Classification, Biodiversity & Conservation

Biodiversity

- It is the degree of variation of life forms in an ecosystem. It refers to the number of habitats and niches, the number of species and the genetic diversity of the species.

Ecosystem

- It is a relatively self-contained interacting community of organisms, the environment they live in and their interactions with that environment with its biotic and abiotic features.

Habitat

- It is the place a species live within an ecosystem

Niche

- It is the role of an organism in a ecosystem

Levels of biodiversity

→ Variation in ecosystems or habitats
→ Number of different species in the ecosystems and their abundance.
→ Genetic variation within each species.

- Species diversity measures species richness and also measures the evenness of the abundance of different species in a community

- Genetic diversity is the diversity of alleles within the genes in the genome of a single species. All the organisms within same species have same genes but different alleles.

How to assess species diversity?

→ Using random or systematic sampling. Random sampling is the best way to assess species diversity if area looks reasonably uniform with no clear pattern on how species are distributed.

Quadrats

→ A quadrat is a square used to mark off a sampling area where species can be identified and their abundance can be measured.

→ Samples must be taken randomly to avoid bias

→ Result obtained can be used to calculate species richness and species density

- Species frequency refers to the possibility of finding a particular species within a quadrat. To calculate this, record no. of squares with species in it, divide by total no. of quadrats and multiply with 100 for %.

- Species density measures how many individuals of a species there are per unit area.

* Estimating no. of mobile animals

- Mark - release - recapture: This is a technique where as many individuals as possible are caught, each individuals are harmlessly marked and all the marked individuals are counted and returned to mix with rest of population.

- After some time, a large sample is captured again and the no. of marked & unmarked are counted. The proportion of marked to unmarked animals is then used to estimate total no. of population.

Systematic Sampling

- Required when samping an environment where the conditions change

→ Line transect
The organism found at regular points along a line are noted. Transects are used to detect changes in community composition along a line across

one or more habitats.

- Belt transect

→ It is a different type of sampling whereby you place quadrants at regular ~~intervals~~ along the line and record the abundance of species within each quadrant.

Line ~~transect~~ transect represented as a drawing while data of belt transect represented as bar chart or a kite diagram.

★ Simpson's Index of Diversity

- After estimating species abundance in a selected area, you can calculate species diversity using this.

$$D = 1 - \left(\Sigma\left(\frac{n}{N}\right)^2\right)$$

D ranges from 0 to 1. Value close to 0 indicates low species diversity and value close to 1 indicates high species diversity

n → no. of specific organisms
N → Total no. of organisms

★ Spearman's rank correlation and Pearson's linear correlation

→ Both used to analyse relationships b/w abundance of species and abiotic or biotic factors.

→ Spearman's rank correlation determines whether there is correlation b/w variables that don't show normal distribution. If p ~~value~~ > 0.05, then null hypothesis is rejected

Null hypothesis always: 'there is no correlation between ___ and ___'

→ Pearson's linear correlation is a statistical test that determines whether there is a linear correlation b/w two variables

↳ If r is close to 1 or -1, then it can be stated that there is a strong linear correlation b/w two variables.

Three domains of life

1. Bacteria
2. Archaea
3. Eukarya

1. Bacteria
- unicellular prokaryotes
- DNA exists as circular chromosomes with no histones
- smaller circular DNA 'plasmids' present
- No membrane bound organelles
- 70s ribosomes
- Cell wall containing peptidoglycans
- cells divide by binary fission
- Usually exists as single cells

2. Archaea
- unicellular prokaryotes
- similar size to bacteria
- No membrane bound organelles

- DNA was circular chromosomes with histones.
- Ribosomes 70s but similar to eukaryotes

Eukarya

- Membrane-bound organelles with nuclei
- DNA arranged as linear chromosomes
- 80s ribosomes.
- cell division by mitosis
- Many different ways of reproducing - sexually or asexually

Kingdoms

Fungi
- heterotrophic
- no chlorophyll
- reproduce by spores
- cell wall made of chitin

Plantae
- multicellular eukaryotes with cells differentiated for organs & tissues
- Some cells have chloroplast & photosynthesise
- Often have permanent vacuoles
- Autotrophic nutrition
- Cell wall made of cellulose

Animalia
- Multicellular eukaryotes with different types of specialised cells
- Cells differentiated to form organs & tissues.
- No chloroplasts
- Cell vacuoles are small & temporary

- heterotrophic nutrition
- cells do not have cell walls
- communication by nervous system

Viruses
- Acellular
- hijack DNA replication machinery in host cells to make proteins & replicate
- Energy for such processes provided by respiration in host cells.