explicit-implicit* model identification

GBF – SOURCE TEXT

Section E. Theory of change

9. The Kunming-Montreal Global Biodiversity Framework is built around a theory of change which recognizes that urgent policy action is required globally, regionally and nationally to achieve sustainable development so that the drivers of undesirable change that have exacerbated biodiversity loss will be reduced and/or reversed to allow for the recovery of all ecosystems and to achieve the Convention's Vision of living in harmony with nature by 2050.

Section F. 2050 vision and 2030 mission

10. The vision of the Kunming-Montreal Global Biodiversity Framework is a world of living in harmony with nature where "by 2050, biodiversity is valued, conserved, restored and wisely used, maintaining ecosystem services, sustaining a healthy planet and delivering benefits essential for all people."

11. The mission of the Framework for the period up to 2030, towards the 2050 vision is:

To take urgent action to halt and reverse biodiversity loss to put nature on a path to recovery for the benefit of people and planet by conserving and sustainably using biodiversity and by ensuring the fair and equitable sharing of benefits from the use of genetic resources, while providing the necessary means of implementation.

Section G. Global goals for 2050

12. The Kunming-Montreal Global Biodiversity Framework has four long-term goals for 2050 related to the 2050 Vision for biodiversity.

GOAL A

The integrity, connectivity and resilience of all ecosystems are maintained, enhanced, or restored, substantially increasing the area of natural ecosystems by 2050;

Human induced extinction of known threatened species is halted, and, by 2050, the extinction rate and risk of all species are reduced tenfold and the abundance of native wild species is increased to healthy and resilient levels;

The genetic diversity within populations of wild and domesticated species, is maintained, safeguarding their adaptive potential.

GOAL B

Biodiversity is sustainably used and managed and nature's contributions to people, including ecosystem functions and services, are valued, maintained and enhanced, with those currently in decline being restored, supporting the achievement of sustainable development for the benefit of present and future generations by 2050.

GOAL C

The monetary and non-monetary benefits from the utilization of genetic resources and digital sequence information on genetic resources, and of traditional knowledge associated with genetic resources, as applicable, are shared fairly and equitably, including, as appropriate with indigenous peoples and local communities, and substantially increased by 2050, while ensuring traditional knowledge associated with genetic resources is appropriately protected, thereby contributing to the conservation and sustainable use of biodiversity, in accordance with internationally agreed access and benefit-sharing instruments.

GOAL D

Adequate means of implementation, including financial resources, capacity-building, technical and scientific cooperation, and access to and transfer of technology to fully implement the Kunming-Montreal Global Biodiversity Framework are secured and equitably accessible to all Parties, especially developing country Parties, in particular the least developed countries and small island developing States, as well as countries with economies in transition, progressively closing the biodiversity finance gap of $700 billion per year, and aligning financial flows with the Kunming-Montreal Global Biodiversity Framework and the 2050 Vision for biodiversity.

KNOWLEDGE GAPS

SEMANTICS:

Lack of clarity and overlapping meanings among some of the key concepts point to the necessity for conceptual integration

STRUCTURE:

Limited interconnectivity undermines the capacity for impact evaluation:

- vertically (among the Theory of Change, Mission, Vision, and the Goals)
- horizontally (among Goals)

UNIVERSALIZATION:

There is considerable potential for leveraging biodiversity-oriented actions if implied links are studied further.

KEY FINDINGS

SEMANTIC CONSISTENCY:

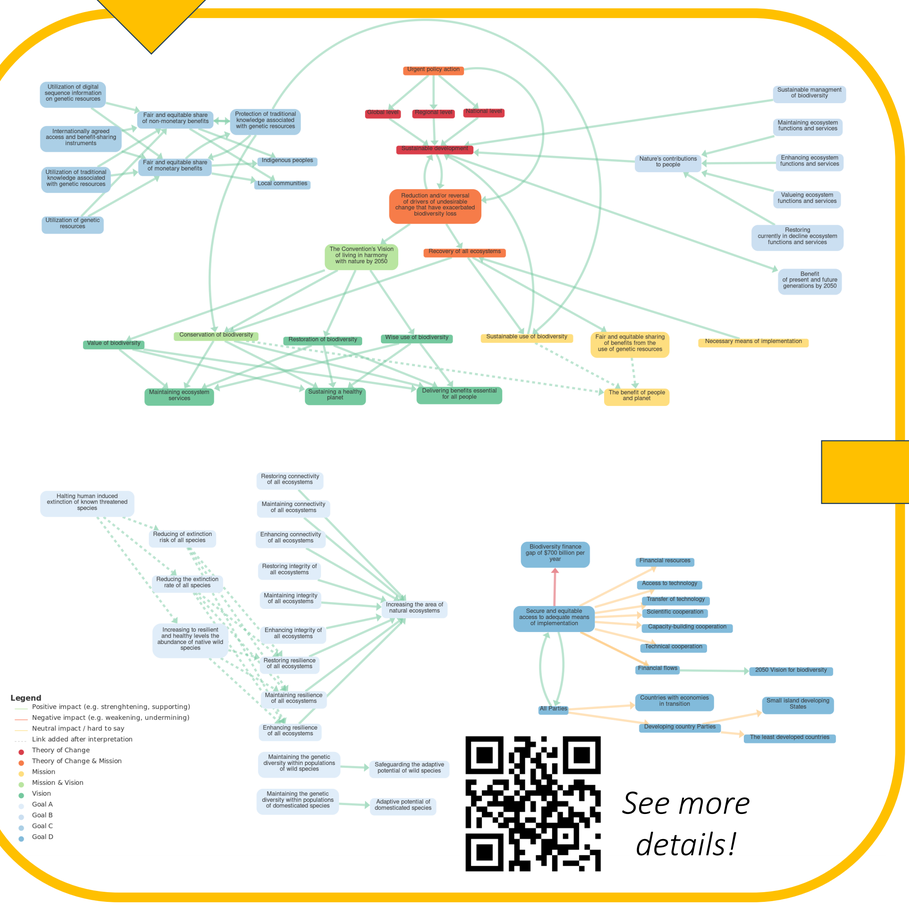
- At least 68 concepts used in the text.
- More similarities between concepts used in the Theory of Change, Mission, and Vision than between Goals A, B, C, and D.
- A few concepts with very close meaning.

$$d = \frac{m}{n(n-1)}$$

STRUCTURAL CONSISTENCY:

- Total density of the digraph: **(2,10%)**.
- Higher level of connectivity between Theory of Change, Mission, and Vision than between Goal A, B, C, and D **(10,23% compared to 2,30%)**.
- A few direct links between the Theory of Change, Mission, Vision, and Goals A, B, C, and D.
- No direct links between the Theory of Change, Mission, Vision, and Goals A and D.

COGNITIVE MAP



See more details!

ADJACENCY MATRIX

Section	Paragraph	ID	Concept
Section E. Theory of change	Theory of change	C01	Sustainable development
		C02	National level
		C03	Global level
		C04	Regional level
Section E. & Section F.	Theory of change & Mission	C05	Urgent policy action
		C06	Reduction and/or reversal of drivers of undesirable change that have exacerbated biodiversity loss
		C07	Recovery of all ecosystems
Section F. 2050 vision and 2030 mission	Mission	C08	The benefit of people and planet
		C09	Fair and equitable sharing of benefits from the use of genetic resources
		C10	Necessary means of implementation
		C11	Sustainable use of biodiversity
	Mission & Vision	C12	Conservation of biodiversity
		C13	The Convention's Vision of living in harmony with nature by 2050
	Vision	C14	Restoration of biodiversity
		C15	Maintaining ecosystem services
		C16	Wise use of biodiversity
		C17	Delivering benefits essential for all people
		C18	Sustaining a healthy planet
		C19	Value of biodiversity
Section G. Global goals for 2050	Goal A	C20	Enhancing connectivity of all ecosystems
		C21	Maintaining the genetic diversity within populations of wild species
		C22	Restoring integrity of all ecosystems
		C23	Adaptive potential of domesticated species
		C24	Enhancing integrity of all ecosystems
		C25	Enhancing resilience of all ecosystems
		C26	Restoring resilience of all ecosystems
		C27	Maintaining connectivity of all ecosystems
		C28	Maintaining resilience of all ecosystems
		C29	Restoring connectivity of all ecosystems
		C30	Increasing the area of natural ecosystems
		C31	Reducing the extinction rate of all species
		C32	Halting human induced extinction of known threatened species
		C33	Increasing to resilient and healthy levels the abundance of native wild species
		C34	Maintaining the genetic diversity within populations of domesticated species
		C35	Reducing of extinction risk of all species
		C36	Maintaining integrity of all ecosystems
		C37	Safeguarding the adaptive potential of wild species
	Goal B	C38	Valueing ecosystem functions and services
		C39	Restoring currently in decline ecosystem functions and services
		C40	Sustainable managment of biodiversity
		C41	Nature's contributions to people
		C42	Maintaining ecosystem functions and services
		C43	Benefit of present and future generations by 2050
		C44	Enhancing ecosystem functions and services
	Goal C	C45	Fair and equitable share of monetary benefits
		C46	Internationally agreed access and benefit-sharing instruments
		C47	Utilization of traditional knowledge associated with genetic resources
		C48	Utilization of digital sequence information on genetic resources
		C49	Utilization of genetic resources
		C50	Local communities
		C51	Indigenous peoples
		C52	Protection of traditional knowledge associated with genetic resources
		C53	Fair and equitable share of non-monetary benefits
	Goal D	C54	Biodiversity finance gap of $700 billion per year
		C55	Countries with economies in transition
		C56	2050 Vision for biodiversity
		C57	All Parties
		C58	Small island developing States
		C59	Transfer of technology
		C60	Developing country Parties
		C61	The least developed countries
		C62	Capacity-building cooperation
		C63	Access to technology
		C64	Financial flows
		C65	Secure and equitable access to adequate means of implementation
		C66	Financial resources
		C67	Scientific cooperation
		C68	Technical cooperation

Emys-R is a 3-yr international action-oriented research project aiming at a socio-ecological evaluation of wetlands restoration and reintroduction programs in favour of the European pond turtle *Emys* and associated biodiversity throughout Europe… for defining and disseminating the most efficient, socially-supported, ecological methods to restore wetlands in favour of *Emys* reintroduction and associated biodiversity in Europe, with three study cases in FR, DE and LV.

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