



TOPIC NOTES FOR BIOD1102: INTRODUCTION TO BIODIVERSITY & CONSERVATION

Completed in 2016 with High Distinction

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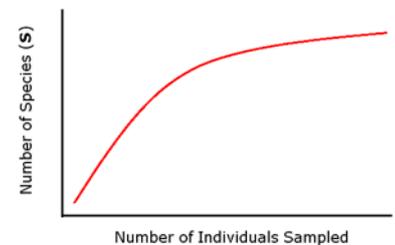
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WK1: What is Biodiversity, how it is measured and sampling techniques – (Professor Mike Bull)

Species Richness (S): the total number of species, or the number of species observed when sampling a community

- When graphed as a species accumulation curve, the **curve rises with increased sample size as more species are identified**. This line will plateau as the estimate of the actual number becomes increasingly accurate.



Shannon-Weiner Index (H'): is a measure of how evenly individuals are distributed among species. H' increases with an increasingly even distribution.

→ $H' = -\sum p_i \times (\ln p_i)$ where p_i = the proportion of species "i"

- E.g. in a sample of 30% slugs and 70% beetles
For slugs; $p_i = 0.3 \times (\ln 0.3) = -0.361$
For beetles; $p_i = 0.7 \times (\ln 0.7) = -0.250$
Sum of overall species = $-0.361 + -0.250 = -0.611$
∴ $H' = 0.611$

Sampling techniques:

- Destructive techniques result in a negative impact to the community of environment via death or damage e.g. dynamite, shot-gun, poison, bottom trawling and fisheries by-catch
- Non-destructive techniques allow for capture and release including fish nets, mist nets as well as pitfall, box and funnel traps.
 - There is also visual observation (counting by sight) and acoustic observation (counting by sound).
- Large pits catch more than small pits
- Longer drift fences catch more than shorter fences
- Drift fences left at a site on a semipermanent basis catch more than those erected at each survey time
- Separate pits are more effective than those that lie in a continuous length.

WK1: Patterns of biodiversity and Ecological Processes that Generate Biodiversity – (Professor Mike Bull)

Biodiversity hotspots: regions with high species diversity of endemic species (found nowhere else) and a high risk to their ecological communities e.g. reefs, mangroves and rainforests.

Variation in biodiversity effected by different factors:

1. The amount of time undisturbed

→ Undisturbed ecosystems accumulate species whereas catastrophes (perturbations) lead to loss of biodiversity. This is reflected by the fossil record with gradual increases in diversity followed by sudden declines demonstrated by many different taxa.

2. Habitat heterogeneity and competition

→ Different 'spaces or resources' within the environment are utilised by different species so to avoid competitions. The range of resources available can be made more diverse with increased diversity of the habitat.

3. The level of predation

→ Predation controls the numbers of the dominant species and therefore their impacts on the community. This in turn allows more species to persist within the ecosystem.

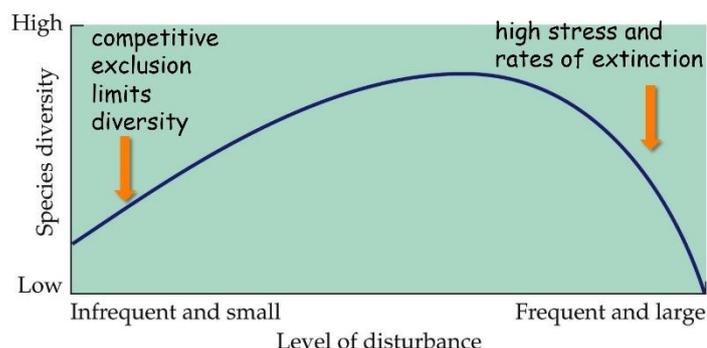
4. Disturbance

→ Disturbances can be regional such as fire, flood or cyclone, or they can be local such as tree falls, faecal deposit and animal digging.

→ All disturbances reduce local population density, delay competitive exclusion and allow more species to persist.

→ The intermediate disturbance hypothesis states that when disturbances are common or rare, diversity is low but is highest when disturbances occur at an intermediate frequency.

- Low disturbance frequency = very damaging as species are unable to adapt/survive the changed conditions
- Intermediate disturbance frequency = organisms are adapted to survive and shall rapidly take advantage of the disturbance
- High disturbance frequency = the environment is to unstable for many organisms to adapt and persist.



5. Climate and the physical environment

→ Hypothesis: harsher conditions require special adaptations and there are fewer species with those adaptations. This is exhibited with decreased diversity with increases in aridness or altitude

A. Climate variation and predictability

→ Increased climate variation and unpredictability means that organisms require a wide range of adaptations (therefore less biodiversity)

→ Stable conditions allow for narrower niches causing increased biodiversity as more species co-exist.