



GOVERNMENT OF ANDHRA PRADESH
COMMISSIONERATE OF COLLEGIATE EDUCATION



LEVELS OF BIODIVERSITY

Life Skill Course: Environmental Education

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Levels/Types of Biodiversity

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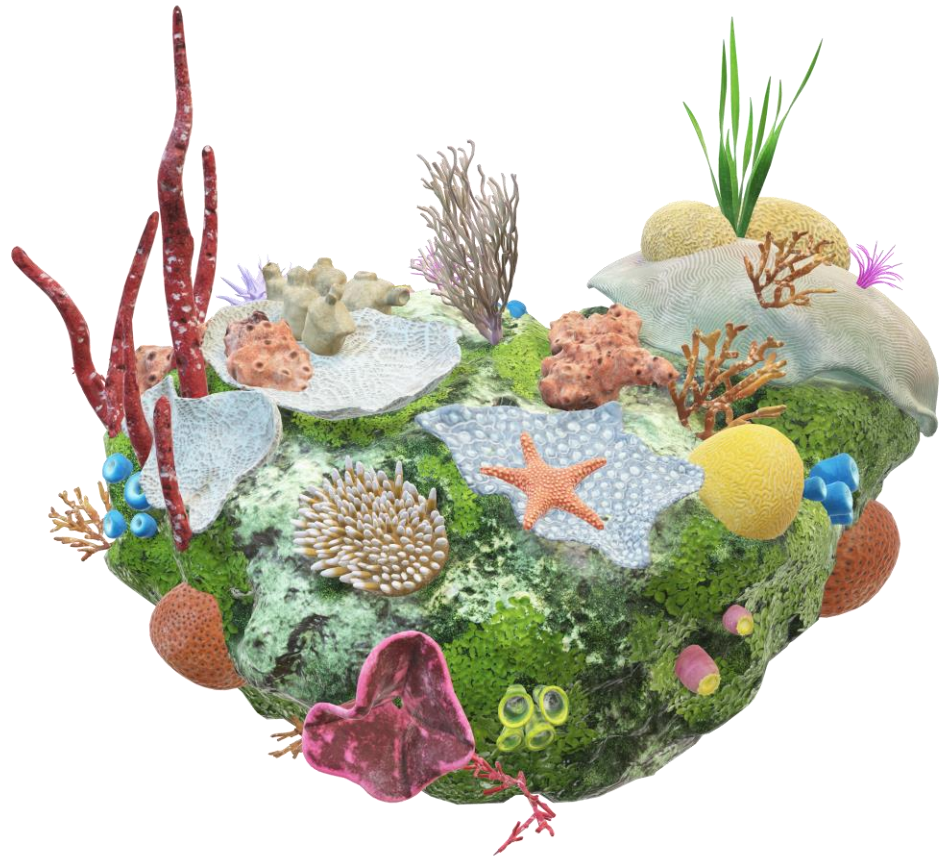
- Beta diversity

- Gamma diversity

Learning Outcomes

After completion of this topic the students will be able to :

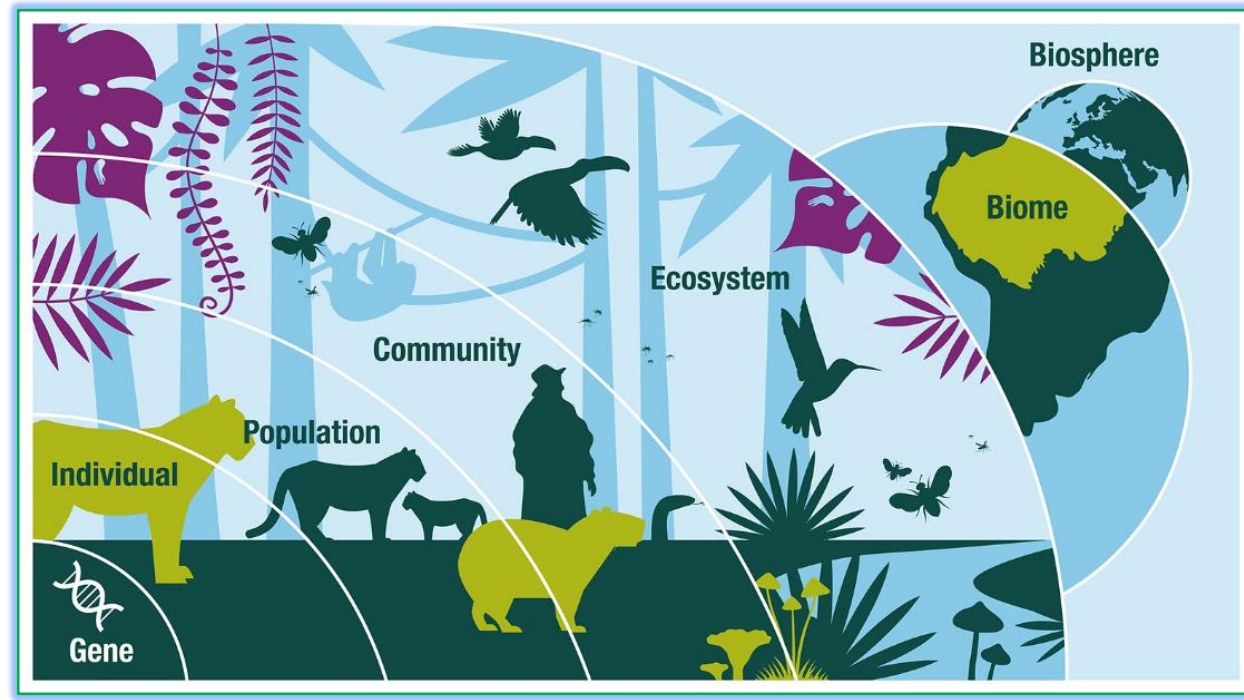
- Understand the importance of biodiversity and gain knowledge on different levels of biodiversity.
- Examine the variety of life on earth.
- Realize the role of each species and its importance in sustaining the biodiversity in the ecosystem.
- Explore the complexity of biodiversity.



Types of Biodiversity

Biodiversity-Definition

The concise definition of biodiversity used by the biologists is “totality of genes, species and ecosystems of a region”



Source: <https://www.flickr.com/photos/191878461@N05/50888035817/in/photostream/>

Levels of Biodiversity

- Different types of diversities help in maintaining the balance of nature.
- Therefore, biodiversity and its proper maintenance is vital for the sustainable life in this planet.



Levels of Biodiversity

Genetic Biodiversity

Variety of genetic makeup within a species

Species Biodiversity

Variety of Species in a specific region

Ecosystem Biodiversity

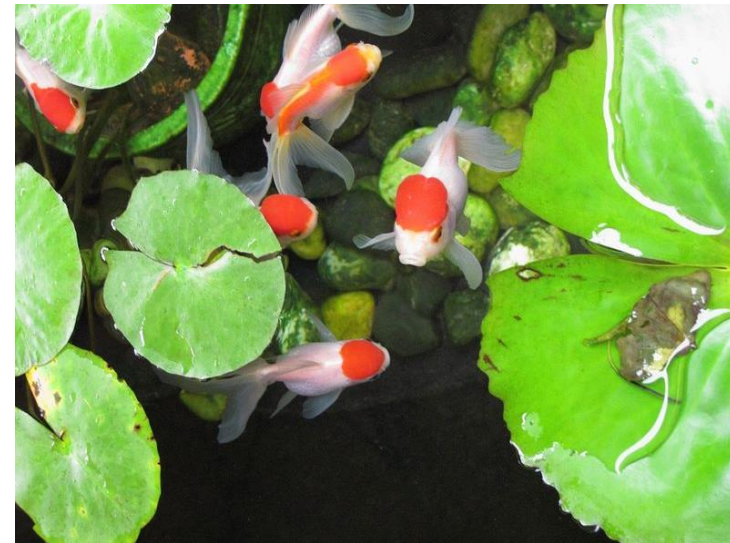
Variety of habitats, ecosystems & communities



Source: <https://rb.gy/dch6aa>



<https://rb.gy/ckjvmn>



<https://rb.gy/oe76up>

1. Genetic diversity

- Genetic diversity: **the diversity within species**
- Each individual of a particular species differs from others in their genetic composition.



<https://rb.gy/z8dqje>



<https://rb.gy/stwadd>

1. Genetic diversity

- Also, there are different varieties in the same species of dogs, frogs, fishes, birds, rice, potatoes etc.



Source: <https://rb.gy/arllx2>



Source: <https://rb.gy/zda4tr>

1. Genetic diversity

- Also, there are different varieties in the same species of dogs, frogs, fishes, birds, rice, potatoes etc.



Source: <https://rb.gy/uhvbqo>



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1. Genetic diversity

- Also, there are different varieties in the same species of dogs, frogs, fishes, birds, rice, potatoes etc.



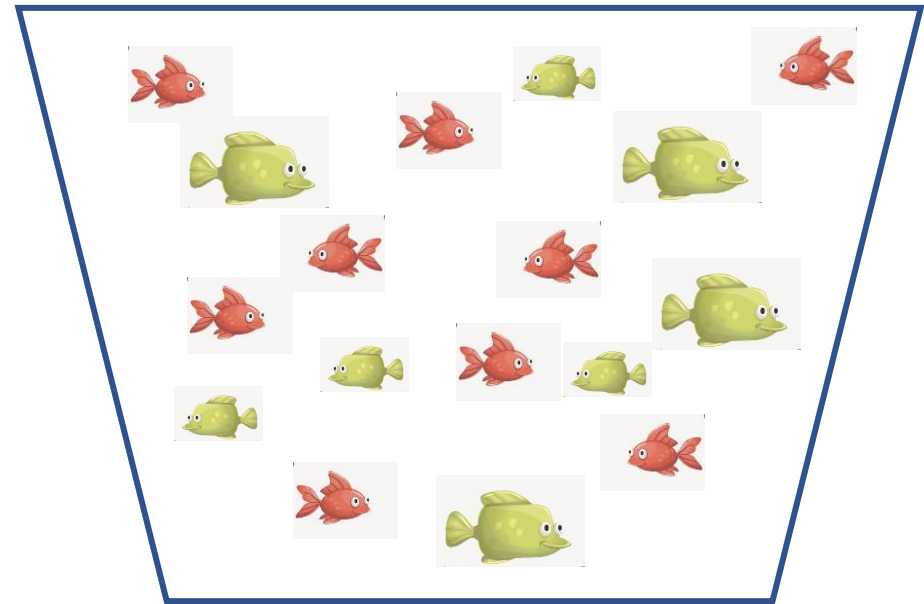
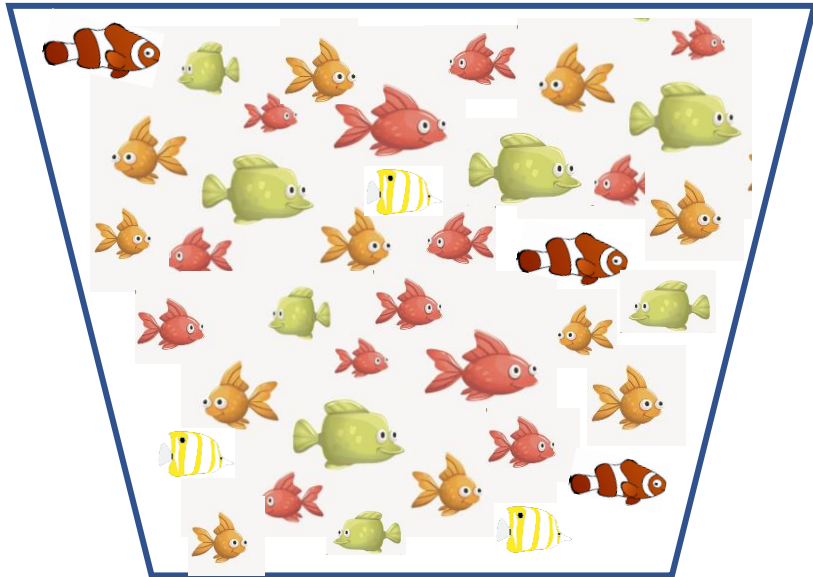
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1. Genetic diversity

- Permits species to adapt to the environmental pressures.
- The loss of individuals and populations through habitat destruction narrows the gene pool- **genetic erosion**
- Genetic diversity increases the chances for a species' survival.



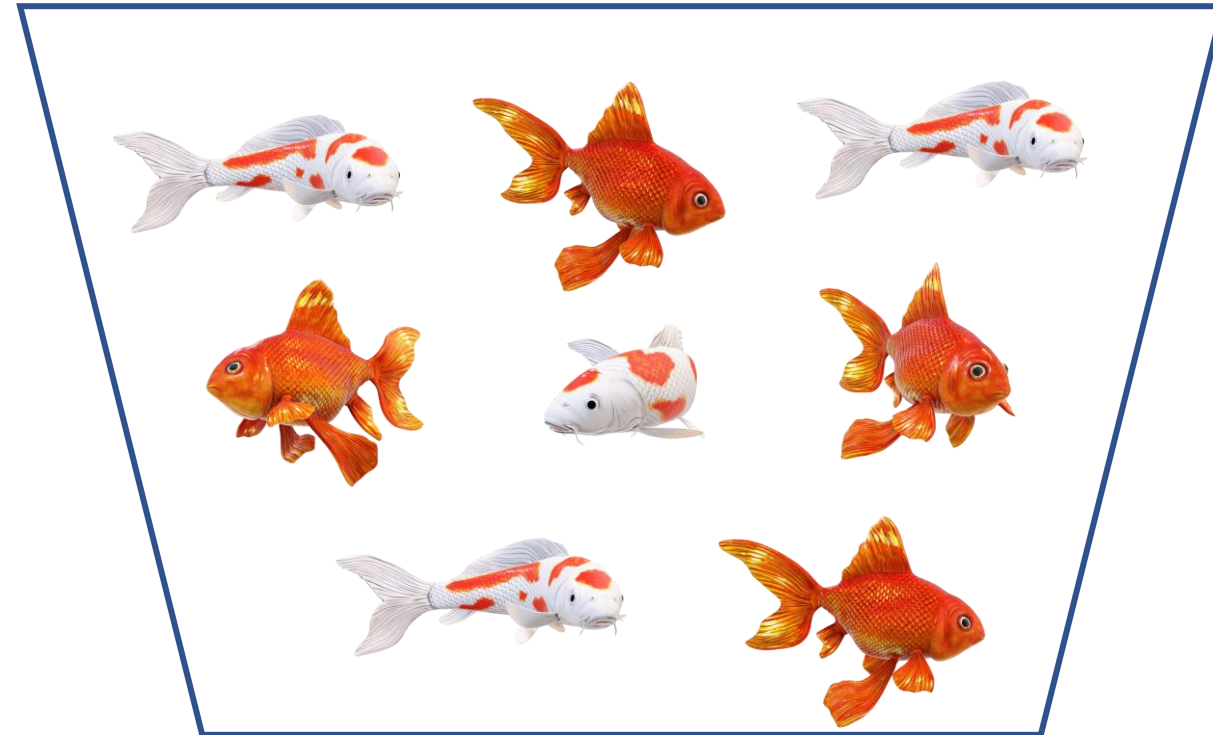
1. Genetic diversity

- Genetic diversity increases the chances for a species' survival.



High Genetic Diversity

large populations retain high genetic diversity



Low Genetic Diversity

small populations lose genetic diversity

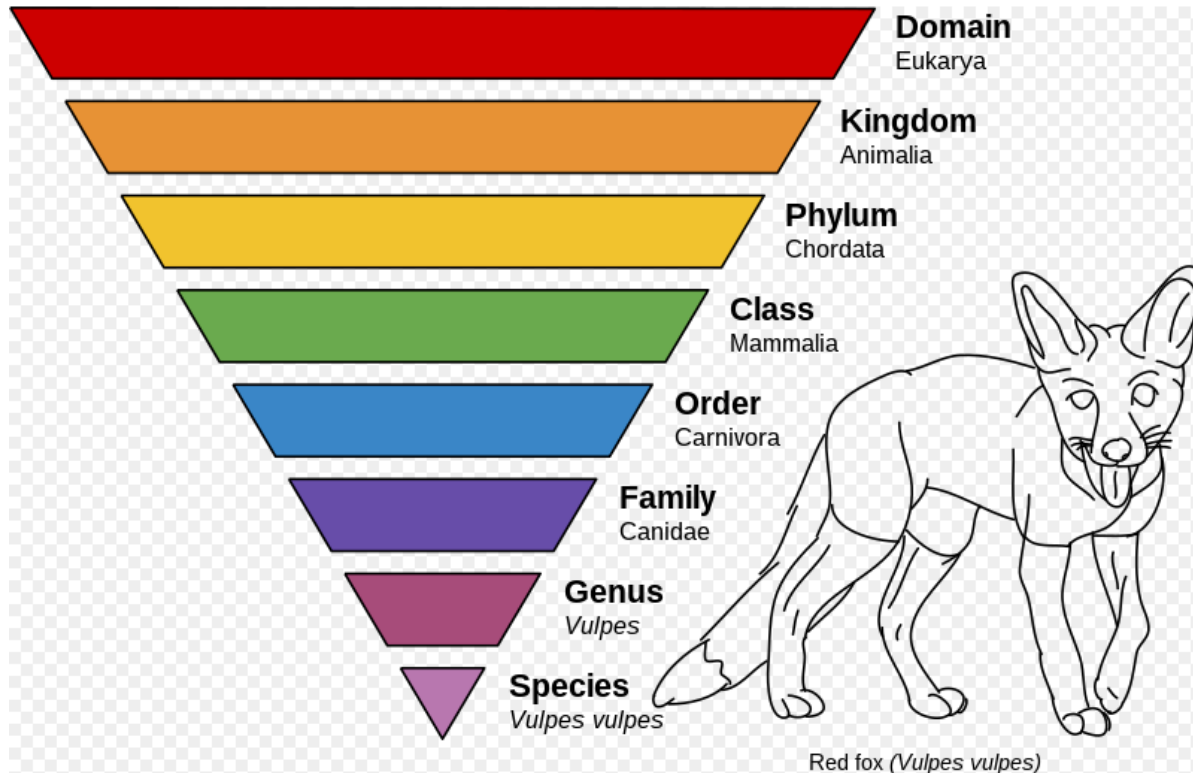
2. Species diversity

- Species diversity: **variety of species with in a geographical area**
- Basic level of biodiversity - microorganisms to multi cellular plants and animals.



2. Species diversity

- A **Species** represents a group of organisms which has evolved distinct inheritable features that occupies a unique habitat.



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2. Species diversity

*Species
Richness*

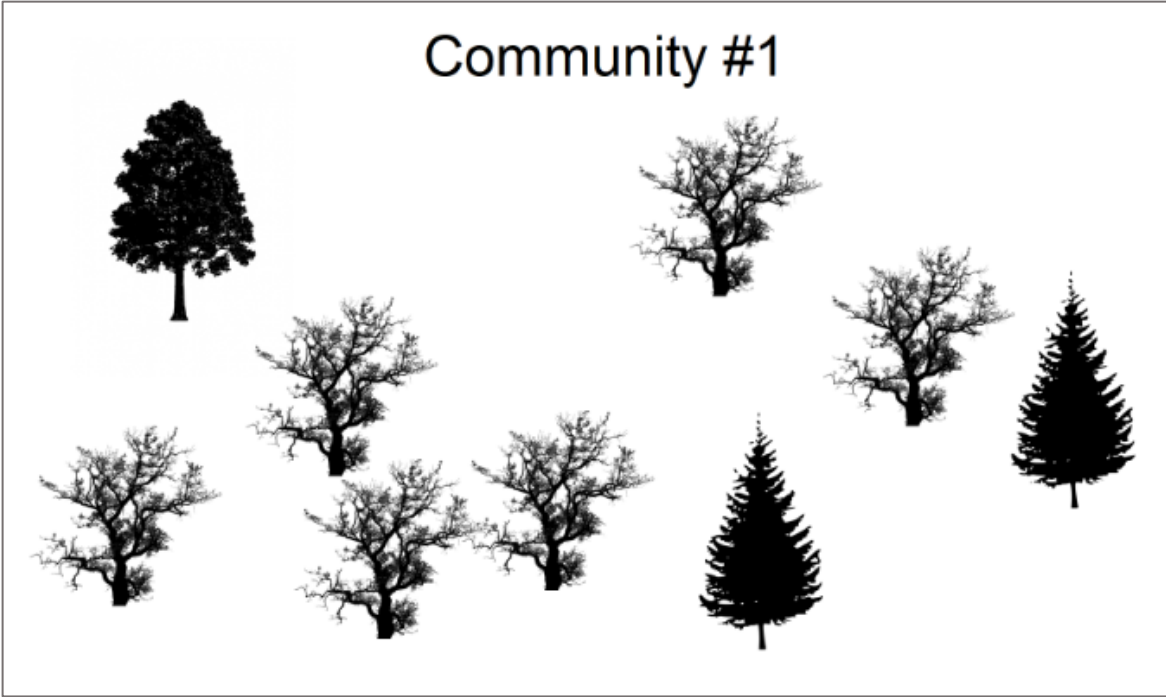
**Number of species
living in a habitat
or a given area**

*Species
Evenness*

**Number of individuals in
a species relative to the
total number of
individuals in all species
with in a group**

2. Species diversity

Community #1



Species richness

Community #2



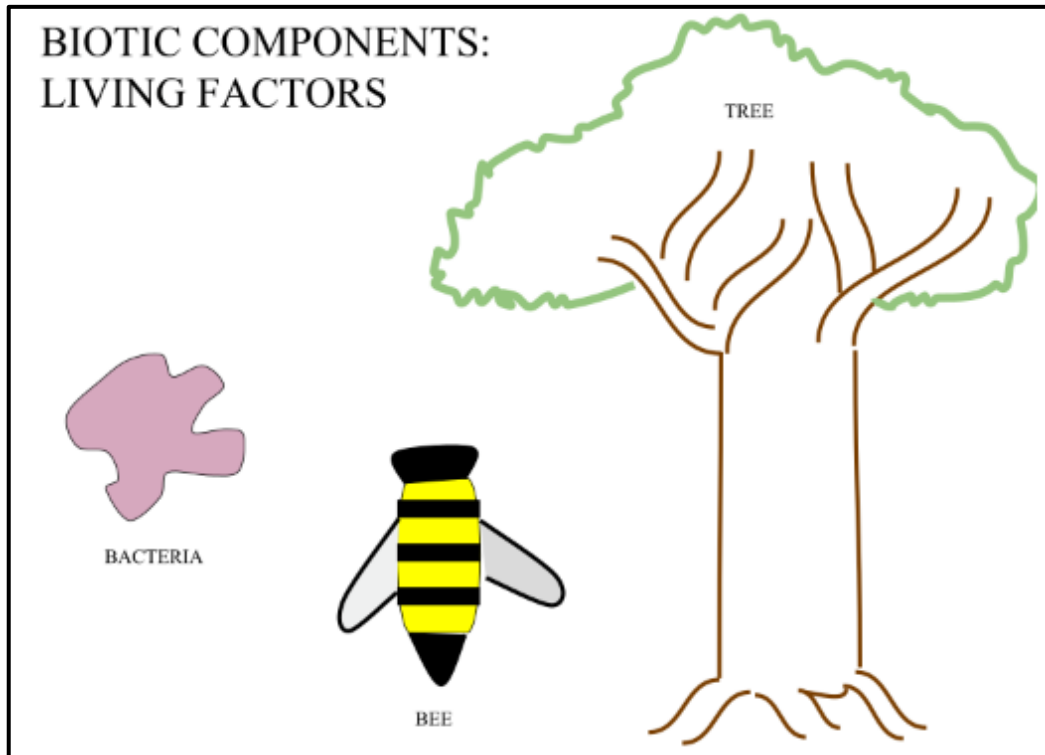
Species Evenness

2. Species diversity

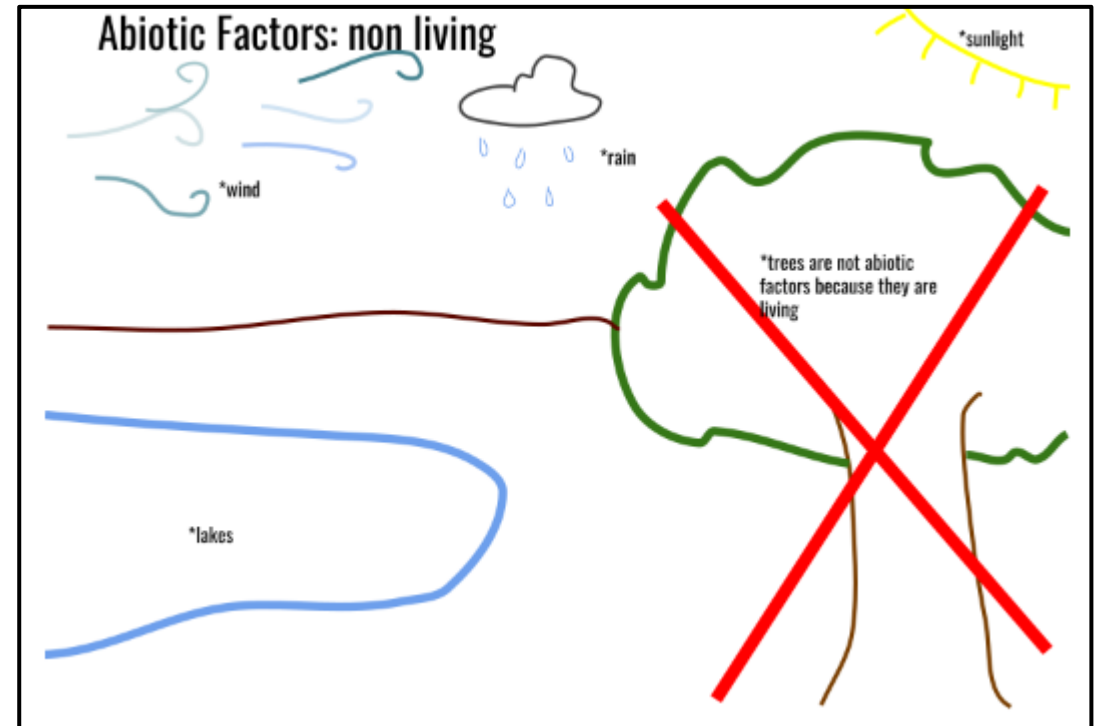
- Areas with more species diversity - ‘**hotspots**’ of biodiversity.
- There are currently 36 recognised biodiversity hotspots.
- Healthy ecosystems are rich in species diversity and helps in maintaining ecological services.

3. Ecosystem diversity

- ❑ Variations among the species in local ecosystems and their interactions
- ❑ Ecosystem - biotic (living) and abiotic (non-living) components- forms a functional unit.



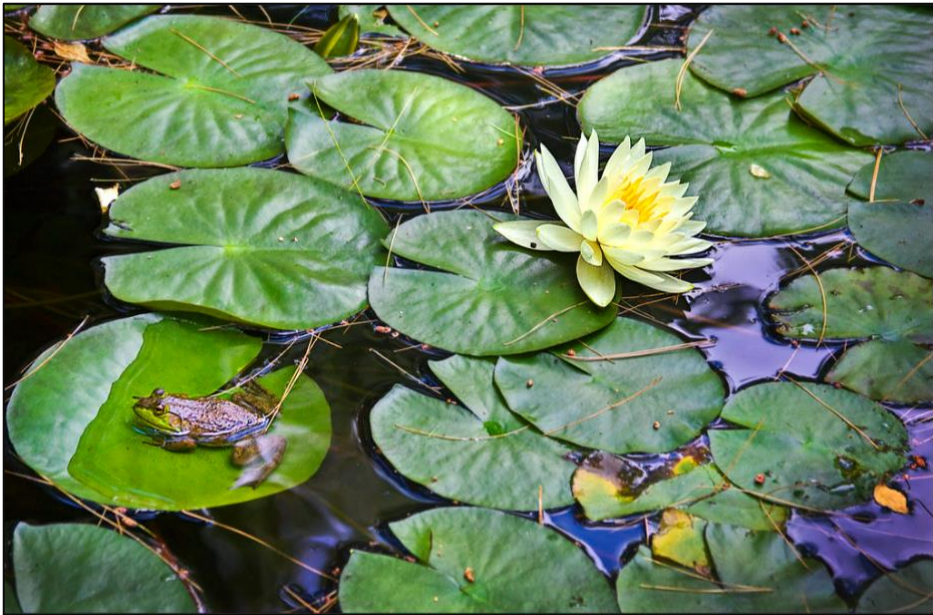
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3. Ecosystem diversity

- ❑ Ecosystems can be **small and ephemeral** (e.g., pond and puddle etc.)
- ❑ They can be **large and long-lived** (e.g., Forest and ocean etc.)



Pond ecosystem

Source: <https://www.flickr.com/photos/calliope/5907599218>



Forest ecosystem

Source: <https://www.flickr.com/photos/dfid/4115002439>

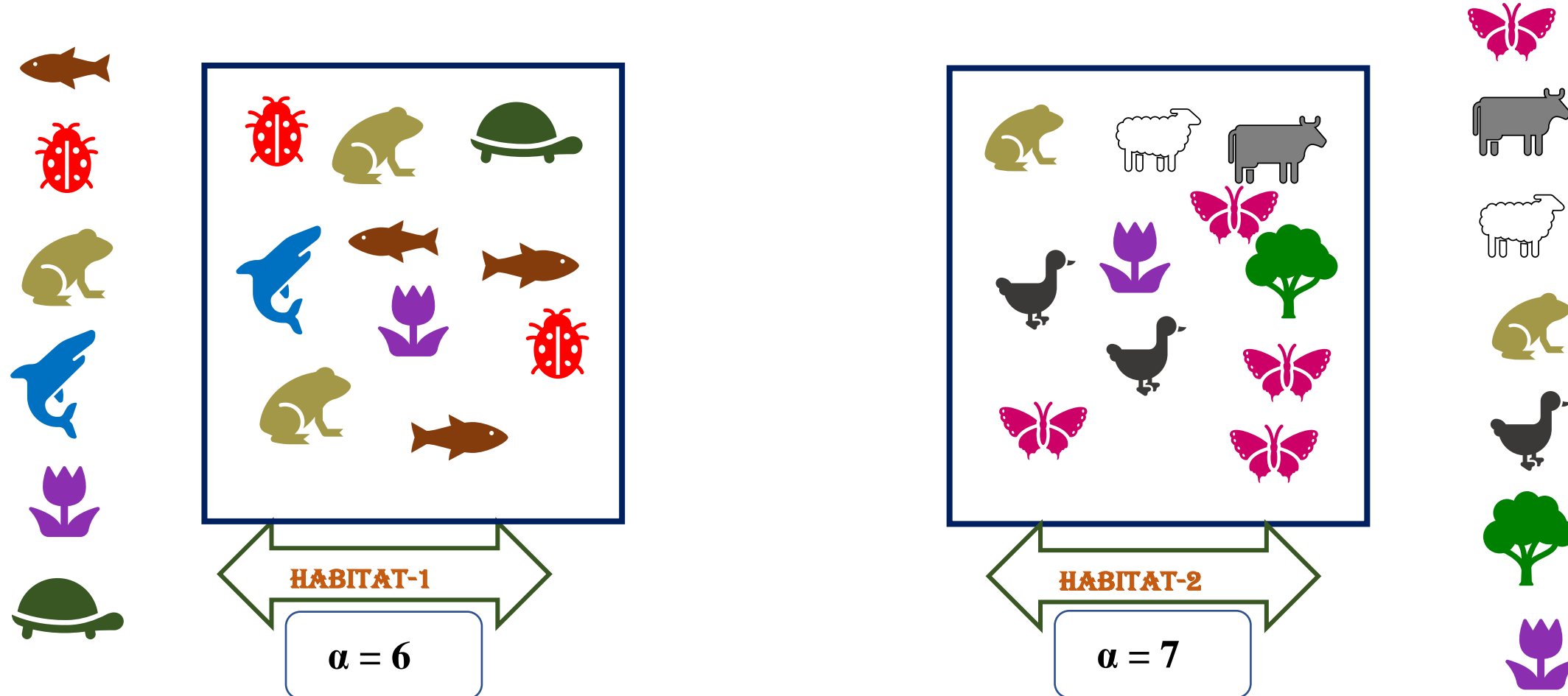
3. Ecosystem diversity

The diversity of various species in a region is typically measured in three different perspectives. They include:

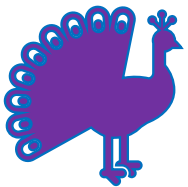
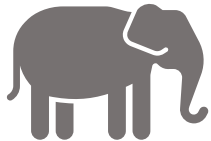
1. Alpha diversity
2. Beta diversity
3. Gamma diversity

Alpha diversity

- It is the measure of species richness in an ecosystem/local habitat
- Total number of different species (or species richness) in single ecosystem
- Count every kind of organism, not just animals.

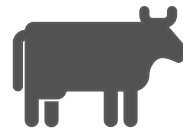
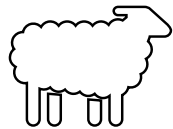


ECOSYSTEM-1



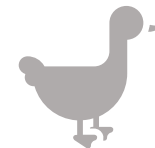
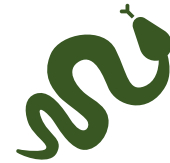
$$\alpha = 7$$

ECOSYSTEM-2



$$\alpha = 8$$

ECOSYSTEM-3

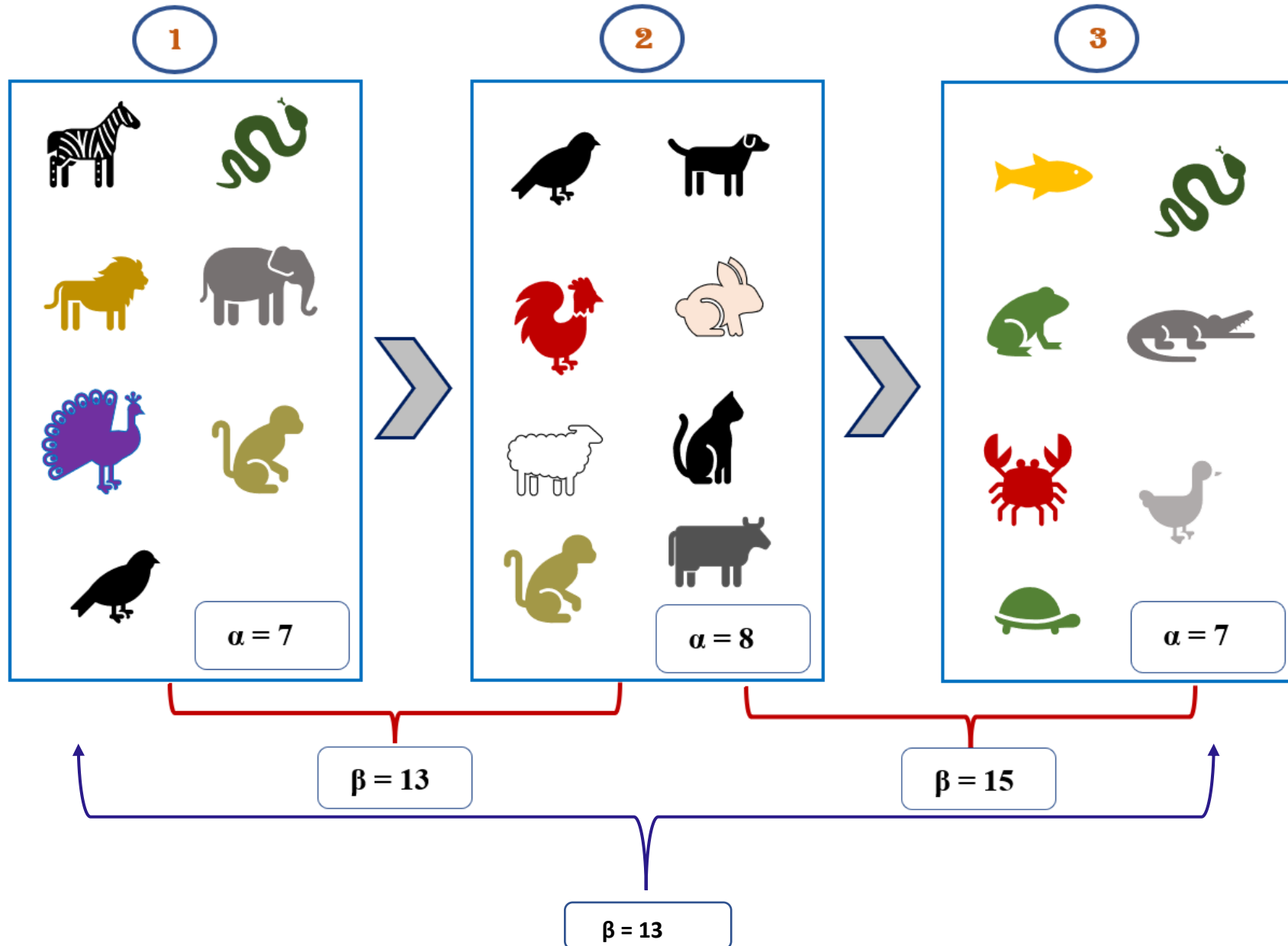


$$\alpha = 7$$




















Beta diversity

- Comparison of diversities among the ecosystems
- Measure of species richness between two distinct ecosystems usually separated by a specific geographical barrier such as river or mountain.
- The beta diversity can be measured between any two of the ecosystems




















Beta diversity



Beta diversity

																			
1	✓	✓	✓	✓	✓	✓	✓												
2					✓	✓		✓	✓	✓	✓	✓	✓						
	Beta diversity between 1 vs 2 = 13																		

Beta diversity




















																			
2					✓	✓		✓	✓	✓	✓	✓							
3		✓												✓	✓	✓	✓	✓	✓

Beta diversity between 2 vs 3 = 15

Gamma diversity

- Measure of the **total diversity** for different ecosystems within a large area or region.
- It is the **complete biodiversity** with all species richness for various habitats in a region.

Gamma diversity

																			
1	✓	✓	✓	✓	✓	✓	✓												
2					✓	✓		✓	✓	✓	✓	✓	✓						
3		✓												✓	✓	✓	✓	✓	✓

Gamma diversity = 19

Biodiversity

**Preservation of
biodiversity for
future generations
is our
responsibility**



Web References:

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[Click Here](#) to to view animated video on **Genes** or

Scan the QR code



[Click Here](#) for additional information about species

or

Scan the QR code



Acknowledgements



Sincere Thanks
to
APCCE