Unit 30 · Conservation Biology

STUDY NOTES

WHAT NEB'S GRADE 11 EXAM ASKS

- **CDC's grid (2077):** Conservation Biology (Units 30–31 together): 2 of 75 marks, 1 MCQ; in one group with Units 1–3, 11–12, 17, 27–29 (21 marks)
- **The paper:** 11 MCQs × 1 · 8 short × 5 · 3 long × 8; 3 hours; 1 mark per expected point
- **CDC's model paper:** MCQ: which is **in-situ** conservation (a wildlife sanctuary: a protected area in the wild, not a zoo or seed bank)
- **MCQ (1 mark)**
  - biodiversity; the level with interactions (ecological); Nepal's flora (11,971), birds (871)
  - not a cause of decline; purpose of ex-situ
  - Banke (tiger, elephant, four-horned antelope); Shey Phoksundo (largest, Phoksundo Lake)
  - one wildlife reserve; Dhorpatan (blue sheep); Annapurna (Ghorepani, Tilicho); Krishnasar (blackbuck)
  - wetlands ~5% of Nepal; their role in climate (store carbon)
- **Short answers** (asked in the unit's exercise)
  - biodiversity, its levels, its purposes; in-situ and ex-situ
  - oldest and largest parks; Bardiya, Shey Phoksundo, Shivapuri Nagarjun, Shuklaphanta
  - wildlife reserves, Koshi Tappu; Dhorpatan; Gaurishankar, Krishnasar, Annapurna
  - wetlands and Ramsar sites

Key terms

Biodiversity: variety of life at every level: genes, species, ecosystems.

Species diversity: number of species (**richness**) and how evenly shared.

Ecological diversity: variety of ecosystems, habitats and their interactions (broadest).

Genetic diversity: variety of genes (alleles) within and between species.

In-situ · ex-situ: in its own habitat · outside it.

Cryopreservation: seeds, sperm, eggs, embryos frozen in liquid nitrogen (−196 °C).

Buffer zone: belt round a park; people use it by rules; get 30–50% of park income.

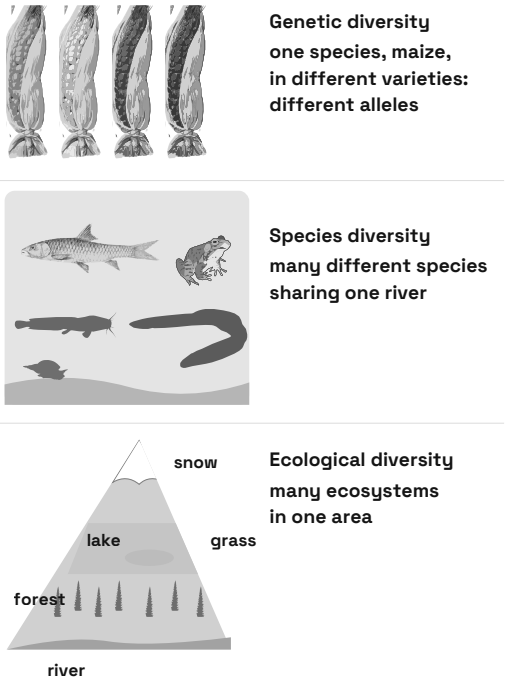
Hotspot: ≥ 1,500 endemic plants and ≥ 70% of natural vegetation lost.

Wetland: soil saturated or under shallow water for all or part of the year.

Ramsar site: wetland of international importance.

Biodiversity

- **~8.7 million** eukaryotic species estimated; ~1.2 million named (Mora, 2011)



Genetic, species and ecological diversity.

Importance (purposes)

1. preserve the variety of life
2. use ecosystems, species, genes **sustainably**
3. **share fairly** benefits of genetic resources
4. recreation, culture, spirit
5. keep **ecosystem services**: oxygen, clean water, soil, pollination, pest control

Nepal: ~0.1% of world's land; **3.2%** of known plants, **1.1%** of animals

- reason: **topography and climate** (60 m to 8,849 m in ~200 km)
- 6 biomes, 35 forest types, 118 ecosystems

Group	Nepal	% of world
angiosperms	6,973	3.2
bryophytes	1,150	8.2
flora total	**11,971**	**3.2**
mammals	210	5.2
birds	**871**	**9.5**
reptiles	137	1.9
amphibians	53	2.5
fishes	228	1.9
butterflies	651	3.7
fauna total	**11,861**	**1.1**

- counts differ between books (Grade 8: 886 birds)

Causes of loss

- **habitat loss** (the biggest)
- **poaching**: rhino horn, tiger bone, pangolin scales, musk
- over-use: timber, yarsagumba, panch aunle; poison fishing
- **invasive species**: *Mikania*, water hyacinth
- human–wildlife conflict; filling wetlands; **climate change**; overgrazing; disasters; pollution
- **species–area relationship**: $S = cA^z$, $z \approx 0.25$

Conservation

In-situ	Ex-situ
in **natural habitat**	**outside** it
national parks, reserves, conservation areas	zoos, botanical gardens, breeding centers
whole ecosystem kept	seed and gene banks, **cryopreservation**
Chitwan's wild rhinos	elephant, gharial breeding centers

Protected areas

- **23.39%** of Nepal (with buffer zones); parks alone ~8%
- **13 national parks** (12 before Chhayanath, 2025), **1 wildlife reserve**, **1 hunting reserve**, **6 conservation areas**, 13 buffer zones
- parks: no poaching, cutting, grazing, settling

Park	Year	Known for
Banke	2010	**tiger**, elephant, **four-horned antelope**; joined to Bardiya
Bardiya	1988 (reserve 1976)	**largest in the Terai**; rhino, swamp deer, blackbuck, Gangetic dolphin
Chitwan	**1973**	**oldest**; World Heritage 1984; **one-horned rhino**, gaur, tiger
Khaptad	1984	middle mountains plateau; **Khaptad Baba**, Sahasra Linga
Langtang	1976	red panda, snow leopard; **Gosaikunda**
Makalu Barun	1992	~8,000 m of height; 31 rhododendrons, 47 orchids
Parsa	2017 (reserve 1984)	Churia hills; elephant, tiger, **sloth bear**; king cobra
Rara	1976	**smallest park**; **Rara Lake**: largest and deepest (~167 m); Rara snowtrout
Sagarmatha	1976	Sagarmatha; World Heritage **1979**; danphe, snow leopard
Shey Phoksundo	1984	**largest park** (~2,712 km^2); **Phoksundo Lake** (2nd largest); Shey Gompa; snow leopard, blue sheep
Shivapuri Nagarjun	2002	north of Kathmandu; valley's water; 177 birds, 129 mushrooms
Shuklaphanta	2017 (reserve 1976)	**swamp deer** (world's largest herd, 2,313 in 2022); Bengal florican; blackbuck since 2012
Chhayanath	**2025**	newest; Mugu; from Shey Phoksundo

Wildlife reserve: rare species and their habitat managed

- **Koshi Tappu** (1976; Sunsari, Saptari, Udayapur): **wild water buffalo** (arna; 63 → 498 in 2021); ~485 birds; gharial, Gangetic dolphin; Nepal's **first Ramsar site** (1987)

Hunting reserve: licensed hunting (DNPWC)

- **Dhorpatan** (1983; Rukum East, Myagdi, Baglung): the only one; **blue sheep** (naur) and **Himalayan tahr**; **patans** (high meadows); hunting **blocks**

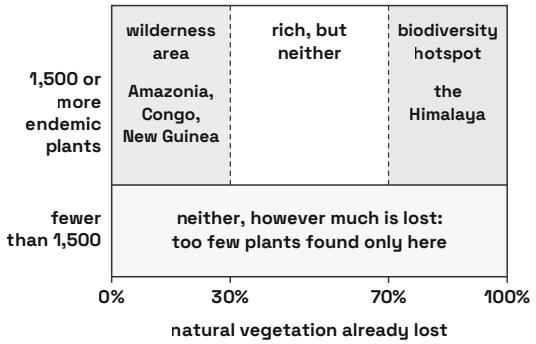
- also musk deer, wolf, red panda, cheer pheasant, danphe

Conservation areas: people live and use the land; integrated, sustainable management

Area	Year	Known for
Annapurna	1986/1992	**first**, **largest** protected area; NTNC; **Ghorepani** rhododendrons; **Tilicho Lake**; Kali Gandaki gorge
Api Nampa	2010	Darchula; snow leopard, red panda; yarsagumba, panch aunle
Gaurishankar	2010	biodiversity, culture and **livelihoods**; NTNC for 20 years; 16 vegetation types
Kanchenjunga	1997	3rd highest peak; first handed to its **community** (2006)
Krishnasar	2009	**blackbuck** (*Antilope cervicapra*); **smallest** protected area; Khairapur (9 in 1975, 255 in 2025)
Manaslu	1998	subtropical to **nival**; snow leopard, musk deer, red panda

Hotspots

- **Norman Myers**, **1988**; Conservation International's two tests:
  1. ≥ **1,500 endemic vascular plants**
  2. ≥ **70%** of natural vegetation **lost**
- **36** hotspots; ~2.4% of land, half of plant species
- Nepal: **Himalaya hotspot**
- **high-biodiversity wilderness areas**: as rich, ≥ 70% **intact** (Amazonia, Congo, New Guinea)



The two tests of a hotspot.

Wetlands

- marshes, swamps, ponds, lakes, floodplains, rice fields
- Nepal: ~**242** wetlands, ~743,500 ha, ~**5%** of the country
- benefits:
  - habitat for many species, **threatened** ones too
  - **sponges**: prevent floods
  - **filter** water
  - recreation, ecotourism
  - **climate**: soils and peat **store carbon**
  - fertile farmland
  - bind soil; cultural value (Gosaikunda)

Ramsar sites

- **Ramsar Convention**: **1971**, Ramsar (Iran); in force 1975; Nepal joined **1988**
- simsar (सिमसार)
- Nepal: **10** sites, ~60,561 ha
  - **Koshi Tappu** (first; 17,500 ha), Beeshazar, Ghodaghodi, Jagadishpur, Gokyo, Gosaikunda, Rara, Phoksundo, Mai Pokhari, **Pokhara Valley lake cluster** (26,106 ha)

COMMON MISTAKES

✗ Nepal has 12 national parks
✓ **13** since Chhayanath (2025); write 12 if the exam expects it and add 13.

✗ Parks cover 23.39%
✓ that's all protected areas with buffer zones; parks ~8%.

✗ Phoksundo is the deepest lake
✓ **Rara** (~167 m); Phoksundo ~136 m.

✗ Amazon and Congo are hotspots
✓ **wilderness areas** (mostly intact); the Himalaya is a hotspot.

✗ Rara is the smallest protected area
✓ smallest **park**; **Krishnasar** is the smallest protected area.