Genetic diversity indicators for the Global Biodiversity Framework are developed, tested and ready for implementation

POLICY BRIEF

SUMMARY

Genetic diversity is a vital part of populations, species and ecosystem resilience - **and can be monitored and reported on using simple indicators that do not need DNA analysis and have data available**. Genetic diversity indicators can be compiled for 100+ species per country quickly, and have national and local benefits. Assessment of 900 species of plants and animals across nine countries has shown: **(a) most populations are maintained BUT (b) in most species, many populations are too small and are losing genetic diversity. Guidance and support for indicator implementation are available.**

The Kunming-Montreal GBF requires conserving genetic diversity of all species

- Genetic diversity helps species adapt to changing conditions, contributes to ecosystem resilience, and improves ecological restoration success.

- Genetic diversity is declining due to habitat loss, fragmentation, overharvest, and other human activities.

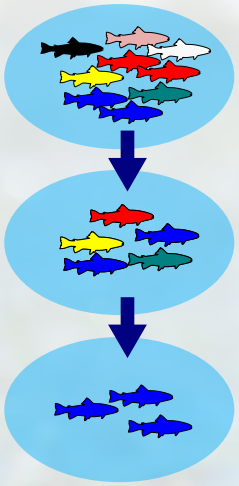
Parties to the CBD are now required to report progress on conserving genetic diversity using indicators of genetic status

- The proportion of populations within species with an effective population size N_e > 500 (Headline indicator A. 4.0).

- The proportion of populations maintained within species.

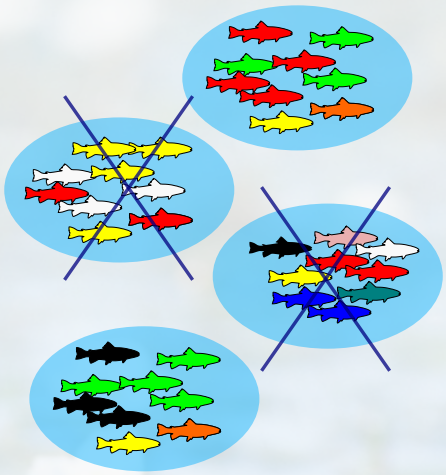
Genetic diversity is variation at the DNA level, but **DNA data are not essential to assess genetic diversity indicators**. The indicators use reliable proxies for genetic diversity change.

Loss of diversity in small populations



Very small populations lose genetic diversity and suffer inbreeding, low viability, and reduced adaptive capacity.

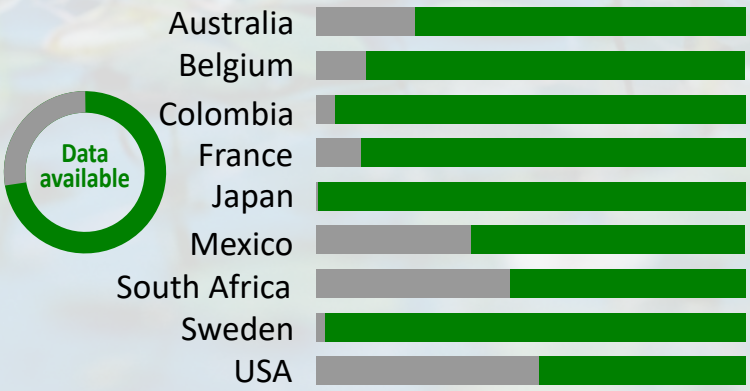
Loss of genetically distinct populations



When populations go extinct, unique genetic variation is lost from the species' gene pool.

Why should genetic diversity be monitored using indicators?

Genetic diversity indicators are useful conservation tools, even beyond the CBD, to guide conservation action, endangered species management, and help communicate with the public about genetic threats.



Green bars show proportion of species with enough data available - which is the majority of species.

Genetic diversity indicators have been used in nine countries across the world including megadiverse countries- and the genetic diversity situation is critical!

- Indicators were assessed for >900 species from Australia, Belgium, Colombia, France, Japan, Mexico, Sweden, South Africa, and USA. 72% of species had data for at least one of the indicators.

- The indicators are affordable and feasible with existing data and require limited time.

- They are applicable and comparable in all countries, taxonomic groups, and ecosystems.

- The indicators show many populations are at a threshold of dramatic genetic diversity decline unless swift action is taken.

Turn the page to read more.

90% of populations of *Luronium natans* (Belgium) are too small to maintain genetic diversity

What type of data are needed and is the process practical for most countries?

• Useful information includes current or recent population sizes, and number of current and lost populations - even rough estimates (e.g., less than 1000, many thousands).

• Data can be gathered from experts, existing research or management reports, agency databases, NGOs, local knowledge, citizen science data (e.g., INaturalist), or GIS based estimates.

• Populations can be defined using geographic isolation, genetic knowledge, ecoregion/ habitat differences, dispersal radius, or other information.

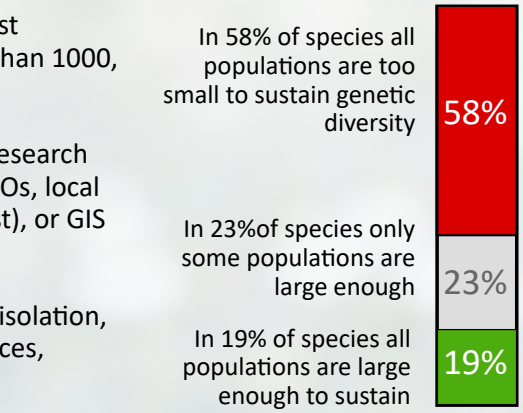
• If there is uncertainty, multiple estimates can be used.

HEADLINE indicator 4.A
% of populations within species with N_e>500

In 58% of species all populations are too small to sustain genetic diversity

In 23%of species only some populations are large enough

In 19% of species all populations are large enough to sustain genetic diversity



n=561

Complementary indicator
% of populations maintained

40% of species have lost at least 1 out of every 10 populations

53% of species maintain all their populations

n=518

Fewer than 5000 individuals remain of *Capensibufo rosei* (South Africa), with only 2 of the 6 populations maintained.

What are the capacity needs?

• Personnel (ideally with knowledge of biodiversity databases, national reporting, management plans, etc.) compile the information- about 400 hours to do 100 species.

• If coordinated with Red Listing efforts, this time can be greatly reduced.

• The country does not need DNA-based genetic research or infrastructure. All data can come from non-genetic sources.

• Hundreds of species can be analyzed with the genetic diversity indicators much faster and more affordably than DNA based studies.

• Still, DNA based projects do provide more detailed and accurate information on species' genetic health.

Guidance for the indicators is available

• Help is available to advise on how to calculate and report the indicators and include them in National Reports and National Biodiversity Strategy and Action Plans, and use them for national or local policy and management. Use the QR codes below!

Next steps?

• UNEP metadata is complete. More support is being developed. Additional written and video guidance will be available by January 2024.

• We suggest the CBD Glossary should now include more genetic terms to help Parties in their reporting.

The genetic diversity indicators have also been estimated in crop wild relatives such as this wild cotton (*Gossypium hirsutum,* Mexico).

Follow the QR link for details of the approach

THE COALITION FOR CONSERVATION GENETICS

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