



An Institute for Civil Services

PRELIMS 2025

ENVIRONMENT

PRACTICE TEST - 8

**Environmental Policies,
Conservation Efforts, *and*
Sustainable Practices**

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- During the Procedure of the examination, Students have to fill the Attendance Sheet also (containing photograph of each student).
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Question Booklet

GENERAL STUDIES

PRACTICE TEST - 8

(Environment: Environmental Policies, Conservation Efforts,
& Sustainable Practices)

Time Allowed: 40 Min.

Maximum Marks: 50

INSTRUCTIONS

1. IMMEDIATELY AFTER THE COMMENCEMENT OF THE EXAMINATION, YOU SHOULD CHECK THAT THIS TEST BOOKLET DOES NOT HAVE ANY UNPRINTED OR TORN OR MISSING PAGES OR ITEMS, ETC. IF SO, GET IT REPLACED BY A COMPLETE TEST BOOKLET.
2. **Please note that it is the candidate's responsibility to encode and fill in the Roll Number carefully without any omission or discrepancy at the appropriate places in the OMR Answer Sheet. Any omission/discrepancy will render the Answer Sheet liable for rejection.**
3. You have to enter your Roll Number on the test booklet in the Box provided alongside. **DO NOT** write anything else on the Test Booklet.
4. This Test Booklet contains **25** items (questions). Each item is printed in English. Each item comprises four responses (answers). You will select the response which you want to mark on the Answer Sheet. In case you feel that there is more than one correct response, mark the response which you consider the best. In any case, choose **ONLY ONE** response for each item.
5. You have to mark all your responses **ONLY** on the separate Answer Sheet provided. See directions in the Answer Sheet.
6. All items carry equal marks.
7. Before you proceed to mark in the Answer Sheet in response to various items in the Test Booklet, you have to fill in some particulars in the Answer Sheet as per instructions sent to you with your Admission Certificate.
8. After you have completed filling in all your responses on the Answer Sheet and the examination has concluded, you should hand over to the Invigilator **only the Answer Sheet**. You are permitted to take away with you the Test Booklet.
9. Sheets for rough work are appended in the Test Booklet at the end.
10. **Penalty for wrong answers:**

THERE WILL BE PENALTY FOR WRONG ANSWERS MARKED BY A CANDIDATE IN THE OBJECTIVE TYPE QUESTION PAPERS.

- (i) There are four alternatives for the answer to every question. For each question for which a wrong answer has been given by the candidate, **one-third** of the marks assigned to that question will be deducted as penalty.
- (ii) If a candidate gives more than one answer, it will be treated as a **wrong answer** even if one of the given answers happens to be correct and there will be same penalty as above to that question.
- (iii) If a question is left blank, i.e., no answer is given by the candidate, there will be **no** penalty for that question.

1. With respect to conventions for recovery of the Ozone layer, consider the following statements:

1. The Montreal Protocol controls the production and consumption of specific chemicals, none of which occur naturally.
2. A State must be a party to the Vienna Convention to become a party to the Montreal Protocol.
3. The Hydrochloro-fluoro carbons (HCFCs) are banned under the Protocol.

How many of the statements given above is/are correct?

- (a) Only one
- (b) Only two
- (c) All three
- (d) None

2. Consider the following statements:

Statement I:

IUCN Members include government agencies as well as non-governmental and Indigenous people.

Statement II:

IUCN participated in the CBD COP15 in Montreal to advocate for a post-2020 Global Biodiversity Framework.

Which one of the following is correct in respect of the above statements?

- (a) Both Statement-I and Statement-II are correct and Statement-II explains Statement-I
- (b) Both Statement-I and Statement-II are correct and Statement-II does **not** explain Statement-I
- (c) Statement-I is correct but Statement-II is incorrect.
- (d) Statement-I is incorrect but Statement-II is correct.

3. With respect to the Intergovernmental Panel on Climate Change (IPCC), consider the following statements:

1. It is an organisation of governments that are members of the United Nations or the World Meteorological Organization (WMO).

2. It undertakes research work, synthesises published and peer-reviewed literature to develop a comprehensive assessment of scientific understanding.
3. It gives scientific information to the United Nations Framework Convention on Climate Change (UNFCCC) and the Paris Agreement.

How many of the statements given above is/are correct?

- (a) Only one
- (b) Only two
- (c) All three
- (d) None

4. With respect to the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES), consider the following statements:

1. The Conference of the Parties (CoP) is the decision-making body of the Convention.
2. It regulates international trade in specimens of species under both live and dead forms.
3. It is legally binding on Parties.
4. The trade of species listed in Appendix I of CITES is regulated by permit.

How many of the statements given above is/are correct?

- (a) Only one
- (b) Only two
- (c) Only three
- (d) All four

5. Consider the following statements in the context of Biodiversity Conservation:

1. Biopiracy is the exploration of biological material for commercially valuable genetic and biochemical properties.
2. Bioprospecting is the commercial exploitation of traditional indigenous knowledge through the patent process.
3. Biosafety refers to the prevention of large-scale loss of biological integrity, focusing both on ecology and human health.

How many of the statements given above are correct?

- (a) Only one
- (b) Only two

- (c) All three
- (d) None

6. Consider the following statements regarding the Convention on the Conservation of Migratory Species of Wild Animals (CMS):

1. It is the only global convention specializing in the conservation of migratory species, their habitats, and migration routes.
2. The convention categorizes migratory species into two appendices based on their conservation status.
3. India is not a signatory to the CMS but has participated in key CMS conferences to discuss migratory species.

How many of the statements given above is/are correct?

- (a) 1 and 2 only
- (b) 2 and 3 only
- (c) 1 and 3 only
- (d) 1, 2 and 3

7. Consider the following statements regarding the Ramsar Convention on Wetlands:

1. The Ramsar Convention is the only global environmental treaty that focuses exclusively on the conservation and wise use of wetlands.
2. Under the Ramsar Convention, each member country must designate all its wetlands as Ramsar Sites.

Which of the statements given above is/are correct?

- (a) 1 only
- (b) 2 only
- (c) Both 1 and 2
- (d) Neither 1 nor 2

8. Which of the following statements is/are correct regarding carbon capture and storage?

1. The Kyoto Protocol under the UNFCCC allows countries to receive credits for their carbon sequestration activities as part of their obligations under the protocol.
2. In geologic carbon sequestration, CO₂ must be pressurized enough until it becomes a liquid and then it is injected into porous rock formations in geologic basins.

Select the correct answer using the code given below:

- (a) 1 only
- (b) 2 only
- (c) Both 1 and 2
- (d) Neither 1 nor 2

9. Which of the following statements is **not** correct regarding the Wetland ecosystem?

- (a) Wetlands are areas where water covers the soil, either permanently or seasonally, and they support both aquatic and terrestrial species.
- (b) Wetlands act as natural water filters, trapping pollutants and sediments, thereby improving water quality.
- (c) All wetlands are characterized by the presence of saltwater and are found only in coastal areas.
- (d) Wetlands are transition zones between terrestrial and aquatic ecosystems.

10. With reference to Indian laws about wildlife protection, consider the following statements:

1. Wild animals are the sole property of the government.
2. When a wild animal is declared protected, such animal is entitled to equal protection whether it is found in protected areas or outside.
3. Apprehension of a protected wild animal becoming a danger to human life is sufficient ground for its capture or killing.

Which of the statements given above is/are correct?

- (a) 1 and 2
- (b) 2 only
- (c) 1 and 3
- (d) 3 only

11. With respect to the Biodiversity Conservation Act 2002, consider the following statements:

1. Both the Protection and rehabilitation of threatened species are concerned under the act.
2. The Act excludes Indian biological resources that are normally traded as commodities.

3. Biodiversity Boards are available at both central and state levels to monitor actions prohibited under the Act.
4. Both public and private corporations need to get permission for commercial utilization of resources from respective state biodiversity boards.

How many of the statements given above is/are correct?

- (a) Only one
- (b) Only two
- (c) Only three
- (d) All four

12. Consider the following statements:

1. The Central Pollution Control Board (CPCB) enforces laws related to pollution under the Environment (Protection) Act, 1986.
2. The National Green Tribunal (NGT) can direct the Central Pollution Control Board (CPCB) to submit a report regarding issues of generation and treatment of electronic waste by all the states.
3. Both Central & State Pollution Control Boards (PCBs) comes under the administration of the Central Government.

How many of the statements given above is/are correct?

- (a) Only one
- (b) Only two
- (c) All three
- (d) None

13. With reference to the differences between Biosphere Reserves and Protected Areas in India, consider the following statements:

1. Protected Areas primarily focus on habitat protection while the Biosphere reserve on sustainable land use.
2. Protected Areas usually impose stricter conservation measures within designated boundaries than biosphere reserves.
3. Biosphere Reserves emphasise centralised management while protected areas focus on community participation and stakeholder engagement in conservation.

How many of the statements given above are correct?

- (a) Only one
- (b) Only one
- (c) All three
- (d) None

14. Consider the following statements about the Javan Rhino (*Rhinoceros sondaicus*):

1. The Javan Rhino is native to the island of Java in Indonesia and is the smallest of all rhino species.
2. It is classified as Endangered on the IUCN Red List due to habitat destruction, poaching, and disease.

Which of the statements given above is/are correct?

- (a) 1 only
- (b) 2 only
- (c) Both 1 and 2
- (d) Neither 1 nor 2

15. Consider the following:

Statement I:

African Elephants are keystone species of Savanna grassland, helping herbivores to survive.

Statement II:

African elephants shape savanna ecosystems by creating water holes and clearing paths through dense vegetation, allowing access to resources and enabling other herbivores to thrive.

Which one of the following is correct in respect of the above statements?

- (a) Both Statement-I and Statement-II are correct and Statement-II explains Statement-I
- (b) Both Statement-I and Statement-II are correct and Statement-II does not explain Statement-I
- (c) Statement-I is correct but Statement-II is incorrect.
- (d) Statement-I is incorrect but Statement-II is correct.

16. Which of the following statements accurately describes cryopreservation as an ex-situ conservation technique?

- (a) Cryopreservation is used for maintaining seeds at controlled temperatures and humidity.
- (b) Cryopreservation involves storing genetic material in liquid nitrogen for extended periods.
- (c) Cryopreservation is a method for cultivating plants in open-air environments.
- (d) Cryopreservation focuses on preserving genetic diversity in natural habitats

17. Consider the following statements regarding the African Lions and Asiatic Lions:

- 1. African lions are adapted to thrive in open shrublands and deserts, whereas Asiatic lions are exclusively found in the deciduous forests of India.
- 2. The presence of a longitudinal fold of skin under the belly is a distinctive feature of the Asiatic lion, which is absent in African lions.
- 3. Both African lions and Asiatic lions are classified as 'Endangered' according to the IUCN Red List.

How many of the above statements are correct?

- (a) Only one
- (b) Only two
- (c) All three
- (d) None

18. This arid grassland on the edge of Western India's marshy salt flats emerged from the sea due to tectonic activities and received soil from mainland rivers. Renowned for its rich wildlife and biodiversity, it supports over 250 bird species, including migratory ones. In recent years, it has become choked by rapidly increasing soil salinity, climate change and the 'Gaando Baval' invasion.

Which grasslands are being referred to here?

- (a) Bugyal grasslands
- (b) Banni grasslands
- (c) Ukhrul grasslands
- (d) Phumdi grassland

19. Consider the following statements:

- 1. Black Tigers are sub-species Bengal tiger with certain gene Mutation.

- 2. Most of India, black tigers are found in Simlipal Tiger Reserve.
- 3. They are also called as "melanistic tiger" because of high level of Melanin pigment.

How many of the above statements are correct?

- (a) Only one
- (b) Only two
- (c) All three
- (d) None

20. Consider the following statements:

- 1. National Tiger Conservation Authority (NTCA) provides legal backing to Project Tiger.
- 2. The 'Project Tiger' is a Centrally Sponsored Scheme (CSS) of the Ministry of Environment, Forests and Climate Change.

Which of the statements given above is/are *incorrect*?

- (a) 1 only
- (b) 2 only
- (c) Both 1 and 2
- (d) Neither 1 nor 2

21. Consider the following statements regarding The Forest Survey of India :

- 1. It started as Pre- Investment Survey of Forest Resources (PISFR) in 1965 with a collaborative effort of UNDP and the GOI Project.
- 2. The National Forest Inventory in India was developed in 2002, under the twelfth five-year plan considering the resource limitation.
- 3. The term green-wash depicts, recorded forest areas and other traditional forest areas at the time of survey.

Which of the statements given above are correct?

- (a) 1 and 3 only
- (b) 2 only
- (c) 1 and 2 only
- (d) 1, 2 and 3

22. Which report, commissioned by the Government of India, revealed the significant decline of tigers in Sariska Tiger Reserve, leading to the revamping of Project Tiger?
- (a) Forest Survey of India (FSI) Report
 - (b) Buxa Committee Report
 - (c) The Tiger Task Force Report
 - (d) National Biodiversity Strategy and Action Plan (NBSAP)
23. Which of the following best characterises the role of “Elephant Task Forces” established under Project Elephant?
- (a) They focus on developing international agreements for elephant conservation.
 - (b) They enforce anti-poaching laws, monitor elephant movement and drive elephant’s back to forests.
 - (c) They are research teams dedicated to studying elephant reproductive health and genetics.
 - (d) They act as advisory bodies providing policy recommendations to the Ministry of Environment, Forest and Climate Change (MoEFCC).
24. Which of the following programs ensures the convergence of species protection and habitat conservation through community involvement and local governance mechanisms in India?
- (a) National Mission for Clean Ganga (NMCG)
 - (b) Project Snow Leopard
 - (c) Eco-Sensitive Zone Regulations
 - (d) Joint Forest Management Program (JFM)
25. Consider the following statements:
- Statement I:**
The World Wide Fund for Nature (WWF) supports small-scale fisheries and sustainable aquaculture.
- Statement II:**
WWF and UNEP, via the Nairobi Convention, signed an MoU to implement marine and coastal programs in the Western Indian Ocean.
- Which one of the following is correct in respect of the above statements?
- (a) Both Statement-I and Statement-II are correct and Statement-II explains Statement-I
 - (b) Both Statement-I and Statement-II are correct and Statement-II does **not** explain Statement-I
 - (c) Statement-I is correct but Statement-II is incorrect.
 - (d) Statement-I is incorrect but Statement-II is correct.



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GENERAL STUDIES

PRACTICE TEST - 8

(Environment: Environmental Policies,
Conservation Efforts, & Sustainable Practices)

Answer Key

Q. 1 (b)	Q. 6 (a)	Q. 11 (d)	Q. 16 (b)	Q. 21 (a)
Q. 2 (b)	Q. 7 (a)	Q. 12 (d)	Q. 17 (d)	Q. 22 (c)
Q. 3 (b)	Q. 8 (a)	Q. 13 (b)	Q. 18 (b)	Q. 23 (b)
Q. 4 (c)	Q. 9 (a)	Q. 14 (a)	Q. 19 (b)	Q. 24 (d)
Q. 5 (a)	Q. 10 (a)	Q. 15 (a)	Q. 20 (d)	Q. 25 (d)

1. Correct Option: (b)

Statement 1 is correct & Statement 2 is correct:

Statement 3 is incorrect: Since the ozone depleting substances regulated under the Protocol are also potent greenhouse gases, the Protocol has contributed to mitigating climate change. However, the ban on CFCs has led to some substituting HCFCs for these chemicals; HCFCs are controlled but not banned under the Protocol. This lessens to some extent the Protocol's effect on climate change.

Step 01: understanding statement 1

Montreal Protocol and Vienna Convention

- **Vienna Convention for the Protection of the Ozone Layer (1985)**
- **Objective:** To establish a framework for international cooperation to protect the ozone layer by controlling activities that harm it.
- **Key Points:**
 - **Adoption Date:** March 22, 1985
 - **Came into Force:** September 22, 1988
 - **Signatories:** 28 (at the time of adoption)
 - **Parties (as of now):** 198 (universal ratification)
 - **Focus:** Establishing legal and scientific frameworks to monitor and reduce ozone-depleting substances (ODS).
- **Provisions:**
 - Encourages research and systematic observation of the ozone layer.
 - Facilitates the exchange of scientific, technical, and legal information.
 - Forms the legal foundation for future binding protocols, such as the Montreal Protocol.
- **Significance:**
 - It was the first global agreement addressing the ozone layer's protection.
 - Provided the basis for the Montreal Protocol's legally binding commitments.

Step 02: understanding statement 02

Montreal Protocol on Substances that Deplete the Ozone Layer (1987)

- **Objective:** To phase out the production and consumption of ozone-depleting substances (ODS) and protect the ozone layer.

Key Points:

- **Adoption Date:** September 16, 1987 (celebrated as *International Day for the Preservation of the Ozone Layer*)
- **Came into Force:** January 1, 1989
- **Parties:** 198 (universal ratification—the only UN treaty with full global participation)
- **Legally Binding:** Yes, with compliance mechanisms.
- **Phases of ODS Reduction:**
 - **Chlorofluorocarbons (CFCs)**—phased out by 2010 in developing countries.
 - **Halons, Carbon Tetrachloride, Methyl Chloroform**—phased out progressively.
 - **Hydrochlorofluorocarbons (HCFCs)**—to be phased out by 2040.
 - **Hydrofluorocarbons (HFCs)**—included under the *Kigali Amendment* (2016).
- **Key Amendments:**
 - **London Amendment (1990):** Accelerated the phase-out of CFCs and added new substances.
 - **Copenhagen Amendment (1992):** Strengthened control measures and funding mechanisms.
 - **Montreal Amendment (1997):** Included stricter regulations on illegal trade.
 - **Beijing Amendment (1999):** Added new chemicals and increased controls.
 - **Kigali Amendment (2016):** Included HFCs under phase-out due to their greenhouse gas effect.
- **Achievements:**
 - Over **99%** of ODS phased out.
 - The ozone layer is on track to **recover by 2066** over Antarctica.
 - Prevented millions of cases of skin cancer and cataracts.
- **Significance:**
 - One of the most successful environmental treaties.
 - Demonstrates effective international cooperation.
 - Pioneered the “**precautionary principle**”—acting before full scientific certainty.

2. Correct Option: (b)

Both statements are correct

Step 01: understanding statement 01

India's Membership in IUCN:

- **Joined IUCN:** 1969
- **Member Category:** State Member (Government of India)
- **Government Agencies as Members:**
 - **Ministry of Environment, Forest and Climate Change (MoEFCC)**
 - **Forest Research Institute (FRI)**
- **Non-Governmental Members in India:**
 - Wildlife Institute of India (WII)
 - Bombay Natural History Society (BNHS)
 - Ashoka Trust for Research in Ecology and the Environment (ATREE)
 - Centre for Environment Education (CEE)

IUCN's Role in India:

- **Conservation Projects:**
 - **Ecosystem Restoration:** Supports projects to restore degraded lands and forests.
 - **Biodiversity Conservation:** Works on preserving endangered species and habitats.
 - **Climate Change Adaptation:** Promotes climate resilience in vulnerable regions.
- **Red List of Threatened Species:**
 - **Indian Species Status:** Evaluates and lists species under categories like 'Endangered' and 'Critically Endangered.'
 - **Notable Species in India:**
 - Bengal Tiger (Endangered)
 - Asiatic Lion (Endangered)
 - Indian Pangolin (Endangered)
- **Policy Support:**
 - Assists in implementing **environmental treaties** like the **Convention on Biological Diversity (CBD)** and **CITES**.
 - Provides scientific input for the **National Biodiversity Action Plan**.
- **Sustainable Development:**
 - Works with local communities to promote **sustainable resource use** and **livelihoods**.

- Supports the **Green India Mission** for afforestation and climate mitigation.

Step 02: understanding statement 02

The International Union for Conservation of Nature (IUCN) actively participated in the 15th Conference of the Parties (COP15) to the Convention on Biological Diversity (CBD), held in Montreal, Canada, in December 2022. During this conference, the landmark Kunming-Montreal Global Biodiversity Framework was adopted, setting ambitious goals for biodiversity conservation through 2030 and beyond.

IUCN's Contributions at CBD COP15:

- **Advocacy for Ambitious Targets:** IUCN played a pivotal role in advocating for the inclusion of "other effective area-based conservation measures" (OECMs) in the global biodiversity targets. This advocacy emphasized recognizing and integrating diverse conservation efforts beyond traditional protected areas to achieve the goal of conserving 30% of terrestrial and marine areas by 2030.
- **Scientific and Technical Support:** Leveraging its extensive expertise, IUCN provided critical scientific data and policy recommendations to inform the negotiations, ensuring that the framework's targets were both ambitious and achievable.
- **Stakeholder Engagement:** IUCN facilitated dialogues among governments, Indigenous peoples, local communities, NGOs, and the private sector, promoting inclusive decision-making processes and the integration of diverse perspectives into the framework.

Key Outcomes of the Kunming-Montreal Global Biodiversity Framework:

- **Area-Based Conservation:** Commitment to effectively conserve and manage at least 30% of the planet's land, inland waters, and oceans by 2030, recognizing the role of OECMs alongside traditional protected areas.
- **Ecosystem Restoration:** Aiming to restore 30% of degraded ecosystems globally, enhancing biodiversity and ecosystem services.
- **Resource Mobilization:** Securing adequate financial resources to implement the framework, with an emphasis on equitable access for developing countries and Indigenous communities.

The **International Union for Conservation of Nature (IUCN)** is a unique membership organization that includes a diverse range

of members from different sectors. **IUCN Membership Categories:**

- **State Members:**

- National governments (e.g., India, New Zealand).
- Engage in international environmental policy-making and conservation programs.

- **Government Agencies:**

- Departments or agencies working on environmental protection (e.g., the U.S. Fish and Wildlife Service).
- Implement conservation policies and programs at national and regional levels.

- **Non-Governmental Organizations (NGOs):**

- Independent organizations working on biodiversity, climate action, and sustainability (e.g., World Wildlife Fund – WWF).

- **Indigenous Peoples' Organizations:**

- Represents Indigenous communities and their rights in environmental conservation.
- Ensures the inclusion of **Indigenous knowledge** and practices in conservation strategies.

- **Affiliates and International Institutions:**

- Universities, research institutions, and other organizations contributing to environmental science and policy.

IUCN's active participation and advocacy were instrumental in shaping a comprehensive and inclusive post-2020 Global Biodiversity Framework, reflecting a collective commitment to halt and reverse biodiversity loss worldwide.

3. Correct Option: (b)

Explanation:

Statement 1 is correct: The Intergovernmental Panel on Climate Change (IPCC) is the leading international body for the assessment of climate change. The IPCC currently has 195 members.

Statement 2 is incorrect: The IPCC does not undertake new research. Instead, it synthesizes published and peer-reviewed literature to develop a comprehensive assessment of scientific understanding.

Statement 3 is correct: It is a key source of scientific information and technical guidance

to the United Nations Framework Convention on Climate Change (UNFCCC) and the Paris Agreement.

Step 01: understanding Concepts

Intergovernmental Panel on Climate Change (IPCC)

- **Established:** 1988 **Founded by:** United Nations Environment Programme (UNEP) & World Meteorological Organization (WMO) **Headquarters:** Geneva, Switzerland **Objective:** To provide comprehensive scientific assessments on climate change, its impacts, and possible adaptation and mitigation strategies.

Structure of the IPCC:

- **Plenary Session:**
 - Main decision-making body with representatives from 195 member countries.
- **Working Groups:**
 - **Working Group I:** Physical Science Basis of Climate Change.
 - **Working Group II:** Impacts, Adaptation, and Vulnerability.
 - **Working Group III:** Mitigation of Climate Change.
- **Task Force:**
 - Works on National Greenhouse Gas Inventories.

Key IPCC Reports:

- **Assessment Reports (AR):**
 - **Sixth Assessment Report (AR6) – 2023:**
 - Global temperatures have risen by **1.1°C** since pre-industrial levels.
 - Calls for urgent, deep reductions in **greenhouse gas** emissions.
- **Special Reports:**
 - **Global Warming of 1.5°C (2018):** Highlighted the dangers of exceeding a 1.5°C increase.
 - **Climate Change and Land (2019):** Addressed desertification and land degradation.
 - **The Ocean and Cryosphere (2019):** Discussed melting glaciers and rising sea levels.

IPCC and the Paris Agreement (2015):

- The IPCC's findings influenced the Paris Agreement's goal to limit warming to **well below 2°C**, ideally **1.5°C**.

- Provides scientific input for the **Global Stocktake** to assess progress every five years.

Awards and Recognition:

- **Nobel Peace Prize (2007):** Shared with **Al Gore** for raising awareness of climate change.

India's Role in the IPCC:

- **Membership:**
 - India is a **founding member** of the IPCC (since 1988).
 - Actively participates in the **Plenary Sessions** and contributes to Working Groups.
- **Indian Scientists in IPCC:**
 - Several Indian experts and institutions contribute to **IPCC reports**.
 - Notable contributors include scientists from **The Energy and Resources Institute (TERI)**, **Indian Institute of Technology (IITs)**, and **Indian Institute of Science (IISc)**.
- **Leadership Positions:**
 - **Dr. Rajendra Kumar Pachauri** (India) served as the **IPCC Chair (2002–2015)** and led during the **Fourth and Fifth Assessment Reports**.

Impact of IPCC Reports on India's Climate Policy:

- **National Action Plan on Climate Change (NAPCC):**
 - Influenced by **IPCC's scientific assessments** to mitigate and adapt to climate change.
 - Includes **8 missions** (e.g., **National Solar Mission**, **National Water Mission**).
- **India's Commitment under the Paris Agreement (NDCs):**
 - Reduce **emission intensity** of GDP by **45% by 2030** (from 2005 levels).
 - Achieve **50% of electricity capacity** from **non-fossil fuels** by 2030.
 - **Net-Zero Target by 2070** (announced at COP26 in Glasgow, 2021).
- **State Action Plans on Climate Change (SAPCC):**
 - Aligned with IPCC's recommendations to develop localized climate resilience strategies.

India's Contribution to IPCC Reports:

- **Sixth Assessment Report (AR6 – 2023):**
 - Emphasized **India's vulnerability** to climate change and the need for **climate justice**.
 - India advocated for **equitable carbon space** and **common but differentiated responsibilities (CBDR)**.
- **Special Report on Global Warming of 1.5°C (2018):**
 - India supports limiting warming to **1.5°C** to prevent **agricultural losses** and **climate migration**.

Recognition:

- **Nobel Peace Prize (2007):**
 - Awarded to **IPCC** (shared with **Al Gore**).
 - **Dr. R.K. Pachauri** received this honor on behalf of the IPCC.

4. Correct Option: (c)

Explanation:

- **Statement 1 is correct:** The ultimate decision-making body of the Convention is the Conference of the Parties (CoP). The CoP meets every three years to review the implementation of the Convention and to consider any proposals put forward by parties to amend the Convention appendices containing the species of animals and plants covered.
- **Statement 2 is correct:** regulate international trade in specimens of species included in Appendices I–III of the Convention. Trade is defined as export, import, re-export, and introduction from the sea.
- **Statement 3 is correct:** CITES is legally binding on Parties.
- **Statement 4 is incorrect:** The trade of species listed in Appendix I of CITES is prohibited except in extraordinary situations for scientific or educational reasons.

Step 01: understanding Concept 01

Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES)

- **Established:** 1973 (CITES Convention signed)
- **Came into Force:** 1975
- **Headquarters:** Geneva, Switzerland

- **Parties (Members):** 184 countries (as of 2024)
- **India's Membership:** Joined in 1976

Objective of CITES:

To ensure that **international trade** in **wild animals and plants** does not threaten their **survival**. It regulates and monitors the trade of species that may become endangered due to over-exploitation.

Key Features of CITES:

- **Legally Binding:**
 - It is **legally binding** on member countries but does **not replace** national laws.
 - Member countries must implement CITES regulations through **domestic legislation**.
- **Species Classification:** CITES protects **over 38,000 species** categorized into **three appendices**:
 - **Appendix I:**
 - Species **threatened with extinction**.
 - **Trade is prohibited**, except under exceptional circumstances.
 - **Examples:** Bengal Tiger, Asiatic Lion, Snow Leopard.
 - **Appendix II:**
 - Species **not immediately endangered** but **could become** if trade is uncontrolled.
 - **Trade is allowed** with proper regulations and permits.
 - **Examples:** Indian Star Tortoise, Sandalwood.
 - **Appendix III:**
 - Species **protected in specific countries** requesting CITES assistance.
 - **Limited regulation** of international trade.
 - **Examples:** Indian Pangolin (by India).

Step 02: understanding Concept 02

CITES and India:

- **India's Role:**
 - **Founding Member** since 1976.
 - Administered by the **Ministry of Environment, Forest and Climate Change (MoEFCC)**.

- Enforced through **Wildlife Protection Act, 1972**.

Protected Indian Species under CITES:

- **Appendix I:** Indian Elephant, Bengal Tiger, Great Indian Bustard.
- **Appendix II:** Red Sandalwood, Seahorses.
- **Appendix III:** Indian Star Tortoise (recently upgraded to **Appendix I** in 2019).

Key Indian Organizations Implementing CITES:

- **Wildlife Crime Control Bureau (WCCB):** Monitors and prevents illegal wildlife trade.
- **Customs and Border Forces:** Enforce regulations at **ports and airports**

5. Correct Option: (a)

Explanation:

Statement 1 is not correct: Bio piracy is a situation where indigenous knowledge of nature, originating with indigenous people, is used by others for profit, without permission from, and with little or no compensation or recognition to the indigenous people themselves.

Statement 2 is not correct: Bioprospecting, also known as biodiversity prospecting, is the exploration of biological material for commercially valuable genetic and biochemical properties.

Statement 3 is correct: Biosafety refers to the prevention of large-scale loss of biological integrity, focusing both on ecology and human health. It encompasses the principles, practices, and procedures to protect people and the environment from potentially harmful biological agents or materials.

Step 01: understanding Concept 01

Biodiversity Conservation

Biodiversity refers to the variety of life on Earth—plants, animals, microorganisms, and the ecosystems they form. **Biodiversity conservation** is the protection, preservation, and sustainable management of biological resources to maintain ecological balance and ensure the survival of all life forms.

Types of Biodiversity Conservation:

- **In-Situ Conservation (On-Site Conservation):**
 - **Definition:** Conserving species in their **natural habitat**.

- **Examples:**
 - **Protected Areas:** National Parks (e.g., Kaziranga), Wildlife Sanctuaries (e.g., Periyar).
 - **Biosphere Reserves:** Nilgiri Biosphere Reserve.
 - **Sacred Groves:** Community-protected areas (e.g., Khasi Hills in Meghalaya).
- **Advantages:**
 - Species remain in their **natural ecosystem**.
 - Supports the **entire ecological community**.
- **Ex-Situ Conservation (Off-Site Conservation):**
 - **Definition:** Conserving species **outside** their natural habitat.
 - **Examples:**
 - **Seed Banks:** National Gene Bank, India (New Delhi).
 - **Botanical Gardens:** Indian Botanical Garden, Kolkata.
 - **Zoos & Breeding Centers:** Project Tiger, Project Elephant.
 - **Advantages:**
 - Protects **critically endangered** species.
 - Allows for **research** and **education**.

Global Initiatives for Biodiversity Conservation:

- **Convention on Biological Diversity (CBD) – 1992:**
 - Legally binding international treaty to **conserve biodiversity**, ensure **sustainable use**, and promote **fair sharing of genetic resources**.
 - **India** is a signatory since **1994**.
- **Aichi Biodiversity Targets (2011–2020):**
 - 20 targets aimed at reducing biodiversity loss.
 - Example: Protect **17% of terrestrial** and **10% of marine** areas.
- **Kunming-Montreal Global Biodiversity Framework (2022):**
 - Replaced the Aichi Targets.
 - **30x30 Goal:** Conserve **30% of Earth's land and oceans** by **2030**.

- **CITES (Convention on International Trade in Endangered Species – 1973):**
 - Regulates **international trade** in endangered species.
- **Ramsar Convention (1971):**
 - Protects **wetlands of international importance**.
 - **India** has **80 Ramsar sites** (as of 2024).

Step 02: understanding Concept 02

In India's Biodiversity Conservation Initiatives:

- **National Biodiversity Action Plan (NBAP):**
 - Implements **CBD commitments** through **community participation**.
- **Wildlife Protection Act (1972):**
 - Legal framework to **protect wildlife** and **habitats**.
 - **Schedules I-V** categorize species for **protection**.
- **Biological Diversity Act (2002):**
 - Implements **CBD guidelines** in India.
 - Established the **National Biodiversity Authority (NBA)**.
- **National Parks & Wildlife Sanctuaries:**
 - **106 National Parks** and **567 Wildlife Sanctuaries** (as of 2024).
 - **Project Tiger (1973)** and **Project Elephant (1992)** conserve flagship species.

6. Correct Option: (a)

Explanation:

- **Statement 1 is correct:** The CMS is the only global convention focusing specifically on the conservation of migratory species, their habitats, and migration routes.
- **Statement 2 is correct:** The CMS categorizes migratory species into two appendices. Appendix I lists migratory species threatened with extinction, while Appendix II lists migratory species that need or would significantly benefit from international cooperation.
- **Statement 3 is incorrect:** India is a signatory to the CMS since 1983, actively participating in key CMS conferences and hosting the CMS Conference of Parties (COP) in 2020.

Step 01: understanding Concept 01**Convention on the Conservation of Migratory Species of Wild Animals (CMS)**

Also Known As: Bonn Convention
Adopted: 1979 (in Bonn, Germany)
Came into Force: 1983
Administered by: UNEP (United Nations Environment Programme)
Headquarters: Bonn, Germany
Members (Parties): 133 countries (as of 2024)
India's Membership: Joined in 1983

Objective of CMS:

To **conserve migratory species** across their **range states** by facilitating **international cooperation** to protect species that cross national boundaries.

Key Features of CMS:

- **Legally Binding Agreement:**
 - It is an **international treaty** under the **UNEP**.
 - Provides **legal protection** for migratory species.
- **Species Classification (Appendices):**
 - **Appendix I:**
 - **Endangered** migratory species.
 - **Strict protection** required.
 - **Examples:** Snow Leopard, Siberian Crane.
 - **Appendix II:**
 - **Species requiring cooperation** to ensure survival.
 - Encourages **regional agreements** for conservation.
 - **Examples:** Asiatic Elephant, Olive Ridley Turtle.
- **Migratory Species:**
 - Species that **move seasonally** across national or international boundaries.

Step 02: understanding Concept 02

- **In CMS and India:**
- **India's Role:**
 - **Signatory** since 1983 and an **active participant** in CMS-related initiatives.
 - Hosted **CMS COP-13** in **Gandhinagar, Gujarat (2020)** with the theme: **"Migratory Species Connect the Planet and We Welcome Them Home"**.

- **Key Migratory Species in India Under CMS:**

◦ **Appendix I:**

- Amur Falcon
- Great Indian Bustard
- Bengal Florican

◦ **Appendix II:**

- Asiatic Lion
- Indian Elephant
- Whale Shark

- **Conservation Programs in India:**

- **Project Tiger (1973):** Conserves Bengal Tigers.
- **Project Elephant (1992):** Protects migratory elephants.
- **National Action Plan for Conservation of Migratory Birds (2018-2023):** Safeguards migratory bird habitats.

Recent Developments:

- **CMS COP-14 (Uzbekistan, 2024):**
 - Focuses on **climate change**, **habitat loss**, and **conservation innovation**.
- **India's Conservation Commitment:**
 - Strengthened legal frameworks like the **Wildlife Protection Act (1972)**.
 - Expansion of **protected areas** and **wetland conservation** under **Ramsar Convention**.

7. Correct Option: (a)**Explanation:**

Statement 1 is correct: The Ramsar Convention is the only global environmental treaty dedicated exclusively to the conservation and sustainable use of wetlands. It provides a framework for national action and international cooperation for the conservation and wise use of wetlands and their resources.

Statement 2 is incorrect: The Ramsar Convention does not require member countries to designate all their wetlands as Ramsar Sites. Instead, each country is obliged to designate at least one wetland site for inclusion in the List of Wetlands of International Importance and to promote the conservation and wise use of all wetlands within its territory.

Step 01: understanding Concept 01**Ramsar Convention on Wetlands**

- **Full Name:** Convention on Wetlands of International Importance, Especially as Waterfowl Habitat
- **Adopted:** February 2, 1971 (in Ramsar, Iran)
- **Came into Force:** December 21, 1975
- **Administered by:** IUCN (International Union for Conservation of Nature)
- **Headquarters:** Gland, Switzerland
- **Members (Contracting Parties):** 172 countries (as of 2024)
- **India's Membership:** Joined on February 1, 1982

Objective of the Ramsar Convention:

To conserve wetlands and promote their sustainable use by recognizing their ecological, economic, and cultural importance.

Key Features of the Ramsar Convention:

- **Wetland Definition:**
 - Areas of **marsh, fen, peatland**, or **water bodies** (natural or artificial, permanent or temporary) where water is **static or flowing, fresh, brackish**, or **saltwater**.
- **Three Pillars of the Ramsar Convention:**
 - **Conservation & Wise Use:** Ensure the sustainable management of wetlands.
 - **Ramsar Site Designation:** Identify and protect **Wetlands of International Importance**.
 - **International Cooperation:** Collaborate to **protect transboundary wetlands**.
- **Ramsar Sites:**
 - **Wetlands of International Importance** recognized under the convention.
 - Selected based on **biodiversity, ecological value**, and **threat status**.
- **Montreux Record:**
 - **Register** of Ramsar sites under **threat from human activities**.
 - India has **2 sites** on the Montreux Record:
 - **Keoladeo National Park, Rajasthan**
 - **Loktak Lake, Manipur**

Step 02: understanding Concept 02

Ramsar Convention and India:

- **India's Contribution:**
 - **First Ramsar Site:** **Chilika Lake (Odisha)** and **Keoladeo National Park (Rajasthan)** (1981).
 - **Total Ramsar Sites:** **80** (as of 2024)—**Largest in Asia**.
- **Notable Ramsar Sites in India:**
 - **Wular Lake (Jammu & Kashmir):** Largest **freshwater** lake in India.
 - **Sundarbans (West Bengal):** World's largest **mangrove forest**.
 - **Chilika Lake (Odisha):** Asia's largest **brackish water lagoon**.
 - **Loktak Lake (Manipur):** Known for **Phumdis** (floating vegetation).
 - **Renuka Wetland (Himachal Pradesh):** Smallest Ramsar site in India.
- **Recent Additions (2023-2024):**
 - **Bakhira Wildlife Sanctuary (Uttar Pradesh).**
 - **Pala Wetland (Mizoram)** – First Ramsar site from Mizoram.
- **Legal Framework in India:**
 - **Wetlands (Conservation and Management) Rules, 2017** regulate the protection of wetlands.
 - Implemented by the **Ministry of Environment, Forest and Climate Change (MoEFCC)**.

Global Significance of the Ramsar Convention:

- **World Wetlands Day (February 2nd):** Celebrates **wetland conservation** worldwide.
- **Ramsar Advisory Mission (RAM):** Provides **technical assistance** to protect threatened wetlands.
- **COP (Conference of Parties) to Ramsar:** Reviews **policies** and **progress**—held every **3 years**.

8. Correct Option: (a)

Explanation:

Statement 1 is correct: The Kyoto Protocol under the United Nations Framework Convention on Climate Change allows countries to receive

credits for their carbon sequestration activities in the area of land use, land-use change, and forestry as part of their obligations under the protocol.

Statement 2 is incorrect: In geologic carbon sequestration, CO₂ is usually pressurized until it becomes a liquid, and then it is injected into porous rock formations in geologic basins.

Step 01: understanding Concept 01

Carbon Sequestration

Definition: Carbon sequestration is the process of **capturing, storing, and preventing** carbon dioxide (CO₂) from being released into the atmosphere. It is a crucial strategy to **mitigate climate change** by reducing **greenhouse gas (GHG)** levels.

Types of Carbon Sequestration:

- **Natural Carbon Sequestration:**
 - Involves the absorption of CO₂ by **natural ecosystems**.
 - **Examples:**
 - **Forests:** Trees absorb CO₂ during **photosynthesis**.
 - **Oceans:** Plankton and seagrass absorb CO₂ from the atmosphere.
 - **Soils:** Organic matter stores carbon from plant decay.
- **Artificial (Technological) Carbon Sequestration:**
 - Uses **human-engineered methods** to capture and store CO₂.
 - **Examples:**
 - **Carbon Capture and Storage (CCS):** Captures CO₂ from industrial sources and stores it underground.
 - **Direct Air Capture (DAC):** Removes CO₂ directly from the atmosphere.
 - **Bioenergy with Carbon Capture and Storage (BECCS):** Combines bioenergy production with CO₂ capture.

Carbon Sequestration Methods:

- **Terrestrial Sequestration:**
 - Involves **planting trees, restoring grasslands, and conserving soils**.
 - **Example:** India's **Green India Mission** aims to increase forest cover.
- **Geological Sequestration:**
 - **Injecting CO₂** into underground rock formations for **long-term storage**.

- **Example:** CO₂ stored in **depleted oil and gas fields**.
- **Oceanic Sequestration:**
 - **Dissolving CO₂** into the ocean's depths where it is stored for **centuries**.
 - **Risk:** May cause **ocean acidification**.
- **Mineral Sequestration:**
 - **Reacting CO₂** with natural minerals to form **carbonates**.
 - **Example:** Using **basaltic rock** to capture CO₂.

Step 02: understanding Concept 02

- **In Carbon Sequestration and India:**
- **Afforestation & Reforestation Programs:**
 - **National Afforestation Programme (NAP)** promotes ecological restoration.
 - **Green India Mission (GIM)** under the **National Action Plan on Climate Change (NAPCC)** targets 5 million hectares of afforestation.
- **Soil Carbon Sequestration:**
 - Promoted through **Zero Budget Natural Farming (ZBNF)** and **Soil Health Card** initiatives.
- **Carbon Market Initiatives:**
 - **Perform, Achieve & Trade (PAT):** Improves **energy efficiency** to reduce emissions.
 - **Carbon Credit Mechanism:** India actively participates in **carbon trading** under the **Paris Agreement**.
- **India's CCS Projects:**
 - **National CCS Research Initiative:** Supports carbon capture technologies.
 - **ONGC's CO₂ Injection Project:** Captures CO₂ for **enhanced oil recovery**.

Global Initiatives for Carbon Sequestration:

- **Paris Agreement (2015):** Aims to limit global warming to **below 2°C** through emission reductions.
- **Carbon Sequestration Leadership Forum (CSLF):** Promotes research on **CCS technologies**.
- **UN-REDD Programme: Reducing Emissions from Deforestation and Forest Degradation** supports developing nations.

- **Global CCS Institute:** Advances worldwide CCS adoption.

9. Correct Option: (a)

Explanation:

Option (c) is correct: Statement 3 is incorrect because wetlands can be freshwater or saltwater, and they are found in both inland and coastal areas.

Step 01: understanding Concept 01

Wetland Ecosystem

Definition: A **wetland ecosystem** is a **transitional zone** between terrestrial and aquatic environments where the land is **saturated with water** either permanently or seasonally. Wetlands play a **vital role** in maintaining **biodiversity**, **climate regulation**, and **water purification**.

Types of Wetlands:

- **Inland (Freshwater) Wetlands:**
 - **Examples:** Lakes, ponds, rivers, marshes, swamps, peat bogs.
 - **Locations in India:** Wular Lake (J&K), Loktak Lake (Manipur).
- **Coastal (Marine/Brackish) Wetlands:**
 - **Examples:** Mangroves, estuaries, lagoons, salt marshes, coral reefs.
 - **Locations in India:** Sundarbans (West Bengal), Pichavaram (Tamil Nadu).
- **Artificial Wetlands:**
 - **Examples:** Reservoirs, paddy fields, salt pans, sewage treatment ponds.
 - **Locations in India:** Bhoj Wetland (Madhya Pradesh)

Functions and Ecological Importance of Wetlands:

- **Biodiversity Hotspots:**
 - Provide **habitats** for **endemic** and **migratory** species.
 - **Example:** Keoladeo National Park (Rajasthan) – a UNESCO World Heritage Site.
- **Climate Regulation:**
 - Act as **carbon sinks** – store large amounts of **carbon dioxide** and **methane**.
 - **Example:** Peatlands sequester **30% of the world's soil carbon**.

Water Purification:

- Filter **pollutants**, **heavy metals**, and **sediments** from water.
- **Example:** Wetlands near urban areas clean wastewater naturally.

Flood Control & Groundwater Recharge:

- Absorb **excess rainwater**, preventing **flooding** and replenishing **aquifers**.
- **Example:** East Kolkata Wetlands regulate floods and treat sewage.

Livelihood Support:

- Provide resources like **fish**, **timber**, **fuelwood**, and **medicinal plants**.
- Support **agriculture** (paddy fields) and **tourism**.

Step 02: understanding Concept 02

- **In Wetland Ecosystems in India:**
- **Significant Wetlands:**
 - **Chilika Lake (Odisha):** Asia's largest brackish water lagoon.
 - **Sundarbans (West Bengal):** World's largest mangrove forest.
 - **Wular Lake (J&K):** Largest freshwater lake in India.
 - **Loktak Lake (Manipur):** Known for **Phumdis** (floating islands).
- **Ramsar Convention and India:**
 - **Total Ramsar Sites (2024):** 80 – the largest in Asia.
 - **First Ramsar Sites (1981):** Chilika Lake (Odisha) & Keoladeo National Park (Rajasthan).
 - **Recent Additions (2023-2024):** Pala Wetland (Mizoram), Bakhira Wildlife Sanctuary (UP).
- **Conservation Initiatives in India:**
 - **National Wetland Conservation Programme (NWCP):** Protects major wetlands.
 - **Wetlands (Conservation and Management) Rules, 2017:** Legal framework for wetland protection.
 - **National Action Plan for Climate Change (NAPCC):** Includes wetlands under **National Adaptation** strategies.

10. Correct Option: (a)

Statement 1 is correct: According to the Wildlife Protection Act, 1972, wild animals are the property of the Government (State or Central).

Statement 2 is correct: The Wildlife (Protection) Act, 1972, does not discriminate between animals found in protected areas and outside. It provides for equal protection for wild animals irrespective of where they are found.

Statement 3 is incorrect: Just the apprehension of a protected wild animal becoming a danger to human life is not a sufficient ground for its capture or killing. Only if the wild animal becomes a danger to human life or is diseased or disabled beyond recovery can it be allowed to be captured or killed by the competent authority i.e., the Chief Wildlife Warden of the State.

Step 01: understanding Concept 01

Wildlife (Protection) Act, 1972

Enacted: 9th September 1972

Came into Force: 1st June 1973

Objective: To provide for the protection of wildlife, preservation of biodiversity, and regulation of hunting and trade in wild animals, plants, and their derivatives.

Background:

- **Before 1972:** Wildlife protection in India was **state-specific**, leading to **ineffective** conservation.
- **Global Influence:** India's commitment to **Convention on International Trade in Endangered Species (CITES)**.
- **Constitutional Mandate:** Article 48A (Directive Principles of State Policy) and Article 51A(g) (Fundamental Duty) promote **environmental protection**.

Key Features of the Wildlife (Protection) Act, 1972:

- **Protection of Wildlife:**
 - **Prohibits** hunting of **wild animals and birds**, with **exceptions** for scientific research and tribal needs.
- **Categorization of Species:**
 - **Schedules I to VI** classify species based on their level of protection.
- **Regulation of Trade:**
 - **Bans** trade in **rare and endangered** species.
- **Protected Areas Network:**
 - Provides for the creation of:
 - **National Parks** (No human activity allowed).

- **Wildlife Sanctuaries** (Limited human activity permitted).
- **Conservation Reserves** (Buffer zones for wildlife).
- **Community Reserves** (Community participation in conservation).

Enforcement Mechanism:

- **Forest officers** empowered to **search, seize, and arrest** without a warrant.

Schedules under the Wildlife (Protection) Act:

Schedule I:

- **Highest protection** – No hunting allowed.
- **Examples:** Bengal Tiger, Snow Leopard, Great Indian Bustard.

Schedule II:

- **High protection** – Limited hunting for scientific purposes.
- **Examples:** Deer, Himalayan Black Bear.

Schedule III & IV:

- **Protected but less restricted** – Common species.
- **Examples:** Monkeys, Wild Boar.

Schedule V:

- **Vermin** – May be hunted.
- **Examples:** Rats, Crows, Common Myna (in specific cases).

Schedule VI:

- **Protection of Plants** – Restricts trade.
- **Examples:** Red Vanda, Blue Vanda, Pitcher Plant.

In Amendments to the Wildlife (Protection) Act:

2002 Amendment:

- Introduced **Community Reserves**.
- Strengthened **punishments** for wildlife crimes.

2006 Amendment:

- Established the **National Tiger Conservation Authority (NTCA)**.
- Launched **Project Tiger** for tiger conservation.

2022 Amendment:

- Aligned with **CITES** for better regulation of **international trade** in endangered species.

- Reduced schedules from **6** to **4** for better management.

Penalties under the Act:

- **For Schedule I & II Species:**
 - **Imprisonment:** 3 to 7 years.
 - **Fine:** Rs. 10,000 to Rs. 50,000.
- **For Other Species:**
 - **Imprisonment:** Up to 3 years.
 - **Fine:** Up to Rs. 25,000.
- **Enhanced Penalties (for Repeat Offenses):**
 - **Imprisonment:** 7 years.
 - **Fine:** Rs. 25,000 or more.

Major Wildlife Conservation Programs in India:

- **Project Tiger (1973):**
 - Launched to protect the **Royal Bengal Tiger**.
 - **53 Tiger Reserves** (as of 2024).
- **Project Elephant (1992):**
 - Protects **Asian Elephants** and their habitats.
- **Crocodile Conservation Project (1975):**
 - Focuses on conserving **Mugger, Gharial, and Saltwater Crocodiles**.
- **Vulture Conservation:**
 - Protects endangered **Gyps vultures** from extinction due to **diclofenac** poisoning.

11. Correct Option: (d)

Explanation:

All statements are correct

Step 01: understanding Concept 01

Biological Diversity Act, 2002

Enacted: 5th February 2003

Objective: To conserve biological diversity, promote **sustainable use** of its components, and ensure **equitable sharing** of benefits arising from biological resources and associated knowledge.

Background:

- **Convention on Biological Diversity (CBD) 1992:**
 - India signed and ratified the **CBD** in **1994**, committing to conserve biological diversity and share benefits.

Need for the Act:

- To protect India's **rich biodiversity** from **biopiracy** and **unsustainable exploitation**.

Key Objectives of the Biological Diversity Act, 2002:

- **Conservation of Biological Diversity** – Protecting ecosystems, species, and genetic resources.
- **Sustainable Use of Biodiversity** – Ensuring resources are used without harming the environment.
- **Equitable Benefit Sharing (ABS)** – Fair distribution of profits derived from biological resources.

Key Provisions of the Act:

- **Access to Biological Resources:**
 - **Foreign entities** need approval from the **National Biodiversity Authority (NBA)**.
 - Indian citizens need **intimation** for research and bio-utilization.
- **Benefit Sharing Mechanism:**
 - Companies using **biological resources** must share **profits** with local communities.
 - Example: **Turmeric and Neem patents** revoked due to biopiracy.
- **Protection of Traditional Knowledge:**
 - Safeguards **indigenous** knowledge from unauthorized commercial use.
- **Prohibited Activities:**
 - **Unauthorized access** to biodiversity for research or commercial use.
 - **Transfer** of biological material without approval.

Institutional Framework Under the Act:

- **National Biodiversity Authority (NBA) – 2003:**
 - Grants approvals for **foreign access** to biological resources.
 - Advises the **Central Government** on biodiversity conservation.
- **State Biodiversity Boards (SBBs):**
 - Regulates access to biological resources within **states**.
 - Implements biodiversity programs at the **state level**.

- **Biodiversity Management Committees (BMCs):**
 - Formed at the **local** level (Panchayats, Municipalities).
 - Prepares **People's Biodiversity Registers (PBRs)** to document local biological knowledge.

Key Sections of the Biological Diversity Act:

- **Section 3:** Restricts access to biological resources by **non-citizens** and **foreign companies**.
- **Section 6:** Requires prior approval from **NBA** before applying for **IPR** (patents) based on Indian biological resources.
- **Section 21:** Provides for **benefit-sharing agreements** to ensure fair distribution of profits.

India's Initiatives for Biodiversity Conservation:

- **National Biodiversity Action Plan (NBAP):** Aligns with **CBD** goals for biodiversity protection.
- **People's Biodiversity Registers (PBRs):** Documents local biodiversity and traditional knowledge.
- **Access and Benefit-Sharing (ABS) Agreements:** Companies must share profits with **local communities**.

Amendments to the Biological Diversity Act:

- **Biological Diversity (Amendment) Bill, 2021:**
 - **Simplifies** access for domestic researchers and Indian traditional medicine.
 - Encourages **foreign investment** in biodiversity-related research.
 - Strengthens **penalties** for violations.

12. Correct Option: (d)

Explanation:

Statements 1 & 2 are correct: With the complaints that many states were not complying with the E-Waste (Management) Rules, the National Green Tribunal has directed the Central Pollution Control Board to file a fresh status report in the generation and treatment of electronic waste by all the states.

Statement 3 is incorrect: State Pollution Control Boards (SPCBs) are constituted under Section 4 of the Water (Prevention and Control of

Pollution) Act, 1974 and the Air (Prevention and Control of Pollution) Act, 1981 by the respective State Government.

Step 01: understanding Concept 01

Central Pollution Control Board (CPCB)

- **Established:** 22nd September 1974
- **Headquarters:** New Delhi
- **Parent Ministry:** Ministry of Environment, Forest and Climate Change (MoEFCC)
- **Objective:** To promote **pollution control**, **environmental quality**, and **sustainable development** across India.

Legal Framework:

- **Water (Prevention and Control of Pollution) Act, 1974** – CPCB was established under this Act.
- **Air (Prevention and Control of Pollution) Act, 1981** – Empowered CPCB to control air pollution.
- **Environment (Protection) Act, 1986** – Expanded CPCB's jurisdiction to all environmental concerns.

Key Programs & Initiatives by CPCB:

- **National Air Quality Monitoring Programme (NAMP):**
 - Monitors air quality in over **400** cities across India.
 - Provides **AQI (Air Quality Index)** data to the public.
- **National Water Quality Monitoring Programme (NWMP):**
 - Assesses the quality of **surface** and **groundwater**.
- **Pollution Control in Ganga River (Ganga Action Plan):**
 - Oversees the **National Mission for Clean Ganga (NMCG)**.
- **Graded Response Action Plan (GRAP):**
 - Implements emergency measures to control **air pollution** in Delhi-NCR.
- **Extended Producer Responsibility (EPR):**
 - Mandates manufacturers to manage **plastic** and **e-waste**.

CPCB's Power and Authority:

- **Issue Directives:**
 - Can direct industries to **shut down** or **penalize** polluters.

- **Conduct Inspections:**
 - Monitors compliance through regular audits and surveys.
- **Legal Action:**
 - Can initiate prosecutions and impose penalties for violations.

13. Correct Option: (b)

Explanation:

Statement 1 & Statement 2 are correct:

Statement 3 is not correct: Biosphere Reserves emphasise community involvement and stakeholder engagement in conservation decision making processes, recognizing the importance of indigenous knowledge and local practices in biodiversity conservation. In contrast, Protected Areas may rely more on top-down management approaches, with less emphasis on local participation and traditional ecological knowledge

Step 01: understanding Concept 01

Biosphere Reserves and Protected Areas

Both **Biosphere Reserves** and **Protected Areas** are critical for conserving **biodiversity**, **ecosystems**, and **cultural heritage**. They differ in their **objectives**, **management**, and **international recognition**.

Biosphere Reserves (BRs)

A **Biosphere Reserve** is a large, protected area that aims to balance **biodiversity conservation** with **sustainable development**. These are designated under the **UNESCO Man and the Biosphere (MAB) Programme**.

Key Features of Biosphere Reserves:

- **Conservation:** Protects genetic resources, species, and ecosystems.
- **Development:** Promotes **sustainable livelihoods** for local communities.
- **Research & Education:** Supports scientific studies and **public awareness**

Zonation of Biosphere Reserves:

- **Core Zone:**
 - **Highly protected**—No human activity.
 - Focuses on **conservation of biodiversity**.
- **Buffer Zone:**
 - **Limited human activity**—Research

and tourism allowed.

- **Activities:** **Environmental education, ecotourism, sustainable agriculture.**
- **Transition Zone:**
 - **Outer area**—Sustainable human activities encouraged.
 - Supports **local communities** through **economic activities**.
- In Biosphere Reserves in India:
 - India has **18 Biosphere Reserves**, of which **12** are part of the **UNESCO World Network of Biosphere Reserves**.

<i>Biosphere Reserve</i>	<i>State</i>	<i>UNESCO Status</i>
Nilgiri Biosphere Reserve	Tamil Nadu, Kerala	(2000)
Nanda Devi	Uttarakhand	(2004)
Sundarbans	West Bengal	(2001)
Gulf of Mannar	Tamil Nadu	(2001)
Great Nicobar	Andaman & Nicobar	(2013)
Pachmarhi	Madhya Pradesh	(2009)
Simlipal	Odisha	(2009)
Agasthyamala	Kerala, Tamil Nadu	(2016)

Step 02: understanding Concept 02

Protected Areas

Protected Areas are designated regions managed for **biodiversity conservation** and **ecosystem preservation** under **national** and **international laws**.

Categories of Protected Areas in India:

- **National Parks:**
 - **Strictly protected**—No human activity allowed.
 - **Example:** Jim Corbett National Park (Uttarakhand, 1936).
- **Wildlife Sanctuaries:**
 - **Less restricted**—Human activity like **tourism** and **research** is allowed.
 - **Example:** Ranthambore Wildlife Sanctuary (Rajasthan).
- **Conservation Reserves:**
 - **Buffer zones**—Located between **national parks** and **human settlements**.
 - **Example:** Asan Conservation Reserve (Uttarakhand).

- **Community Reserves:**
 - **Managed by local communities**— Promotes **traditional practices**.
 - **Example:** Keshopur Chhamb (Punjab).

Legal Framework for Protected Areas in India:

- **Wildlife (Protection) Act, 1972** – Legal foundation for **protected areas**.
- **Environment Protection Act, 1986** – Strengthens protection for **ecosystems**.

Statistics of Protected Areas in India (2024):

- **National Parks:** 106
- **Wildlife Sanctuaries:** 567
- **Conservation Reserves:** 105
- **Community Reserves:** 220

14. Correct Option: (a)

Explanation:

Statement 1 is correct: The Javan Rhino is indeed native to the island of Java in Indonesia. However, it is not the smallest of all rhino species; it is smaller compared to the African rhinos but not the smallest overall.

Statement 2 is incorrect: The Javan Rhino is classified as Critically Endangered, not just Endangered, on the IUCN Red List. The primary threats include habitat destruction and natural disasters, but poaching is less of an issue compared to other rhino species due to the lower horn size and effective conservation measures in place.

Step 01: understanding Concept 01

Javan Rhino (*Rhinoceros sondaicus*)

The **Javan Rhino** is one of the **most endangered** and **rarest** large mammals on Earth, with fewer than **80 individuals** remaining. It is known for its **solitary** nature and **single horn**.

Classification:

- **Scientific Name:** *Rhinoceros sondaicus*
- **Family:** Rhinocerotidae
- **Order:** Perissodactyla (odd-toed ungulates)
- **IUCN Red List Status:** Critically Endangered (CR)
- **CITES Listing:** Appendix I (Strict protection against international trade)

Habitat & Distribution:

- **Native Range:** Southeast Asia (formerly found across India, Bangladesh, and Indonesia).

- **Current Population:**
 - **Only in Ujung Kulon National Park, Java, Indonesia.**
 - **Population Estimate (2024):** ~76 individuals.

Physical Characteristics:

- **Size:** 3.1–3.2 meters long, 1.4–1.7 meters tall.
- **Weight:** 900–2,300 kg.
- **Horn:** Only **one** horn (~25 cm), unlike the **two-horned** Indian Rhino.
- **Skin:** Greyish-brown with **mosaic folds**, giving an **armor-plated** appearance.

Behavior & Ecology:

- **Diet:** Herbivore – feeds on **leaves, twigs, fruits, and shoots**.
- **Activity:** Mainly **nocturnal** and **solitary**.
- **Reproduction:**
 - Gestation: **16 months**.
 - Birth Interval: **4-5 years**.
 - Lifespan: ~**30-40 years**.

Conservation Efforts:

- **Protected Habitat:**
 - **Ujung Kulon National Park** – Declared a **UNESCO World Heritage Site** (1991).
- **Surveillance & Monitoring:**
 - **Camera traps** and **foot patrols** to monitor their numbers and protect against poaching.
- **Javan Rhino Study and Conservation Area (JRSCA):**
 - Established in 2010 to **expand** their habitat.
- **Global Collaboration:**
 - Supported by **IUCN, WWF, and Indonesian Government**.

Key Facts About Javan Rhinos:

- **Rarest Rhino Species** – More endangered than the **Sumatran Rhino**.
- **Unique Habitat** – Survives only in a **single location** globally.
- **Conservation Success** – Population has grown from **60 to 76** in the last **decade**.

15. Correct Option: (a)

Explanation:

Statement I is correct: Without African elephants, the savanna would be a forest, where

the densely canopied trees would never give room for grass to grow – with no grass, there would be no sufficient food to sustain large herds of grassland herbivores.

Statement II is correct: In light of this, elephants are considered the very engineers of the savanna, for they help shape the landscape when spending 20 hours a day eating all kinds of vegetation, from grass, sprouts and shrubs to tree barks, fruits and even roots.

Step 01: understanding Concept 01

Keystone Species

A **keystone species** is a species that has a **disproportionately large impact** on its ecosystem relative to its abundance. These species play a **critical role** in maintaining the structure, stability, and diversity of an ecosystem. If removed, the entire ecosystem could undergo **significant changes** or even collapse.

Characteristics of Keystone Species:

- **Ecological Importance:** Their presence affects the **survival** of many other species.
- **Disproportionate Impact:** Their influence is much **greater** than their population size suggests.
- **Ecosystem Stability:** They help maintain **biodiversity** and prevent ecosystem degradation.

Types of Keystone Species:

- **Predator Keystone Species:**
 - Control the population of **prey** and maintain **species diversity**.
 - **Example:**
 - **Tiger** (India) – Controls herbivore populations like **deer**, maintaining forest balance.
 - **Wolves** (Yellowstone, USA) – Keep **elk** in check, preventing overgrazing.

- **Prey Keystone Species:**
 - Serve as a **critical food source** for predators.
 - **Example:**
 - **Salmon** – Provide nutrients to aquatic and terrestrial ecosystems.
 - **Krill** (Antarctica) – Form the **base** of the Southern Ocean's food chain.
- **Ecosystem Engineers:**
 - Modify their environment, creating **habitats** for other species.
 - **Example:**
 - **Beavers** – Build **dams**, creating wetlands that support biodiversity.
 - **Elephants** – Uproot trees and maintain **savanna** ecosystems.
- **Mutualists:**
 - Engage in **mutualistic relationships**, helping multiple species thrive.
 - **Example:**
 - **Honeybees** – Pollinate flowering plants, supporting **crop production** and wild flora.
 - **Fig Trees** (Tropical Forests) – Provide year-round food for various species.
- **Foundation Species:**
 - Form the **base** of the ecosystem and provide structural support.
 - **Example:**
 - **Coral Reefs** – Provide shelter for **marine** organisms.
 - **Mangroves** – Protect coastal areas and support marine life.

Examples of Keystone Species (Global & India):

Species	Ecosystem	Role
Tiger	Indian Forests (Terrestrial)	Controls herbivore populations
Coral	Coral Reefs (Marine)	Provides habitat for marine species
Mangroves	Coastal Areas (India)	Prevents erosion, supports fisheries
Honeybee	Global (Terrestrial)	Pollinates crops and wild plants
Snow Leopard	Himalayas (India)	Maintains balance in mountain ecosystems
Sea Otter	Kelp Forests (Pacific)	Controls sea urchins, preserving kelp
Indian Elephant	Tropical Forests (India)	Creates clearings, disperses seeds

Conservation of Keystone Species:

- **Protected Areas:** Establishment of **national parks** and **reserves** (e.g., Project Tiger in India).

- **Legislation:** Enforcing **Wildlife Protection Act (1972)** and **international treaties** (CITES).

- **Restoration Projects: Reintroducing** key species (e.g., Wolf reintroduction in Yellowstone).
- **Community Involvement:** Engaging local communities in species protection.

16. Correct Option: (b)

Explanation:

Option (b) is correct: Cryopreservation is an advanced ex-situ conservation technique that involves the preservation of genetic material, such as seeds, pollen, and embryos, by cooling it to extremely low temperatures using liquid nitrogen. This process halts biological activity and deterioration, allowing for virtually unlimited storage without loss of viability. By maintaining genetic material at temperatures around -196°C (-320°F), cryopreservation ensures long term preservation, crucial for conserving endangered species and plant varieties.

Step 01: understanding Concept 01

Cryopreservation is a technique used to **store and preserve genetic material** at **ultra-low temperatures**, typically in **liquid nitrogen** (-196°C). This method helps maintain the **viability** of biological samples for **long-term use**.

Key Aspects of Cryopreservation:

- **Materials Preserved:**
 - **Genetic Material** – Sperm, eggs, embryos, and plant seeds.
 - **Tissues & Cells** – Stem cells, blood, and bone marrow.
 - **Microorganisms** – Bacteria, fungi, and viruses for research.
- **Process:**
 - **Cooling** – Slow freezing to prevent **ice crystal formation**.
 - **Storage** – Submersion in **liquid nitrogen** for long-term preservation.

- **Thawing** – Controlled warming to restore **cell function**.

Applications of Cryopreservation:

- **Biodiversity Conservation:**
 - **Seed Banks:** Preserve endangered **plant species** (e.g., Svalbard Global Seed Vault).
 - **Animal Germplasm:** Store **genetic material** from rare species for future breeding.
- **Medical Science:**
 - **Fertility Preservation:** Store **sperm, eggs, and embryos** for assisted reproduction (IVF).
 - **Stem Cell Banking:** For **cancer treatments** and regenerative medicine.
- **Agriculture:**
 - Preserve **crop diversity** and ensure **food security**.
 - Maintain genetic material for **livestock improvement**.
- **Research & Medicine:**
 - Store **biological samples** for future medical and genetic studies.

17. Correct Option: (d)

All three Statements are Incorrect

Step 01: understanding Concept 01

African Lion vs. Asiatic Lion: A Detailed Comparison

African lions (*Panthera leo leo*) and Asiatic lions (*Panthera leo persica*) are **subspecies** of lions with **distinct physical, behavioral, and ecological** differences. While African lions are more widespread, Asiatic lions are **critically endangered** and confined to a small region in **India**.

- **Classification**

Feature	African Lion	Asiatic Lion
Scientific Name	<i>Panthera leo leo</i>	<i>Panthera leo persica</i>
Conservation Status	Vulnerable (VU) (IUCN Red List)	Endangered (EN) (IUCN Red List)
Habitat	Grasslands, savannas, open woodlands	Dry deciduous forests, scrublands
Geographic Range	Sub-Saharan Africa (Botswana, Kenya, Tanzania, etc.)	India (Gir Forest, Gujarat)

- Physical Differences

Feature	African Lion	Asiatic Lion
Size	Larger (2.5 – 3.3 meters in length)	Slightly smaller (2.0 – 2.9 meters)
Weight	Males: 150-250 kg, Females: 120-182 kg	Males: 160-190 kg, Females: 110-120 kg
Mane	Full mane around head and neck	Shorter, darker mane; ears visible
Skin Fold	Absent	Distinct belly fold (a unique trait)
Tail Tuft	Prominent black tuft at the tip	Similar black tuft at the tip
Facial Structure	Broader skull, more robust	Narrower skull, less robust

- Habitat and Distribution

Feature	African Lion	Asiatic Lion
Range	Spread across 26 African countries	Only in Gir Forest, Gujarat, India
Preferred Habitat	Savannas, grasslands, and open woodlands	Dry deciduous and thorn forests
Population (2024)	~20,000-25,000 in the wild	~675 in Gir and surrounding areas

- Behavior and Social Structure

Feature	African Lion	Asiatic Lion
Pride Structure	Large prides (15-30 members) with multiple males	Smaller prides (4-6 members), typically 1 male
Territoriality	Males fiercely defend large territories	Males live solitarily and join females only to mate
Activity	Nocturnal (active at night)	Nocturnal and crepuscular (active at dawn/dusk)
Hunting	Cooperative hunters – females hunt, males protect	Similar hunting methods but smaller prey size

- Diet and Prey

Feature	African Lion	Asiatic Lion
Primary Diet	Large herbivores – zebras, wildebeests, buffalos	Chital, nilgai, sambar, and domestic livestock
Hunting Strategy	Ambush and teamwork	Ambush and stalking, often individually

- Threats and Conservation Status

Feature	African Lion	Asiatic Lion
Threats	Habitat loss, poaching, human-wildlife conflict	Habitat fragmentation, disease outbreaks, genetic bottleneck
Conservation Measures	National parks (Serengeti, Kruger), CITES protection	Gir Lion Project, relocation efforts, breeding programs
Legal Protection	Protected under CITES Appendix II	Schedule I of India's Wildlife Protection Act (1972)

- Key Conservation Initiatives

- African Lions:

- Lion Guardians Program – Community-based conservation.
 - CITES – Controls the international trade of lion parts.
 - Protected Areas – Serengeti (Tanzania), Kruger (South Africa).

- Asiatic Lions (India):

- Gir National Park – The only natural habitat for Asiatic lions.
 - Asiatic Lion Conservation Project – Population monitoring and habitat protection.
 - Relocation Plans – Proposed Kuno-Palpur Sanctuary (Madhya Pradesh) as a secondary habitat.

Step 02: understanding Concept 02**Asiatic Lion in India**

The **Asiatic lion** (*Panthera leo persica*) is a **critically endangered** subspecies found **only in India**. Once widespread across Asia, it is now confined to the **Gir Forest** and surrounding areas in **Gujarat**. Intensive conservation efforts have helped increase their population, making them a symbol of **India's wildlife conservation success**.

Key Facts About Asiatic Lions

Feature	Details
Scientific Name	<i>Panthera leo persica</i>
Conservation Status	Endangered (IUCN Red List)
Location in India	Gir Forest, Gujarat
Population (2024)	~675 individuals
Legal Protection	Schedule I of the Wildlife (Protection) Act, 1972
Habitat Type	Dry deciduous forests, savannahs, and scrublands
Distinct Feature	Prominent belly fold, shorter mane, visible ears

Geographic Distribution

- **Core Habitat:**
 - **Gir National Park and Wildlife Sanctuary** (Sasan Gir, Gujarat) – the **only natural habitat** of Asiatic lions.
- **Extended Range:**
 - Coastal regions of **Amreli, Bhavnagar, and Junagadh** in Gujarat.
 - **Mitiyala and Pania Wildlife Sanctuaries** as buffer zones.
- **Physical Characteristics**

Feature	Asiatic Lion
Size	Males: 160-190 kg, Females: 110-120 kg
Length	2.0 – 2.9 meters
Mane	Shorter, darker mane (ears visible)
Skin Fold	Distinct belly fold (absent in African lions)
Social Structure	Smaller prides (4-6 members, usually one male)

Conservation Efforts in India

- **Gir Lion Project (1972):**
 - Initiated to **protect and monitor** the Asiatic lion population.
- **Asiatic Lion Conservation Project (2018):**

- Budget: Rs. **97.85 crore** for **habitat improvement**, disease prevention, and community participation.
- **Habitat Expansion:**
 - Creation of **buffer zones** and **corridors** (e.g., **Mitiyala** and **Pania** sanctuaries).
- **Relocation Project:**
 - **Kuno-Palpur Wildlife Sanctuary** (Madhya Pradesh) proposed as a **secondary habitat** to reduce the risk of extinction. However, it faces **political and ecological challenges**.

18. Correct Option: (b)**Explanation:**

Option (b) is correct: The Banni grassland reserves form an arid grassland ecosystem along the outer southern edge of the marshy salt flats of the Rann of Kutch. The Banni region, which emerged from the sea due to tectonic activities, received soil deposits from rivers flowing from the Bhuj mainland, ultimately extending into the Greater Rann of Kutch.

Step 01: understanding Concept 01**Banni Grassland Reserve**

The **Banni Grassland Reserve** is one of the **largest natural grasslands** in **Asia**, located in the **Kachchh (Kutch) district** of **Gujarat, India**. It is an **ecologically unique** and **economically vital** region known for its **rich biodiversity, indigenous livestock, and cultural heritage**.

Key Facts About Banni Grassland

Feature	Details
Location	Kachchh (Kutch) district, Gujarat, India
Geographic Area	~ 2,618 km ²
Ecological Type	Arid grassland ecosystem
Formation	Formed by the Indus River delta deposits
Conservation Status	Protected Area under the Eco-Sensitive Zone
Cultural Significance	Home to Maldhari pastoralist communities

Geographic and Ecological Features

- **Location:**
 - Lies on the **southern edge** of the **Great Rann of Kachchh**.
 - **Borders** Pakistan and the Arabian Sea.

- **Topography:**
 - Saline low-lying plains – prone to seasonal flooding.
 - Alluvial deposits from the Indus River.
- **Climate:**
 - Arid and semi-arid – high temperatures and low annual rainfall (~300 mm).
 - Extreme climate: **Hot summers** (~48°C) and **cold winters** (~2°C).

Biodiversity of Banni Grassland

- **Flora:**
 - **Grass Varieties:** Over 40 grass species (e.g., *Dichanthium* and *Cenchrus*).
 - **Domination by *Prosopis juliflora*** (an invasive species introduced in the 1960s).
- **Fauna:**
 - **Mammals:** Chinkara (Indian Gazelle), Indian fox, Desert cat.
 - **Birds:** Over 260 species, including the **Great Indian Bustard** and migratory birds like **flamingos** and **cranes**.
 - **Reptiles:** Monitor lizards, desert snakes.

Indigenous Communities and Livelihoods

- **Maldhari Pastoralists:**
 - Traditional **nomadic herders** raising **Banni buffalo**, sheep, and cattle.
 - **Banni Buffalo:** A unique **indigenous breed** known for **high milk yield** (recognized by the **National Bureau of Animal Genetic Resources**).
- **Economy:**
 - **Animal husbandry** (livestock rearing).
 - **Handicrafts** (embroidery, leatherwork) by **local communities**.

Conservation and Policy Initiatives

- **Eco-Sensitive Zone (ESZ):**
 - Declared as an **Eco-Sensitive Zone** under the **Environment Protection Act (1986)** to regulate development.
- **Banni Grassland Restoration Project:**
 - Aims to **restore native flora**, **control invasive species**, and **revive pastoral practices**.

- **Banni Buffalo Conservation:**
 - The **National Dairy Development Board (NDDB)** and **Gujarat Livestock Development Board** promote **Banni buffalo breeding** and conservation.

19. Correct Option: (b)

Explanation:

Statement 1 is incorrect: Black tigers are not a separate subspecies. They are Bengal tiger with a gene mutation, which give them their distinctive dark stripe pattern.

Statement 2 is correct: According to Union Minister of state for environment, there are only 10 Black Tigers and all are exclusively found in Simlipal Tiger Reserve (Odisha)

Statement 3 is correct: Bengal tiger are called as melanistic tiger” because of high level of Melanin pigment.

Gene Mutation in Black Tigers

Black tigers are a rare color variant of the **Bengal tiger** (*Panthera tigris tigris*), primarily found in **India**, especially in the **Simlipal Tiger Reserve**, Odisha. Their distinctive **black stripes** are due to a unique **genetic mutation** affecting coat color and pattern.

Key Facts About Black Tigers

Feature	Details
Scientific Name	<i>Panthera tigris tigris</i>
Mutation Type	Pseudo-melanism (a form of gene mutation)
Location in India	Simlipal Tiger Reserve, Odisha
Population	~10 individuals (mostly in Simlipal)
Conservation Status	Endangered (IUCN Red List – Bengal Tiger)
Distinct Characteristic	Thicker, closely spaced black stripes on an orange-brown coat

Genetic Cause of Black Tigers

- **Pseudo-melanism Mutation:**
 - **Black tigers** are not fully melanistic; instead, they exhibit **pseudo-melanism** – a genetic condition causing **abnormally thick and closely spaced black stripes**.
 - Caused by a **mutation in the Transmembrane Aminopeptidase Q (Taqppep) gene**, which affects coat pattern.

- **Recessive Trait:**
 - **Pseudo-melanism** is an **autosomal recessive** trait – both parents must carry the **mutant gene** to produce **black tiger offspring**.
- **Inbreeding Effect:**
 - The **Simlipal** population has **limited genetic diversity** due to **inbreeding**, increasing the frequency of **pseudo-melanistic** individuals.

Distribution of Black Tigers

- **India:**
 - **Simlipal Tiger Reserve** – the only place where **black tigers** are consistently found.
 - **Other sightings:** **Satkosia, Nandankanan Zoological Park** (Odisha), and isolated sightings in **Chhattisgarh**.

Scientific Studies and Findings

- **2021 Study by NCBS:**
 - Researchers from the **National Centre for Biological Sciences (NCBS)** confirmed the role of the **Taqpep gene** in black tiger coloration.
 - Findings indicate that **inbreeding** and **genetic drift** within an **isolated population** led to the **high prevalence** of this mutation in **Simlipal**.
- **Genetic Bottleneck:**
 - Due to **geographical isolation**, the **Simlipal tiger population** faces a **genetic bottleneck**, making the **pseudo-melanistic gene** more common.
- **Differences: Black Tigers vs. Melanistic Tigers**

Feature	Black Tiger (Pseudo-melanistic)	Melanistic Tiger
Cause	Mutation in the Taqpep gene	M u t a t i o n causing excess melanin
Appearance	Dense black stripes on orange coat	Fully black coat with faint stripes
Rarity	Found only in India (Simlipal)	Extremely rare – no confirmed cases in tigers
Genetics	Recessive trait (requires two copies of the mutated gene)	Overexpression of melanin-producing genes

20. Correct Option: (d)

Both the statements are correct

Step 01: understanding Concept 01

National Tiger Conservation Authority (NTCA)

The **National Tiger Conservation Authority (NTCA)** is a **statutory body** under the **Ministry of Environment, Forest and Climate Change (MoEFCC)**, established to **strengthen tiger conservation** in India. It plays a crucial role in the implementation of **Project Tiger** and the protection of **tiger habitats**.

Key Facts About NTCA

Feature	Details
Established	2005 (under the Wildlife Protection Act, 1972)
Ministry	Ministry of Environment, Forest & Climate Change (MoEFCC)
Headquarters	New Delhi, India
Governing Law	Wildlife (Protection) Act, 1972 (Amendment in 2006)
Chairperson	Minister of Environment, Forest & Climate Change
Objectives	Tiger conservation, habitat protection, and ecological sustainability
Flagship Program	Project Tiger (Launched in 1973)

Historical Background

- **1973: Project Tiger** launched to save the rapidly declining tiger population.
- **2005:** NTCA established following recommendations from the **Tiger Task Force** due to concerns over **tiger poaching** and **habitat loss**.
- **2006:** Formally **legalized** through an amendment to the **Wildlife (Protection) Act, 1972**.

Objectives of NTCA

- **Tiger Conservation:**
 - Ensure the **protection** of **tiger populations** and their **habitats**.
- **Scientific Monitoring:**
 - Conduct **scientific research** and **monitoring** of tiger populations using **modern technology** (e.g., **camera trapping** and **DNA analysis**).
- **Habitat Preservation:**
 - Safeguard **tiger reserves** and maintain **corridors** for **tiger movement**.

- **Community Involvement:**
 - Involve local communities in conservation efforts while balancing livelihood needs.
- **Policy Implementation:**
 - Enforce **Project Tiger** guidelines and **anti-poaching** measures.

Structure of NTCA

- **Chairperson:** Minister of **Environment, Forest & Climate Change**.
- **Vice-Chairperson:** Minister of State (MoEFCC).
- **Members:**
 - **Parliamentarians** (3 members from Lok Sabha, 2 from Rajya Sabha).
 - **Environment Experts, Wildlife Scientists, NGOs, and State Forest Officials.**

Key Functions of NTCA

- **Tiger Reserve Management:**
 - **Approval and supervision of tiger reserves.**
 - **59 Tiger Reserves** in India (as of 2023) under **Project Tiger**.
- **Funding & Policy Support:**
 - Provide **financial and technical** assistance to tiger reserves.
- **Monitoring & Evaluation:**
 - Regularly **monitor** tiger populations through the **All-India Tiger Estimation** (every 4 years).
- **Anti-Poaching Measures:**
 - Implement **Special Tiger Protection Forces (STPF)** to combat **wildlife crime**.
- **Relocation & Rehabilitation:**
 - Facilitate **voluntary relocation** of **human settlements** from **core areas** of tiger reserves.

Conservation Initiatives by NTCA

- **M-STrIPES Program (2010):**
 - **Monitoring System for Tigers – Intensive Protection and Ecological Status.**
 - Tracks **tiger movements** and ensures **field protection**.
- **Special Tiger Protection Force (STPF):**
 - **Anti-poaching unit** in **sensitive reserves**.

- **Tiger Corridor Conservation:**
 - **Secure corridors** between tiger reserves to promote **genetic diversity**.

Global Collaboration

- **Global Tiger Forum (GTF):**
 - India is a **founding member** of the **Global Tiger Forum** for transnational cooperation.
- **St. Petersburg Declaration (2010):**
 - Committed to **doubling tiger populations** by **2022** (Goal achieved).

21. Correct Option: (a)

Only Statement 2 is incorrect: As the forest inventories carried out in different parts of the country since 1965 were in a different time frame, it was not possible to generate national-level estimates on growing stock, area statistics and other parameters regarding one point of time.

Step 01: understanding Concept 01

Forest Survey of India (FSI)

The **Forest Survey of India (FSI)** is a premier **national organization** responsible for **assessing and monitoring** the **forest cover** and **vegetation** of India. It plays a crucial role in providing **scientific data** for **forest conservation** and **sustainable forest management**.

Key Facts About FSI

Feature	Details
Established	1981 (Operational since 1982)
Predecessor	Pre-Investment Survey of Forest Resources (1965-1981)
Headquarters	Dehradun, Uttarakhand
Governing Ministry	Ministry of Environment, Forest and Climate Change (MoEFCC)
Mandate	Forest Resource Assessment, Forest Inventory, Conservation Planning
Key Publication	India State of Forest Report (ISFR) (Published biennially)

Historical Background

- **1965: Pre-Investment Survey of Forest Resources** was launched under the **Food and Agriculture Organization (FAO)** and **UNDP** for assessing **forest resources**.
- **1981: Forest Survey of India (FSI)** established by merging **existing forest resource agencies**.
- **1982: FSI** became **operational** and started **nationwide forest monitoring**.

- **1987: First India State of Forest Report (ISFR)** published.

Functions of FSI

- **India State of Forest Report (ISFR):**
 - Biennial publication detailing forest cover, tree cover, mangroves, bamboo resources, and forest fires.
- **Forest Carbon Assessment:**
 - Monitor forest carbon stock to evaluate India's role in climate change mitigation.
- **Forest Fire Alert System:**
 - Operates a real-time forest fire monitoring system using satellite data in collaboration with ISRO.
- **Inventory of Forest Resources:**
 - Conducts field-based surveys for tree species and forest density.
- **Remote Sensing and GIS:**
 - Utilizes satellite technology for forest mapping and change detection.
- **Forest Management Plans:**
 - Provides technical support to states for preparing working plans.

Key Reports and Publications

- **India State of Forest Report (ISFR)** (Biennial)
- **Forest Inventory Report**
- **Carbon Stock in India's Forests**
- **Forest Fire Monitoring Report**

Forest Fire Monitoring System

- **Launched: 2019**
- **Technology:** Uses MODIS and VIIRS satellite data from ISRO and NASA.
- **Alerts:** Real-time alerts sent via SMS, email, and mobile apps.

International Collaboration

- **FAO and UNDP:** Supported the establishment of FSI in 1965.
- **Global Forest Resources Assessment (FRA):** Provides data for FAO's international forest reports.
- **Paris Agreement (2015):** Monitors carbon sequestration to meet India's Nationally Determined Contributions (NDCs).

Recent Initiatives by FSI

- **e-Green Watch:** Monitors forest plantations and afforestation activities.

- **National Working Plan Code (2014):** Provides guidelines for sustainable forest management.
- **Digital Forest Mapping:** Uses GIS technology to create interactive forest maps.
- **Carbon Stock Monitoring:** Measures above-ground biomass for climate action.

22. Correct Option: (c)

Option (c) is correct: The Tiger Task Force Report (2005) was commissioned by the Government of India after the shocking discovery that there were no tigers left in the Sariska Tiger Reserve due to rampant poaching and poor management. This revelation prompted a nationwide concern over the state of India's tiger population, leading to a comprehensive review of Project Tiger.

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The **Tiger Task Force Report**, officially titled "*Joining the Dots: The Report of the Tiger Task Force*", was submitted in **2005**. It was commissioned by the **Government of India** after reports of dwindling tiger populations, especially the disappearance of tigers from the **Sariska Tiger Reserve** in Rajasthan. The report provided a comprehensive analysis of the status of tigers and recommended a holistic approach to conserve them. **Background**

- The **Prime Minister of India** formed the Tiger Task Force in **2005** due to rising concerns about the declining tiger population.
- The disappearance of tigers from **Sariska Tiger Reserve** highlighted major lapses in the conservation system.
- Chaired by **Sunita Narain**, the task force included experts from wildlife conservation, social sciences, and government agencies.

Major Findings

- **Decline in Tiger Population:** Poaching and habitat destruction were the primary causes of the tiger population's decline.
- **Weak Protection System:** Inadequate monitoring, poor intelligence networks, and lack of coordination among law enforcement led to ineffective protection.
- **Human-Tiger Conflict:** Increased encroachment in forest areas led to human-tiger conflicts.
- **Livelihood Challenges:** The report highlighted the marginalization of forest-

dependent communities and the need for their inclusion in conservation efforts.

- **Flaws in Project Tiger:** Issues such as poor funding, weak governance, and lack of transparency hindered the effectiveness of **Project Tiger**.

Impact of the Report

- Formation of the **National Tiger Conservation Authority (NTCA)** in **2006** for improved governance.
- **Tiger Census** was revamped using **scientific methods** like camera trapping and DNA analysis.
- Creation of the **Tiger Protection Force** in critical areas.
- Greater **involvement** of local communities and focus on **eco-development**.
- Significant **increase** in tiger numbers: From **1,411 tigers** in 2006 to **3,682 tigers** in 2022 (as per latest estimates).

23. Correct Option: (b)

Explanation:

Option (b) is correct: The “Elephant Task Forces” established under Project Elephant are specialised units tasked with critical field operations to ensure the safety and conservation of elephants. Their primary roles include enforcing anti-poaching laws, which is crucial in areas where illegal hunting threatens elephant populations. They also monitor elephant movement to track migration patterns and prevent human-wildlife conflicts.

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Project Elephant in India

Launched: 1992

Nodal Ministry: Ministry of Environment, Forest and Climate Change (MoEF&CC)

Objective: To protect elephants, their habitats, and corridors while addressing human-elephant conflicts and ensuring the welfare of captive elephants.

Background and Need for Project Elephant

- **Asian Elephants (*Elephas maximus indicus*)** are **endangered** as per the IUCN Red List.
- India is home to **over 60% of the world's wild Asian elephant population**.
- Habitat loss, fragmentation, and increasing **human-elephant conflicts** posed severe threats to elephant conservation.

- The Government of India launched **Project Elephant** to provide a focused and scientific approach to elephant conservation.

Key Components of Project Elephant

- **Elephant Reserves (ERs):**
 - Identify and protect areas with significant elephant populations.
 - As of 2023, **33 Elephant Reserves** have been established across **14 states**.
- **Human-Elephant Conflict Mitigation:**
 - Creation of barriers (electric fences, trenches).
 - Early warning systems and elephant tracking.
 - Compensation schemes for crop damage and loss of life.
- **Elephant Corridors:**
 - Maintain **101 elephant corridors** to allow safe movement between fragmented habitats.
 - Prevent infrastructure development in these areas.
- **Captive Elephant Welfare:**
 - Establishment of **Elephant Care Centers** and rescue facilities.
 - Regulation of elephants in **tourism, temples**, and other domestic settings.
- **Monitoring and Research:**
 - **Gajah Report (2010):** Comprehensive assessment of elephant conservation.
 - Population estimation through **DNA analysis** and **direct counts**.
- **Major Elephant Reserves in India**

<i>Elephant Reserve</i>	<i>State</i>	<i>Special Feature</i>
1. Singhbhum ER	Jharkhand	First Elephant Reserve (1991)
2. Periyar ER	Kerala	Connected to Periyar Tiger Reserve
3. Mayurbhanj ER	Odisha	Simlipal Biosphere Reserve link
4. Nilgiri ER	Tamil Nadu, Kerala, Karnataka	Largest elephant reserve in India
5. Kaziranga-Karbi Anglong ER	Assam	Connected to Kaziranga National Park

States with the highest elephant populations:

- **Karnataka** (over 6,000)
- **Assam**
- **Kerala**
- **Tamil Nadu**
- **Odisha**

Legal Framework Supporting Elephant Conservation

- **Wildlife Protection Act, 1972** – Provides the highest protection under **Schedule I**.
- **Environment Protection Act, 1986** – Safeguards elephant habitats.
- **Forest Conservation Act, 1980** – Restricts diversion of forest land for non-forest use.

Initiatives Under Project Elephant

- **MIKE Program (Monitoring of Illegal Killing of Elephants):**
 - Launched by **CITES (2003)** to track illegal poaching.
 - India has **10 MIKE Sites** (e.g., Kaziranga, Periyar).
- **Gaj Yatra (2017-2018):**
 - Nationwide awareness campaign.
 - Focused on preserving **101 elephant corridors**.
- **Elephant Care Centers:**
 - Rehabilitation of injured and captive elephants.

24. Correct Option: (d)

Option (d) is correct: The Joint Forest Management Program (JFM) ensures the convergence of species protection and habitat conservation by involving local communities in forest governance. Initiated in 1990 by the Government of India,

Step 01: understanding Concept 01

Joint Forest Management (JFM) in India:

Initiated: 1990

Nodal Ministry: Ministry of Environment, Forest and Climate Change (MoEF&CC)

Objective: To involve **local communities** in the **protection, conservation, and management** of forests in partnership with the government.

Background of Joint Forest Management (JFM)

- **Pre-Independence Era:** British policies prioritized **commercial exploitation** over community rights, leading to **alienation** of forest-dwelling communities.
- **Post-Independence:** The **Forest Policy of 1952** focused on **state control** but neglected community participation.
- **1980s Crisis:** **Depleting forest cover** and **rising conflicts** led to a shift in policy, recognizing the importance of **people's participation**.
- **1990:** The **Government of India** issued a **JFM resolution**, formalizing community involvement in forest conservation.

Objectives of Joint Forest Management

- **Participatory Governance:** Engage **local communities** and **forest departments** in collaborative forest management.
- **Sustainable Management:** Promote **sustainable use** of forest resources while ensuring ecological balance.
- **Livelihood Generation:** Provide **livelihood** opportunities through non-timber forest products (NTFPs).
- **Conflict Resolution:** Minimize **disputes** between the state and forest-dependent communities.
- **Forest Protection:** Control **deforestation, poaching, and illegal activities** through community-led monitoring.

Legal and Policy Framework Supporting JFM

- **National Forest Policy, 1988:** Emphasized the role of **local communities** in **forest conservation**.
- **Forest (Conservation) Act, 1980:** Regulates forest land diversion and promotes community-based approaches.
- **Scheduled Tribes and Other Traditional Forest Dwellers (Recognition of Forest Rights) Act, 2006 (FRA):** Recognizes **individual and community rights** over forest resources.
- **Panchayats (Extension to Scheduled Areas) Act, 1996 (PESA):** Empowers **Gram Sabhas** to manage and protect local resources.
- **Structure of Joint Forest Management**

Level	Entity/ Committee	Role
Village Level	Forest Protection Committees (FPCs)	Community-led forest monitoring and management.
District Level	Divisional Forest Officer (DFO)	Supervises and supports community initiatives.
State Level	State Forest Department	Policy implementation and technical guidance.
National Level	MoEF&CC	Policy formulation and national coordination.

Achievements of Joint Forest Management

- **Community Engagement:** Over 85,000 JFM Committees managing 25 million hectares of forest land across 28 states (as of recent estimates).
- **Forest Cover Improvement:** Increased afforestation and reforestation through community participation.
- **Livelihood Promotion:** Enhanced incomes through NTFP collection (e.g., tendu leaves, honey, medicinal plants).
- **Conflict Reduction:** Improved state-community relations and minimized forest encroachments.
- **Women's Participation:** Encouraged gender inclusion in forest governance through community groups.

25. Correct Option: (d)

Both Statement-I and Statement-II (a) are correct and Statement-II explains Statement-II does not explain statement-I

Step 01: understanding Concept 01

World Wide Fund for Nature (WWF): A Comprehensive Overview

Founded: 1961
Headquarters: Gland, Switzerland
Mission: To conserve nature and reduce the most pressing threats to the environment through science-based programs, advocacy, and community engagement.

Background and History

- **Origin:** Established on April 29, 1961, in Morges, Switzerland, by a group of scientists, conservationists, and business leaders, including Sir Julian Huxley and Prince Bernhard of the Netherlands.

- **Symbol:** The giant panda logo was inspired by Chi-Chi, a panda in the London Zoo, chosen for its universal appeal and endangered status.
- **Global Network:** Operates in 100+ countries, with 5 million+ supporters worldwide.

Objectives of WWF

- **Protect Natural Ecosystems:** Safeguard biodiversity and critical habitats (e.g., forests, oceans, freshwater).
- **Combat Climate Change:** Advocate for renewable energy, reduce carbon emissions, and promote climate resilience.
- **Sustainable Development:** Encourage responsible consumption, reduce waste, and promote sustainable practices.
- **Wildlife Conservation:** Protect endangered species (e.g., tigers, elephants, rhinos) from poaching and habitat loss.
- **Policy Advocacy:** Collaborate with governments and international bodies to strengthen environmental laws.

WWF in India

- **Established:** 1969
- **Headquarters:** New Delhi
- **Mission:** To protect India's biodiversity, sustain ecological processes, and reduce environmental risks.

Major Projects in India:

- **Project Tiger:** Supporting habitat conservation and anti-poaching efforts.
- **Rivers for Life:** Protecting major river systems like the Ganga and Brahmaputra.
- **Living Himalayas:** Conserving fragile Himalayan ecosystems and species like the snow leopard.
- **Species-Specific Conservation:**
 - Tigers (TX2)
 - Asian Elephants
 - One-Horned Rhinoceros
 - Ganges River Dolphins

WWF's Global Campaigns

- **Earth Hour (2007-Present):**
 - Annual event where millions switch off lights for one hour to raise awareness on climate change.

- **Living Planet Report (Since 1998):**
 - Biennial publication analyzing **biodiversity trends** and **planetary health**.
- **No Plastic in Nature:**
 - Global campaign to **eliminate plastic pollution** in oceans by **2030**



GS SCORE