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Defining natural and anthropogenic ecosystems in the context of GBF Indicator A.2 Extent of natural ecosystems, based on SEEA Ecosystem Accounting

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United Nations

Overview

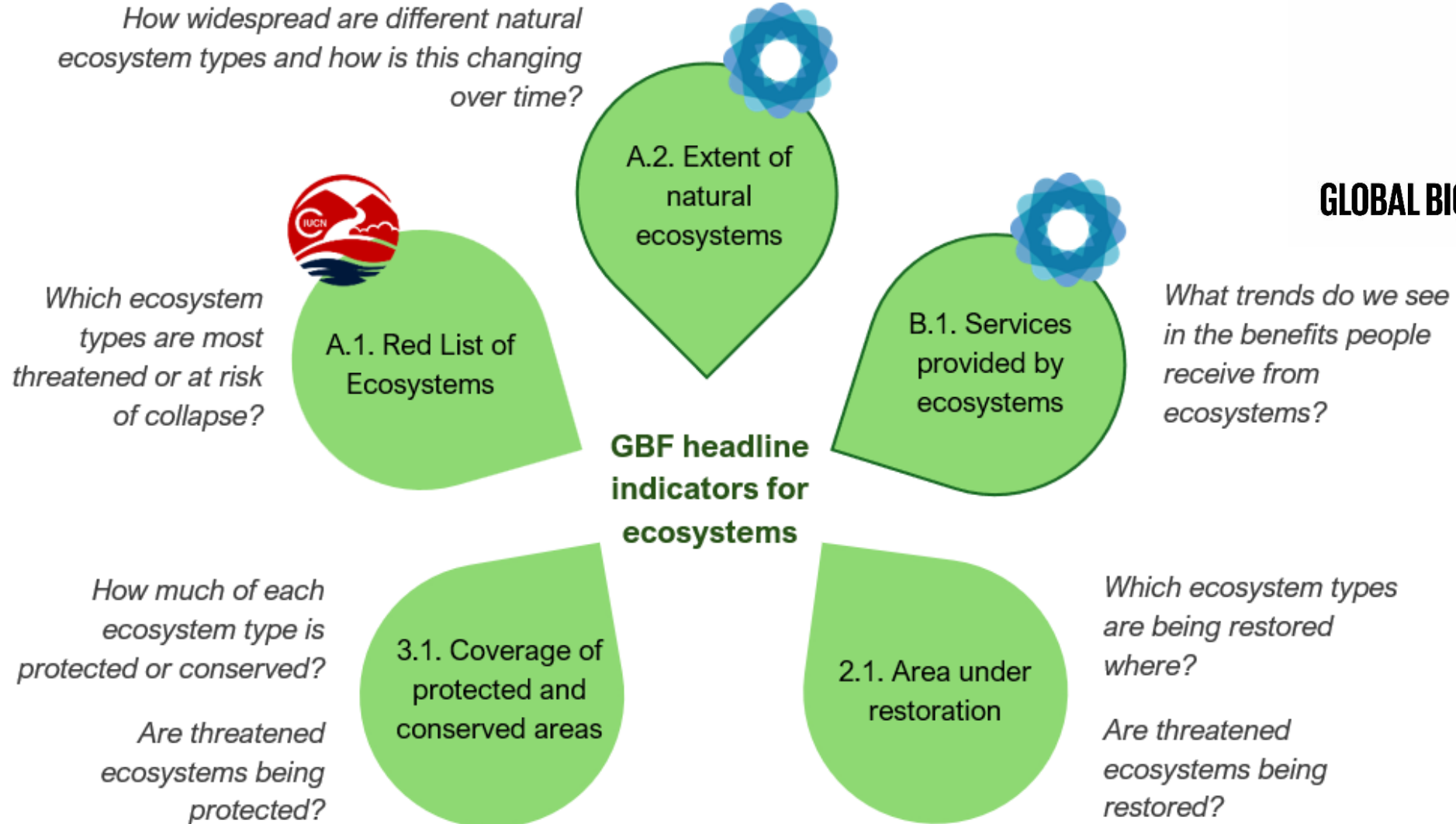
- GBF Indicator A.2 – context, intent, limitations
- Concept of an ecosystem type (distinct from ecosystems in general)
- Inclusive definition of natural ecosystem types
- Narrow definition of anthropogenic ecosystem types, based on stringent criteria
- Role of the IUCN Global Ecosystem Typology in operationalising these definitions
- Avoiding confusion between ecosystem condition and ecosystem type
- Dealing with borderline cases between natural and anthropogenic ecosystem types

Five ecosystem-related headline indicators of the GBF



Kunming-Montreal

GLOBAL BIODIVERSITY FRAMEWORK



Indicator A.2
based on
ecosystem extent
accounts

Indicator B.1
based on
ecosystem
services accounts
in biophysical
terms

UNSD is leading an EU-funded project to develop further guidance on the SEEA-related indicators of the GBF, alongside testing with three project countries and capacity building activities

- Includes producing Compilation Guidelines, currently in advanced draft, to be finalized early 2027
- Task Team and Expert Group convened to give input on conceptual and methodological issues



Expert Group Meeting, Feb 2026, Cambridge UK



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SEEA-related Indicators
for the Kunming-Montreal Global Biodiversity Framework

ADVANCED DRAFT: Compilation Guidelines for GBF headline indicator A.2 Extent of natural ecosystems

This advanced draft of the Compilation Guidelines has been prepared for information for the twenty-eighth meeting of the Subsidiary Body on Scientific, Technical and Technological Advice (SBSTTA-28) of the Convention on Biological Diversity (CBD). The Guidelines are being developed by the United Nations Statistics Division, with the support of an expert group convened under the auspices of the Technical Committee on SEEA Ecosystem Accounting of the United Nations Committee of Experts on Environmental-Economic Accounting (UNCEEA). Their development has also been informed by an [Expert Group Meeting on SEEA-related indicators for the Kunming-Montreal Global Biodiversity Framework \(GBF\)](#), held in February 2026. Following a final Expert Group Meeting scheduled for November 2026, a revised version of the Guidelines will be made available for public consultation.

This version of the guidelines was produced in July 2026 and is available as part of the portfolio of 'other documents' on the [SBSTTA-28 webpages](#) and the ["SEEA-related Indicators for the Global Biodiversity Framework"](#) project website. It is being circulated for information purposes only, and has not been finalized, endorsed, or released for public consultation.

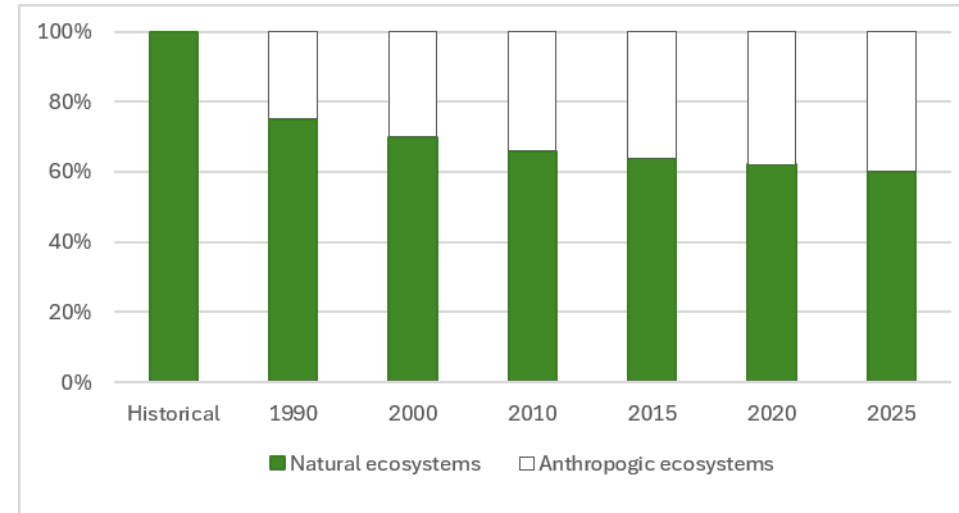


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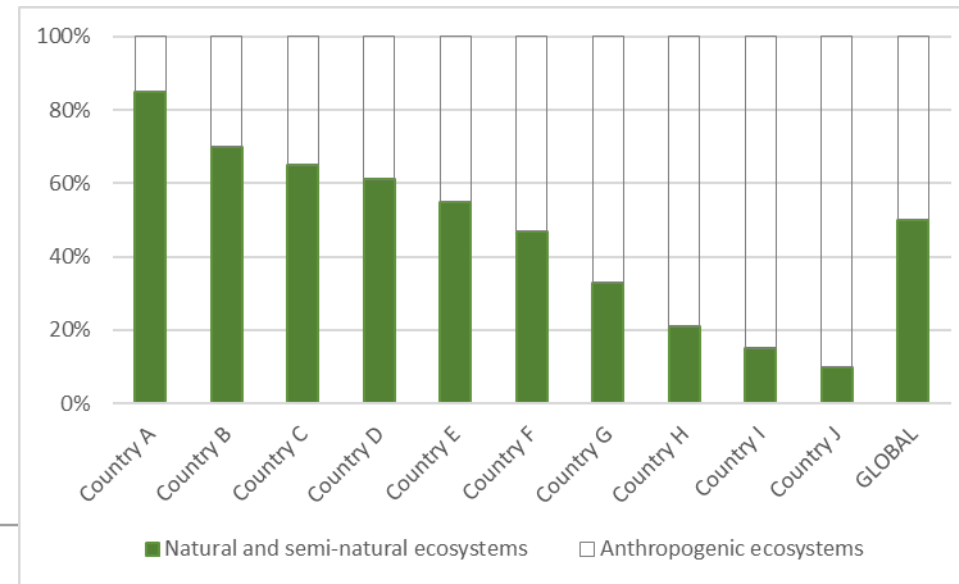
[SEEA-related Indicators for the Global Biodiversity Framework](#)

Indicator A.2: Extent of natural ecosystems

- **A.2 Rationale:**
- Natural ecosystems are the foundation of biodiversity, providing the conditions for a wide array of life forms to coexist and thrive
- Conversion of natural ecosystems to anthropogenic is a major driver of biodiversity loss
- **A.2 Intent:** Show the extent of natural ecosystems *as a proportion of total area* (of a country, a region or the globe), and to track changes in this proportion over time
- Easy-to-understand snapshot of the relative area of natural ecosystems at national and global level
- **Doesn't** reflect ecosystem condition

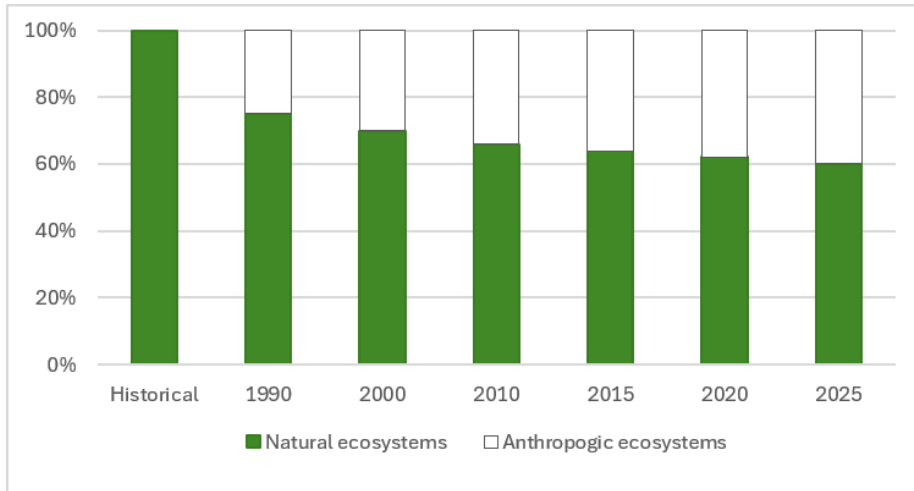


Mock-up of Indicator A.2 for **one country** over several years



Mock-up of Indicator A.2 for **several countries** and globally, in year X

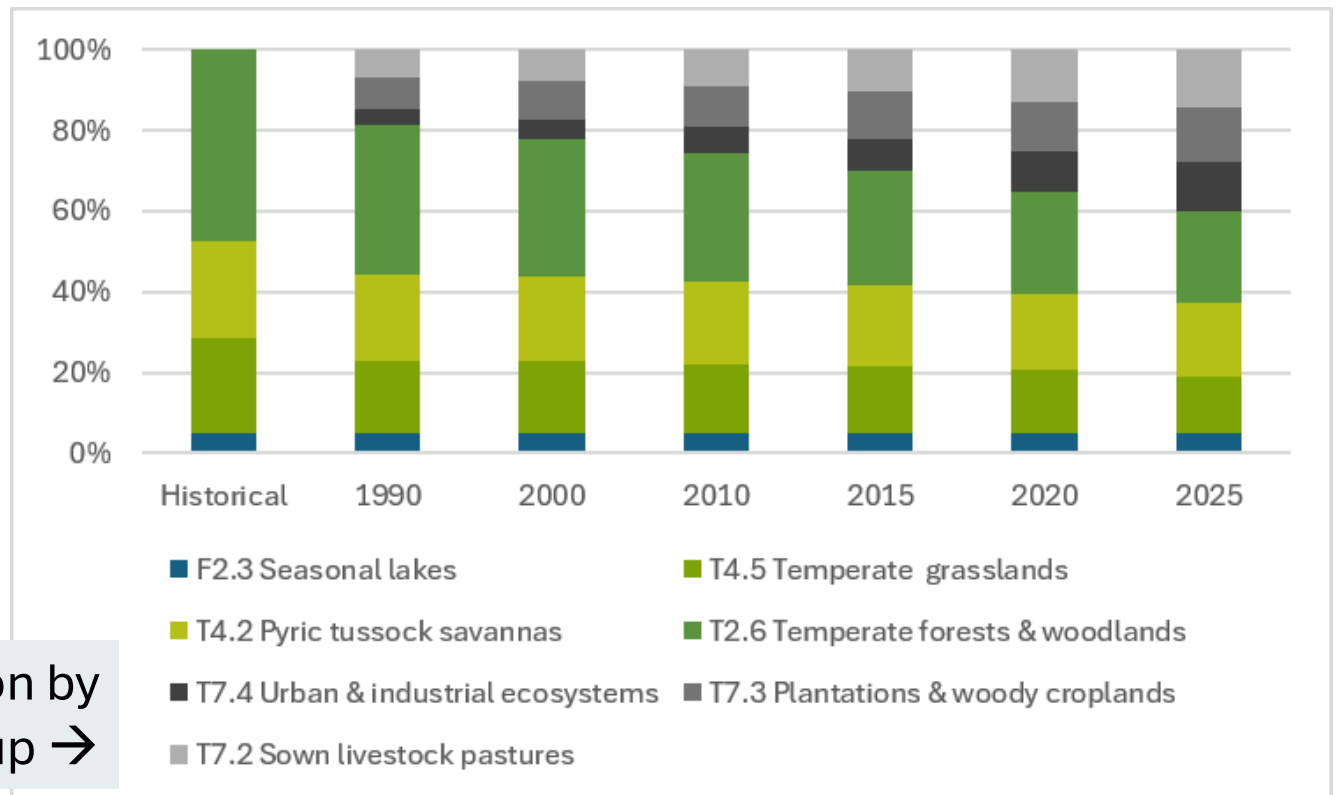
Basic (binary) version of Indicator A.2...



- Ecosystem-based disaggregation provides much richer information
- Supported by change matrices, typically compiled alongside ecosystem extent accounts – shows which ecosystem types have changed to which

Example of disaggregation by ecosystem functional group →

... is intended to be disaggregated by realm, biome, ecosystem functional group and ecosystem type

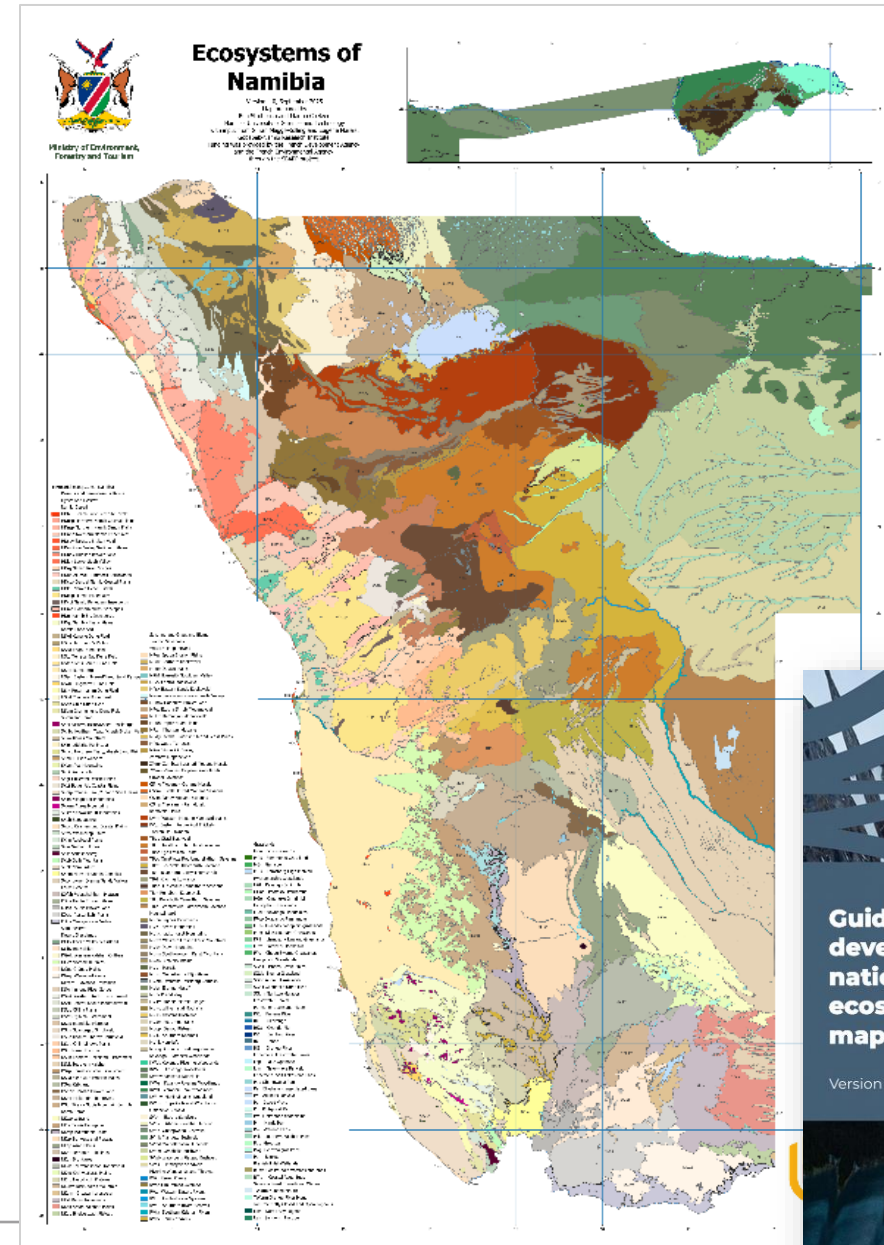


Central challenge for Indicator A.2

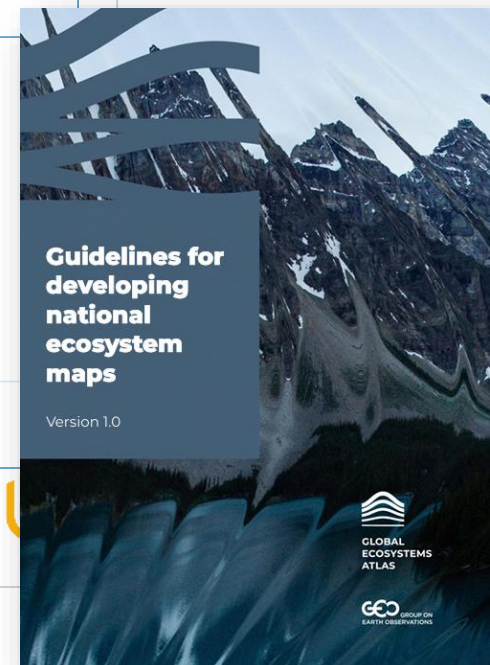
- Making a *binary distinction between natural and anthropogenic ecosystems* when in reality there's a continuum of human influence and impacts on ecosystems, over many millennia
- Must be able to make this distinction conceptually and operationalise it in practice
- Key to resolving this challenge is the concept of an *ecosystem type*

Ecosystem types

- Units in an *ecosystem classification system*, typically hierarchical
- Used for many real-world applications, not only ecosystem accounting
- An ecosystem type “reflects a distinct set of abiotic and biotic components and their interactions” (SEEA EA, paragraph 2.11)
- Characterised by distinct *compositional, structural and functional* properties – all three must be considered together for ecologically meaningful units
- Ideally identified and delineated as part of a *national ecosystem map* – foundational data product with a wide range of uses



Example of a national ecosystem map, for Namibia



Inclusive definition of natural ecosystem types

Starting points:

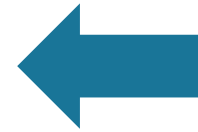
- Continuum of human influence and impact on ecosystems – arguably all ecosystems on Earth have been influenced by humans in some way
- Ecosystems modified by humans can support substantial biodiversity → no inherent requirement from a biodiversity perspective that “natural ecosystems” must be defined as pristine, wild or devoid of human influence
- Human activities are not always associated with biodiversity loss, e.g. may include conservation and restoration efforts, traditional or Indigenous management over millennia

This means: **Natural ecosystem types represent a broad category of ecosystems** that includes:

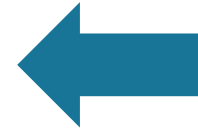
- **Ecosystems influenced or modified by human interventions**, but with natural compositional, structural and functional characteristics still at least partially present and recognisable
- Instances or occurrences of natural ecosystem types that are in a **range of condition states**, from excellent condition/high integrity to poor condition/low integrity

Narrow definition of anthropogenic ecosystem types

- “Anthropogenic” means originating from or caused by human activity
- Anthropogenic ecosystem types are *created and maintained* through human interventions, which are the *primary determinant* of the composition, structure and functioning of the ecosystem
- Typically *replace* pre-existing natural ecosystem types, which are no longer recognisably present (except maybe in small patches)
- Often associated with land- and sea-use systems in modern-day industrial societies
- Support far less biodiversity but not necessarily devoid of biodiversity



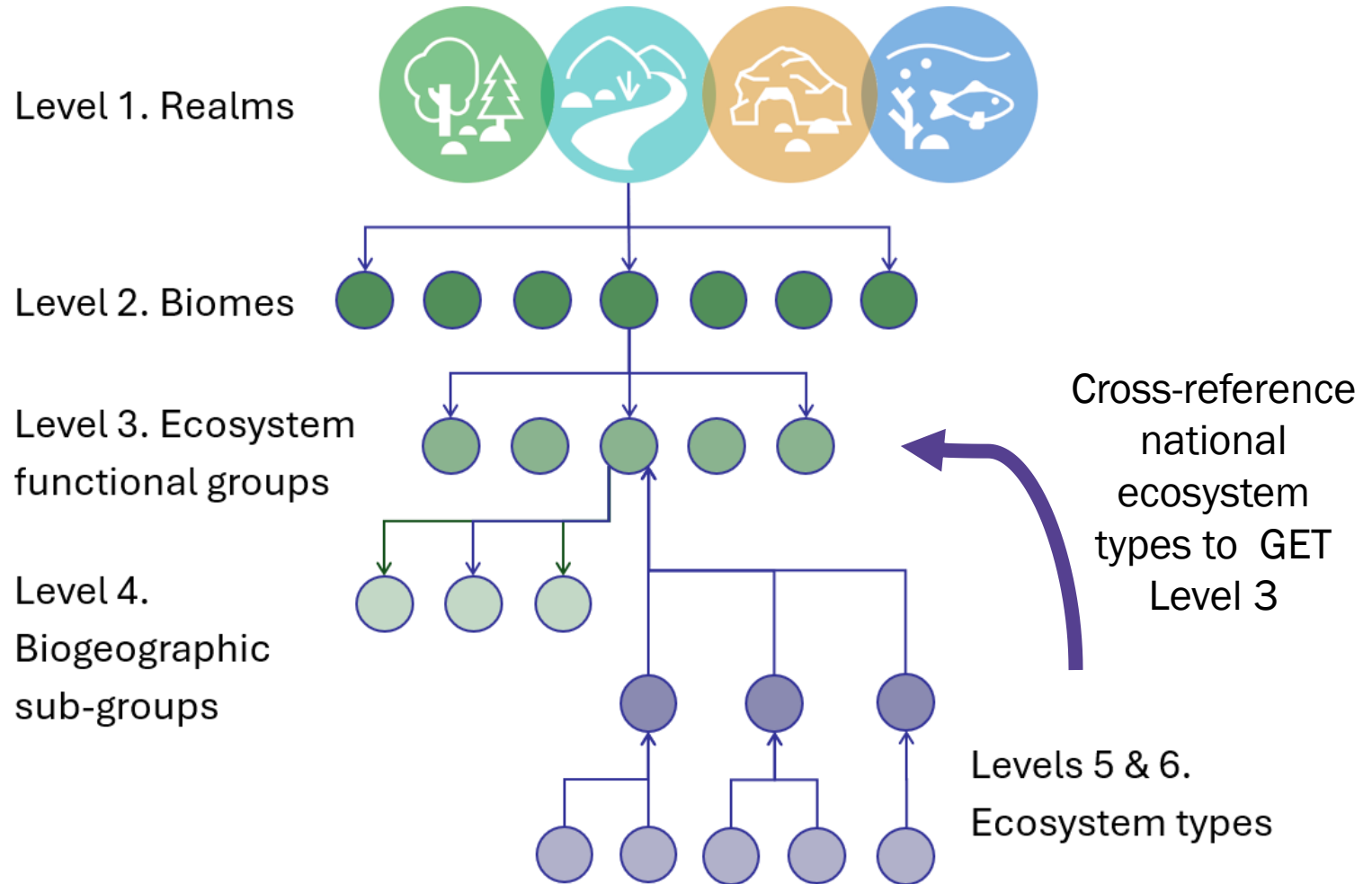
Criterion 1: *Created and typically maintained* by human activity, which is the *origin* of the ecosystem type



Criterion 2: Has *replaced*, not just altered, a pre-existing natural ecosystem type

Role of the IUCN Global Ecosystem Typology (GET)

- Reference classification for ecosystem types in SEEA EA
- Recommended for use in the GBF monitoring framework
- Links national ecosystem classifications to a consistent global system to enable comparison across countries and global synthesis
- Provides the basis for *allocating ecosystem types to natural and anthropogenic categories*



The GET has 4 anthropogenic biomes with 13 anthropogenic EFGs

Realm	Biome	Ecosystem functional group (EFG)
Terrestrial (T)	T7 Intensive land-use biome/Anthropogenic terrestrial biome	T7.1 Short-rotation croplands
		T7.2 Sown livestock pastures
		T7.3 Plantations and woody croplands
		T7.4 Urban and industrial ecosystems
		T7.5 Derived semi-natural pastures and old fields**
Freshwater (F)	F3 Artificial wetlands biome	F3.1 Large reservoirs
		F3.2 Constructed lacustrine wetlands
		F3.3 Aquatic and semi-aquatic croplands
		F3.4 Freshwater aquafarms
		F3.5 Canals, ditches and drains
Marine (M)	M4 Anthropogenic marine biome	M4.1 Submerged artificial structures
		M4.2 Marine aquafarms
Marine-terrestrial (MT)	MT3 Anthropogenic shorelines biome	MT3.1 Artificial shorelines

Anthropogenic ecosystem types are often associated with land- and sea-use systems that maintain modern-day industrial societies



Examples illustrating the distinction between natural and anthropogenic ETs

Natural ecosystem type	Anthropogenic ecosystem type
Savanna with livestock grazing, e.g. in Indonesia (EFG T4.2)	Sown livestock pastures (EFG T7.2)
Tropical lowland rain forest with logging, e.g. in Thailand (EFG T1.1)	Teak plantation (EFG T7.3)
Managed boreal pine forests, e.g. in Finland (EFG T2.1)	Pine plantation (EFG T7.3)
Shaded cocoa (natural forest interspersed with cocoa trees), e.g. in Ghana (T1 biome)	Mono-cropped cocoa plantation (EFG T7.3)
Large permanent natural lake with fishing, e.g. in Malawi (EFG F2.1)	Artificial (man-made) lake (EFG F3.1)
River modified for flood control or irrigation in an agricultural area, e.g. in Egypt (EFG F1.2)	Canals, constructed irrigation channels (EFG F3.5)
Mixed mangrove-aquaculture systems, e.g. in Viet Nam (EFG MFT 1.2)	Freshwater aquafarms (EFG F3.4)
Coastal dunes stabilised with grasses, e.g. in the Netherlands (EFG MT 2.1)	Constructed seawall (EFG MT 3.1)
Natural shellfish beds and reefs with low-intensity shellfish culture, e.g. in Canada (M1.4)	Marine aquafarms (EFG M4.2)

→ Natural ecosystems can be substantially modified without being converted to an anthropogenic ecosystem type

Where do semi-natural ecosystems fit in?

“Semi-natural” can mean:

- (1) A condition state of a natural ecosystem → falls within the broad category of natural ecosystem types, equivalent to modified natural ecosystems
- (2) A distinct ecosystem type

Key example is semi-natural grasslands in Europe – derived from natural forests or woody ecosystems, over millennia, through ongoing removal of biomass through human management

Within anthropogenic EFG T7.5 Derived semi-natural pastures and old fields:

- Specific ecosystem types may be grouped with the broad category “natural” IF the ecosystem type existed pre-industrially and/or has substantial importance for biodiversity
- Should be assessed at the national level based on context-specific knowledge and judgement



Important not to confuse changes in ecosystem condition with changes in ecosystem type

Modified or poor condition:
The natural ecosystem's identity remains recognisable

≠

Change in ecosystem type:
A natural ecosystem type is converted to an anthropogenic one

→ A change in ecosystem type occurs only when human intervention becomes the *primary* determinant of composition, structure and function

Some examples of natural ecosystems in poor condition:

Coral reef

Bleached and biodiversity-depleted, yet natural reproduction and complex trophic interactions continue

Savanna

Fire and grazing regimes are altered, yet native grasses, wildlife and seasonal processes still shape the system

Temperate forest

Fragmented and often secondary growth, yet native species, regeneration and core functions remain

Desert shrubland

Reduced plant cover and increased erosion, yet characteristic native species and ecological processes persist

Borderline cases related to agriculture, forestry and fisheries

The activity alone doesn't determine the ecosystem type

Borderline case	Is associated with a natural ecosystem type when...	Is associated with an anthropogenic ecosystem type when...
Shifting cultivation	Fallow periods allow secondary forest to recover and natural forest dynamics remain evident	Cropping intervals prevent secondary forest development and cultivation is the dominant system
Flood-recession agriculture	Seasonal flooding, wetland biota and natural hydrological dynamics continue to define the ecosystem	Cropping is intensive and continuous, with engineered irrigation or drainage; natural wetland characteristics are lost
Planted forests	Native species, natural regeneration and characteristic forest structure and functions are evident	Intensive planting and management maintain a simplified timber plantation system
Grazing systems	Native grasses and natural savanna or grassland processes still shape the ecosystem	Native vegetation is replaced by sown pasture, often dominated by introduced grasses, and is maintained for livestock production

→ **Borderline cases require contextual judgement:**
compare the relative influence of natural factors and human intervention

Borderline cases related to restoration of anthropogenic ecosystems towards natural ecosystems

Restoration is a transition – usually slow

Examples:

- Sown pasture restoring to the forest ecosystem type it replaced
- Exotic pine plantation restoring to a native shrubland
- Wetland re-establishing following dam removal and flow recovery
- Abandoned cropland reverting to a natural ecosystem type
- Coastal dune system re-establishing following the removal of a protective seawall

To assess if the ecosystem type has changed to a natural one, consider:

- **Compositional criteria**, e.g. presence of native species assemblages with self-sustaining populations
- **Structural and functional criteria**, e.g. vegetation layers, hydrological regimes, disturbance dynamics
- **Human intervention criteria**, e.g. limited human maintenance

→ **Classification of ecosystem type should reflect the ecosystem's present identity, based on composition, structure and function, not simply the restoration intention**

Questions for the London Group

- Are the proposed definitions of natural and anthropogenic ecosystem types clear and coherent? Are they applicable in a range of ecological contexts around the world?
- Are the two criteria for identifying anthropogenic ecosystem types (i.e., (i) human activities *create* and *maintain* the ecosystem type, (ii) *replacing* an antecedent natural ecosystem type) clear and sufficient?
- For Indicator A.2, is the approach to dealing with semi-natural ecosystem types that fall within EFG T7.5 of the Global Ecosystem Typology suitable?
- Are the definitions and criteria well aligned with nature restoration projects, especially from the perspective of GBF Goal A which includes substantially increasing the area of natural ecosystems by 2050?
- Could these definitions be relevant and useful more widely than for Indicator A.2? For example, for other indicators and for policy, planning and monitoring more broadly?