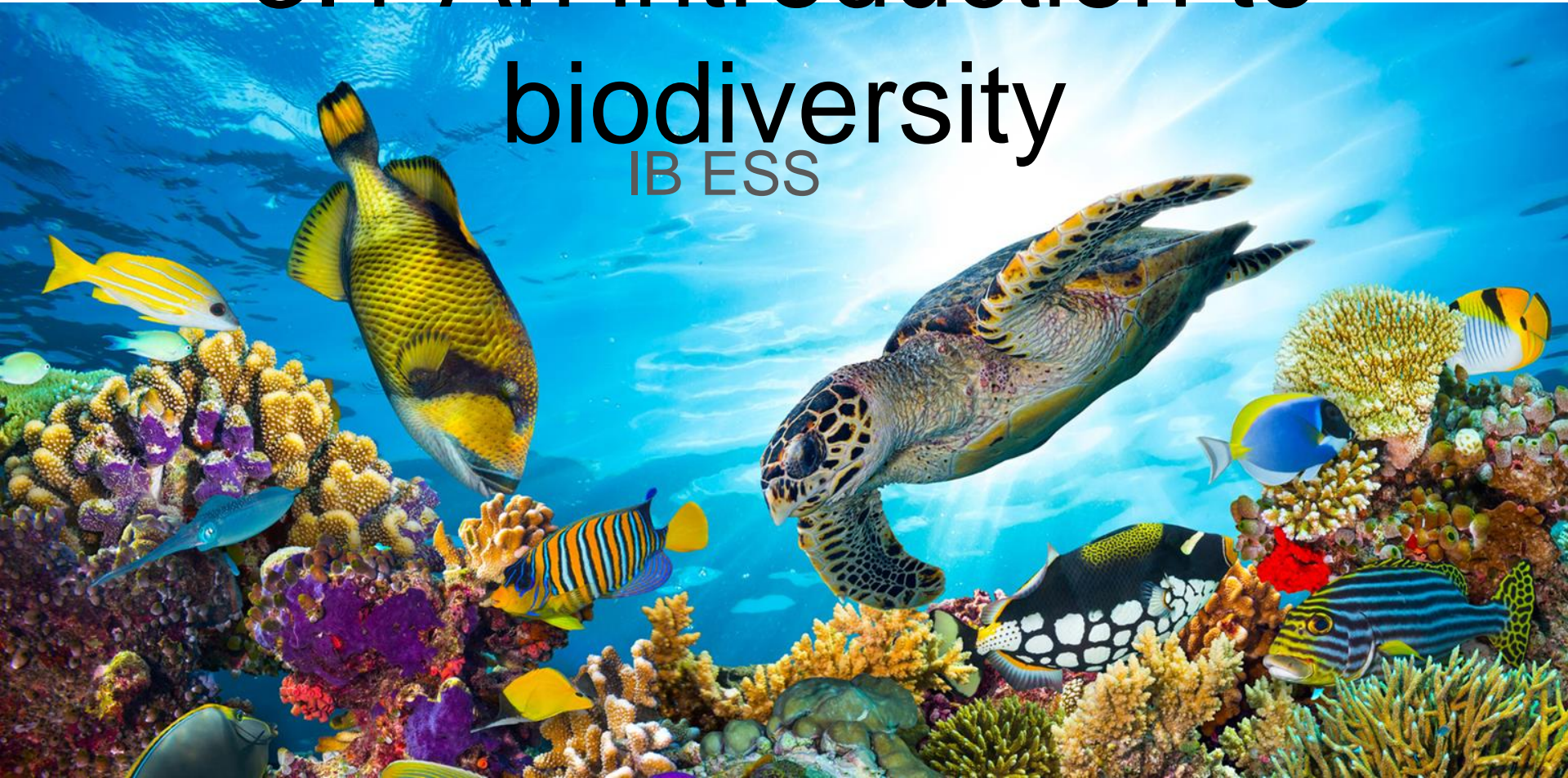


3.1 An introduction to biodiversity

IB ESS



Learning Objectives:

- Outline the concept of biodiversity, which includes diversity of species, habitats and genetics
- Explain how diversity is a product of the number of species (richness) and their relative proportions (evenness)
- Discuss how quantification of biodiversity is important to conservation efforts
- Describe how the assessment of changes to biodiversity is important in assessing human impact in a community

KEY QUESTIONS:

1. What are the 3 ways in which biodiversity can be identified?
2. Why is the ability to understand and quantify biodiversity important for conservation of species?

biodiversity

- Measure of the quantity of living diversity per unit area
- Includes species diversity, habitat diversity & genetic diversity
 - Can be used to assess the health of a system
 - Influenced by climate
 - Tropical regions with high productivity = more diverse
 - Varies within regions & depends on temp, precipitation, altitude, soil, geography & presence of other species

Habitat biodiversity

- # of ecological niches or range of different habitats that are present per unit area of a biome, ecosystem, or community.
- If conserved, leads to the conservation of both species and genetic diversity
 - Assessed by studying the variety of niches in that habitat
 - Rainforest has high habitat diversity (i.e. canopy, soil, pools of standing water, etc)

Species diversity

- Variety of species per unit area
- Includes both # of species present & relative abundance
 - Simpson diversity index is 1 way to quantify species diversity
 - Complex ecosystem (rainforest) has wide variety of species (likely abundant) = high species diversity
 - 1 hectare of rainforest = > 400 different species of tree

Genetic diversity

- Range of genetic material present in the population of a species or its gene pool
 - Where more species & more individuals present usually = greater genetic diversity
 - Genetic diversity high when pop has large gene pool
 - Gene pool - # of variations of same gene present in the DNA of a particular species
 - Can be artificially reduced
 - Inbreeding animals (highly selected farm animals) or cloning plants for agriculture
 - Smaller gene pool than natural relatives
 - Less adaptable to changes in environment
 - More susceptible to diseases

Comparing communities

Community - group of populations that live in the same habitat and interact with one another

- Can be compared & described using diversity indices (Simpson diversity index)
 - If 1 has lower diversity index = sign of pollution or its under stress for other reasons
 - 'Dead zone' in Gulf of Mexico
 - Water pollution in the area
 - Biotic indices used to monitor key indicator species (presence or absence indicates threat)
- Important for conservation measures
- NOTE: areas undisturbed & unpolluted exist that show low diversity for natural reasons (Arctic...cold climate yields low diversity)

Comparing communities

- Comparing similar habitats to monitor changes to biodiversity over time
 - Measurements taken at intervals (i.e. before & after large building projects)
 - Used to assess impact of new housing developments, industry or other human activities

Biodiversity hotspots

- A biogeographic region that is both a significant reservoir of biodiversity and is under threat
 - 34 identified hotspots cover about 15% of Earth's surface
 - West African rainforest, Japan, California & Mediterranean coastline
 - 25 have lost at least 70% of natural habitat, yet support 60% of Earth's species!
 - Hotspot biodiversity assessed 3 ways:
 - # of total species (species richness)
 - # of endemic species (unique to the region)
 - # of species at risk