Genetic diversity targets and indicators proposed for the CBD post-2020 Global Biodiversity Framework

POLICY BRIEF

Executive Summary

Genetic diversity goals and metrics to assess genetic diversity (indicators) in the post-2020 biodiversity framework must be improved to prevent the irreplaceable loss of biodiversity and to meet the Convention on Biological Diversity (CBD) targets. Genetic diversity within **all species** must be conserved, measured, and monitored using appropriate metrics. Suitable for the post-2020 framework, we propose a genetic Goal with a recommended Action Target, and suggest three new genetic indicators, plus changes to current CBD indicators.

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Like many species, pool frogs (*Pelophylax lessonae*) live in multiple connected populations, which should be considered when measuring genetic diversity

Background

Genetic diversity contributes to supporting human society and the life support systems of the biosphere. It is decreasing globally due to human actions. This diversity enables species to adapt, maintains ecosystem services (e.g. water filtration, food), and is essential to ensure the resilience of species and ecosystems to climate change. The "zero draft" of the CBD's post-2020 framework follows the 2011-2020 CBD strategy to conserve biodiversity, for which few targets have been met. **Maintaining genetic diversity is recognised in the post-2020 strategy as one of five primary 2050 goals. However,**

1. The CBD's zero draft Goal for genetic diversity is weak and unclear (Laikre et al. 2020, Science)
2. There is no 2030 Action Target for genetic diversity.
3. Current CBD genetic diversity indicators neglect most wild species as they are restricted to domesticated species and their wild relatives. Wild species are essential to ecosystem integrity and services, especially under climate change.
4. The current indicators are also inadequate to sufficiently monitor changes in genetic diversity.

Proposed indicators

To meet global conservation goals, we propose that genetic diversity within all species needs to be conserved, measured, and monitored using appropriate metrics.

We propose three new indicators for the post-2020 CBD framework, to be used in addition to modifications to the current CBD's zero draft indicators. One indicator alone is insufficient for monitoring progress towards the CBD genetic diversity goal. These indicators:

- · Are applicable to all species,
- · Are available immediately.
- · Are scalable, thus, can be calculated locally, regionally, or globally.
- · Can be aggregated across species and among different taxonomic groups.
- · Do not require genetic data (Indicator 1, 2).

For more details please read our paper or contact **Sean Hoban** shoban@mortonarb.org and **Linda Laikre** linda.laikre@popgen.su.se

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Proposed Indicators

1.

The number of populations [or breeds] within species with an effective population size > 500 compared to the number < 500

Ne lower than 500 means that a population has a reduced ability to adapt to environmental change. If no genetic, demographic, or pedigree data is available on a species, *Ne* **can be roughly approximated as 1/10 (i.e. 10%) of the population census size (number of adults).**

2.

The proportion of (sub)populations [or geographic range] maintained within species

The loss of genetically distinct wild populations, or the agricultural equivalent - breeds, landraces, or varieties - will result in large losses of genetic diversity within species. This indicator **compares the number of genetically distinct populations, relative to a historic baseline.** Alternatively, a percentage of the species historic range which is maintained would suffice.

3.

The number of species and populations in which genetic diversity is being monitored using DNA-based methods

To safeguard genetic diversity we need to know the level of genetic diversity within and among populations, environmental drivers of that diversity, and how connected the populations are. However, **this indicator cannot be relied on alone** as it may simply reflect a greater ability to gain this information OR more species being targeted for conservation genetic research efforts.

Edits to current CBD Zero Draft Goal 3 indicators

- Do not use IUCN Red List Index as a genetic indicator
- Ensure minimum requirements for *ex situ* collections are representative, replicated, and resilient
- Include **all species,** not only domesticated and their wild relatives

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Effective population size (*Ne*) is an estimate of the genetic population size. *Ne* is smaller than census size because not all individuals in a population reproduce, and those that do can have different numbers of offspring. Factors like population inbreeding may reduce *Ne* further.

2030 Goal

Maintain existing genetic diversity and halt the loss of genetic diversity **within all species**. Develop and initiate strategies to avoid future genetic diversity loss.

2050 Goal

Secure and **restore adaptive potential** and **long-term maintenance** of genetic diversity within populations of species.

Action Target

Halt loss, retain, safeguard and restore the genetic diversity and adaptive potential of species and populations, in the wild and in captivity/collections, assuring that by 2030: populations have an effective population size >500, genetic diversity and genetic connectivity is monitored using DNA-based methods in populations of key species, and loss of distinct populations within species has been halted.

Microcycas calocoma (critically endangered). Most *ex situ* collections of this species descended from one plant. Collections must be more resilient, representative, and replicated to conserve genetic diversity.