Biodiversity and Conservation Class 12 Key Points

CBSE Class 12 Biology · NCERT · for boards, NEET and JEE revision

ChapterNotes

What is Biodiversity

3 levels: Genetic → Species → Ecological (ecosystem)

Term popularised by Edward Wilson

- Genetic: variation in genes within ONE species (e.g. reserpine in Rauwolfia)
- Species: variety of species in a region (Western Ghats > Eastern Ghats amphibians)
- Ecological: variety of habitats/ecosystems (India's deserts, reefs, mangroves)

How Many Species

~1.5 million described · 7-50 million estimated total (working figure ≈ 7 million)

IUCN 2004 figures

- Animals >70% of recorded species; insects are the largest animal group (~70%)
- Plants (algae+fungi+bryo+gymno+angio) only ~22%
- India: 2.4% of land area but 8.1% of global species → megadiverse

Latitudinal Gradient

Diversity: equator (highest) → poles (lowest); tropics 23.5°N–23.5°S richest

Amazon = most biodiverse place on Earth

- Tropics undisturbed for millions of years → long evolutionary time
- Less seasonal, constant climate → niche specialisation
- More solar energy → higher productivity → more diversity

Species–Area Relationship

$\log S = \log C + Z \log A$

Described by Alexander von Humboldt; straight line only on log–log axes

- S = species richness, A = area, C = intercept, Z = slope
- Z ≈ 0.1-0.2 for small areas (within a continent)
- Z ≈ 0.6-1.2 for very large areas (across continents) - steeper

Importance of Biodiversity

Narrowly utilitarian · Broadly utilitarian · Ethical

~25% of drugs from plants; Amazon gives ~20% of atmospheric O_2

- Narrowly utilitarian: direct products - food, fibre, firewood, medicines
- Broadly utilitarian: ecosystem services - O_2, pollination, climate regulation
- Ethical: every species has intrinsic value; moral duty to future generations

The Evil Quartet

Habitat loss · Over-exploitation · Alien invasions · Co-extinctions

Current extinction rate 100-1000× pre-human background

- Habitat loss & fragmentation = MOST important cause
- Over-exploitation drove Steller's sea cow & passenger pigeon extinct
- Alien: Nile perch wiped out Lake Victoria cichlids; Lantana, Eichhornia

Diversity & Stability

Rivet Popper Hypothesis (Paul Ehrlich): species = rivets on a plane

Tilman's plots: more species → less variation + higher productivity

- Stability = low year-to-year variation + resistance to disturbance & invasion
- Each lost rivet (species) weakens the plane; wing rivets = key species
- Losing key species threatens the whole ecosystem even if early loss seems harmless

In-situ Conservation

Hotspots (Norman Myers): high endemism + serious habitat loss; 25 → 34

India has 3 hotspots: Western Ghats–Sri Lanka, Indo-Burma, Himalaya

- Hotspots: <2% of land but could prevent up to 30% of extinctions
- Biosphere reserve zones: core (no human activity) → buffer → transition
- Sites: biosphere reserves, national parks, sanctuaries, sacred groves

Ex-situ Conservation

Zoos · botanical gardens · cryopreservation (seed/gene banks) · in-vitro & tissue culture

Cryopreserved gametes/seeds kept viable AND fertile

- Captive breeding then reintroduction to the wild
- Convention on Biological Diversity - Rio Earth Summit, 1992
- Johannesburg 2002: 190 countries pledged to cut loss rate by 2010

Quick revision

- 3 levels: genetic, species, ecological diversity
- Tropics = most biodiverse; latitudinal gradient
- Species-Area: log S = log C + Z log A
- Threats: the Evil Quartet (habitat loss #1, over-exploitation, alien species invasions, co-extinctions); Steller's sea cow, passenger pigeon = extinct from over-exploitation
- Conservation: in-situ (national parks, biosphere reserves) + ex-situ (zoos, seed banks)
- India: 3 hotspots per NCERT (plus Sundaland via Nicobar), mega-diversity country, 18 biosphere reserves
- Sacred groves: traditional in-situ conservation (Khasi-Jaintia hills, Western Ghats)

Full chapter notes with solved examples and practice questions: https://chapternotes.in/cbse/class-12-biology/biodiversity-and-conservation-class-12-notes/