

WHAT IS BIOLOGICAL DIVERSITY?



Biological diversity or biodiversity is the variety of life - the wealth of life forms found on earth.

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WHAT IS BIOLOGICAL DIVERSITY?

Wilcox's (1984) definition: *"Biological diversity is the variety of life forms at all levels of biological systems (organization) from molecules, to organisms, species, populations, communities and ecosystems (and landscapes)"*

Species = one unit of biodiversity [Species = *a group of genetically similar organisms that interbreed and produce fertile offspring*]. [So, what prevents different species from interbreeding?]

But life on earth contains much greater variety than can be measured by species alone.

Each species contain its variety, such as different races or breeds, and differences among individuals.

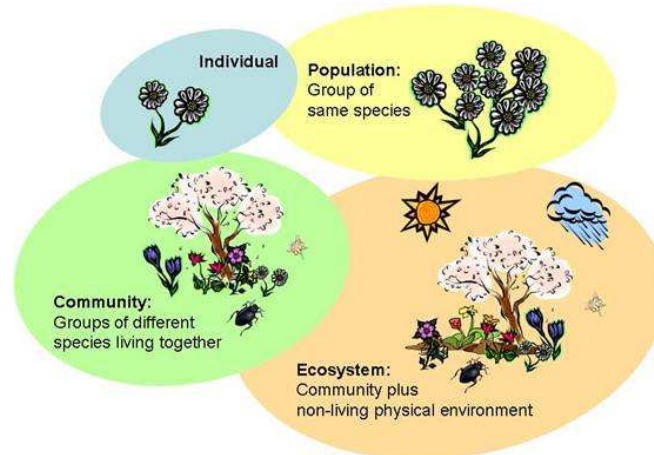


WHAT IS BIOLOGICAL DIVERSITY?

Species come together to form communities.

Communities come together to form ecosystems.

Hence, biodiversity comprise the millions of different plants, animals and micro-organisms, the genes they contain and the intricate ecosystems they form.



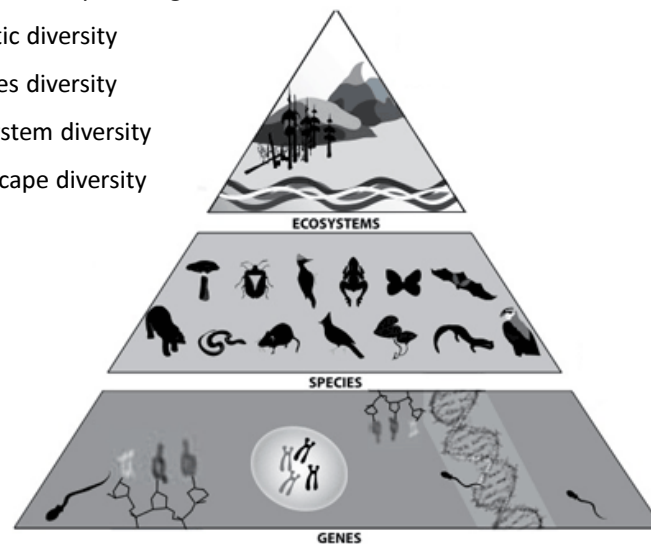
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BIOLOGICAL DIVERSITY

Plus, many species survive in only one specific ecosystem.

Hence biodiversity is recognized at three/four levels:

1. genetic diversity
2. species diversity
3. ecosystem diversity
4. landscape diversity



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GENETIC DIVERSITY

Encompasses the differences in DNA among individuals within species and populations

- Populations with higher genetic diversity = survive (can cope with environmental change)
- Populations with low genetic diversity = vulnerable to environmental change and disease
- Inbreeding depression = genetically similar parents mate and produce inferior offspring



What's the significance?

Understanding genetic diversity has made it possible to:

- ✓ *produce new breeds* of crop plants and domestic animals, and in the wild allowed species to adapt to changing conditions.
- ✓ *minimize the deleterious effects* of inbreeding, important for breeding programs for endangered species

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SPECIES DIVERSITY

...frequently used as a measurement of the total number of species within discrete geographical boundaries.

the number or variety of species in the world or in a particular region



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ECOSYSTEM DIVERSITY

Can be:

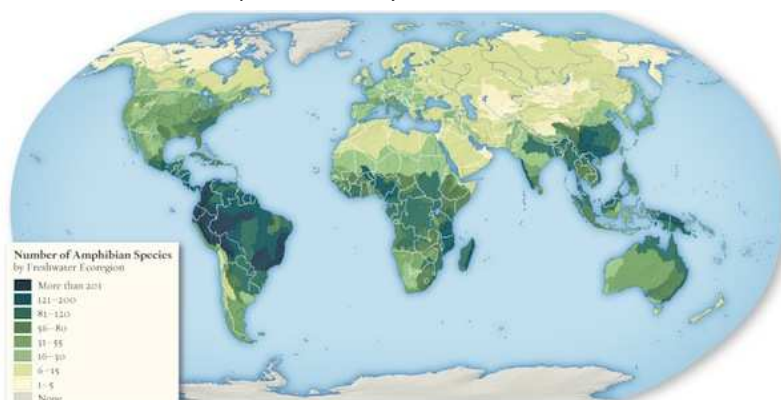
- ✓ the *variety of species* within different ecosystems – the more diverse ecosystems contain more species;
- ✓ the *variety of ecosystems* found within a certain biogeographical or political boundary



ECOSYSTEM DIVERSITY

Note:

- *rapid vegetation change and varying landscapes within an ecosystem promote higher levels of biodiversity*
- *living things not evenly distributed across Earth - species richness increases towards the equator*
- *diverse habitats increase species diversity*



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LANDSCAPE DIVERSITY

...variation in landscapes within a region.

A landscape is "*a mosaic of heterogeneous land forms, vegetation types, and land uses*" (Urban et al., 1987).

...assemblages of different ecosystems (the physical environments and the species that inhabit them, including humans) create landscapes on Earth.

[Note: no standard definition of the size of a landscape, but usually in the hundred or thousands of square kilometers].



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LANDSCAPE DIVERSITY

Note:

- *Diversity within and between landscapes depends on local and regional variations in environmental conditions (as well as the species supported by those environments).*
- *In turn, species composition and population viability are often affected by the structure of the landscape*
- *Landscape diversity is often incorporated into descriptions of "ecoregions"*



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HIERARCHICAL INDICATORS OF BIODIVERSITY			
	Composition	Structure	Function
Genetic	Allelic diversity Presence/Absence rare alleles	Heterozygosity Polymorphism	Inbreeding Gene flow Genetic drift
Population-Species	Abundance Density	Sex ratio Age distribution	Population growth Mortality rates Pop. fluctuations
Community-Ecosystem	Species richness Exotic to native sp. Endemic species	Habitat attributes- vegetation Keystone species	Patch dynamics Nutrient cycling Herbivory, predation, etc.
Landscape	Multipatch habitat types Species distributions	Connectivity Fragmentation	Energy flow Nutrient cycling Disturbance