



# Environment & Ecology

Previous Year Question Analysis  
2021-2023





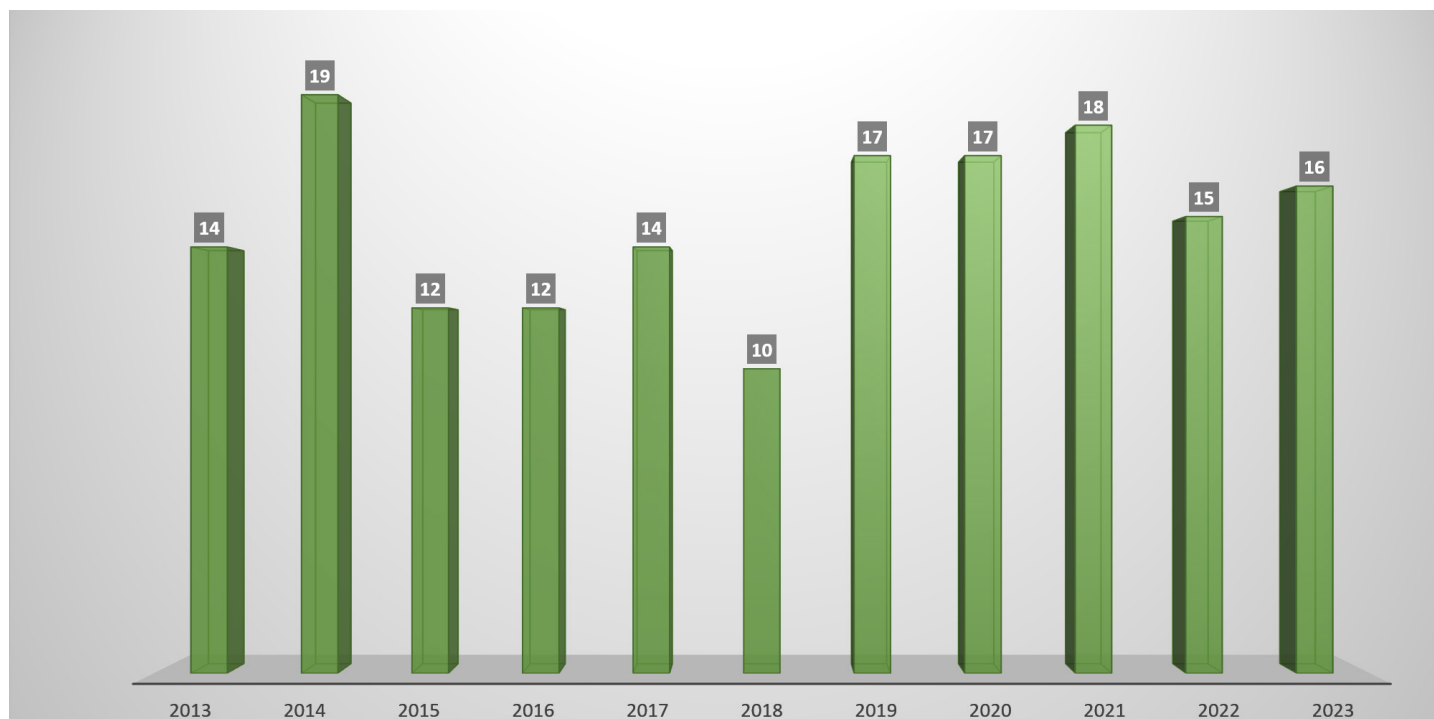
# PREFACE

**FORTUNE IAS ACADEMY** is presenting an in-depth analysis of past year's questions (from 2021 to 2023) and providing comprehensive explanations of the key terms and concepts essential for prelims preparation.

# TREND ANALYSIS



**The following graph examines the pattern of questions from Environment and Ecology spanning from 2013 to 2023:**



## Topic wise analysis of previous year questions:

TOPICS/ YEARS	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
Ecosystem	5	3	2	1	-	1	-	-	6	1	2
Succession	1	1	-	-	-	-	-	-	-	-	-
Biogeochemical Cycles	1	1	-	-	-	-	-	-	1	-	-
Biodiversity acts	-	1	-	-	2	1	3	1	-	1	-
Pollution	2	2	-	1	3	1	4	2	3	2	2
Protected areas	-	-	2	-	1	1	2	3	-	1	1
Flora	-	1	-	2	-	1	1	-	2	1	-
Fauna	4	2	2	3	2	-	3	4	1	1	5
Biodiversity conservation	-	6	5	2	3	-	1	1	3	5	2
Threat to biodiversity	-	1	-	-	-	1	1	-	-	-	-
Institutions and bodies	-	-	-	-	-	2	-	1	-	2	1
Conventions	-	-	1	3	2	-	1	-	-	-	-
Sustainable Energy	-	1	-	-	1	-	1	1	-	-	2
Sustainable Agriculture	1	-	-	-	-	1	-	3	1	1	-
Sustainable Development	-	-	-	-	-	1	-	1	1	-	1

# STRATEGIC ANALYSIS



## **THE QUESTIONS FROM THE PAST THREE YEARS ARE DIVIDED INTO FOUR CATEGORIES:**

---

### **Factual questions**

It demands basic facts from static sources like NCERT, class notes, and other standard materials.

### **Current affairs questions**

Current affairs questions demands general awareness about current events of National and International importance.

### **Conceptual questions**

Such questions require knowledge of fundamental concepts along with conceptual clarity.

### **Application questions**

It demands application of factual and conceptual knowledge to current events.

## **THE QUESTIONS ARE CLASSIFIED BASED ON ITS DIFFICULTY LEVEL:**

---

### **EASY**

The questions which can be answered from basics (NCERTs, and class notes) and does not need deep knowledge. Such questions are typically cracked by aspirants.

### **MODERATE**

Moderate questions require decent level of conceptual clarity along with cognitive analysis. It can be solved through constant practice and revision.

### **HARD**

Hard questions demand deeper understanding of concepts with critical thinking skills. Most of the aspirants leave such questions due to its increased difficulty.

**Wishing you a productive and enjoyable learning experience!!**

# 2021-PRELIMS PREVIOUS YEAR QUESTIONS

## Type of the questions: Factual

1. In the nature, which of the following is/are most likely to be found surviving on a surface without soil?

- 1) Fern
- 2) Lichen
- 3) Moss
- 4) Mushroom

Select the correct answer using the code given below.

- a) 1 and 4 only
- b) 2 only
- c) 2 and 3 only ✓
- d) 1, 3 and 4 only

Difficulty level: Moderate

## EXPLANATION

### Fern

- Ferns are **non-flowering vascular** plants that belong to the group of plants called **Pteridophytes**.



#### Features

→ Feather like leaves.

→ Commonly found in **moist** and **shady** environment.

→ Do not produce flowers or seeds for reproduction they **reproduce via spores**.

### Lichens

- Lichens are slow growing organisms that formed from a **symbiotic association between a fungus and an alga**.



#### Features

→ Produce food through **photosynthesis**.

→ They are very **sensitive to pollution** and can be used as **bioindicators** of air quality.

→ They are commonly the **first organisms to colonise bare rocks**, which is why they are called **Pioneer species**.

→ They can survive on a **surface without soil**.

### Moss

- Mosses are small, **non-vascular, non-flowering** plants that belong to the division of plants called **Bryophyta**.



→ They **do not produce seeds** or flowers.

→ They are **commonly found in damp, shaded environments**, such as forests and wetlands.

→ They can help **retain moisture in soil, prevent erosion**, and create **habitat** for small organisms.

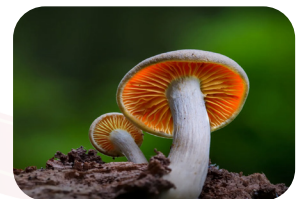
→ They can **survive on a surface without soil**.

→ **Non vascular**: They lack true vascular tissues (xylem, phloem) for water and nutrient transport.

#### Features

### Mushroom

- Mushrooms are a **type of fungus**, belonging to the kingdom **Fungi**. They are **not plants** and **do not contain chlorophyll**.



→ They are **important decomposers** in ecosystems.

→ There are **edible, medicinal** and **toxic varieties** of mushrooms.

#### Features

## RELATED PYQs

Q1. Lichens, which are capable of initiating ecological succession even on a bare rock, are actually a symbiotic association of

- a) algae and bacteria
- b) algae and fungi
- c) bacteria and fungi
- d) fungi and mosses

[2014]

2. Consider the following kinds of organisms :

- 1) Copepods
- 2) Cyanobacteria
- 3) Diatoms
- 4) Foraminifera

Which of the above are primary producers in the food chains of oceans?

- a) 1 and 2
- b) 2 and 3 ✓
- c) 3 and 4
- d) 1 and 4

Difficulty level: Moderate

## EXPLANATION

### Primary producers

- Primary producers are the **autotrophs** capable of **producing organic compounds** from light energy or chemical energy (e.g. inorganic sources) through **photosynthesis** or by **chemosynthesis**, respectively.
- Primary producers are capable of **manufacturing their own food**. Since they are at the **base of the ecological pyramid**, **all life on earth relies on them** either directly or indirectly.

### Copepods

- Copepods are **small aquatic organisms** that are a crucial component of **marine** and **freshwater** ecosystems.
- **Some** copepod species have **haemoglobin** in their bodies, enabling them to **transport oxygen**.
- They are considered as **indicator species**.
- They are **not primary producers**; instead, they are herbivores and predators.

### Cyanobacteria (Blue-Green algae)

- They are **photosynthetic bacteria** that are known for their ability to **perform photosynthesis** like plants. So they are categorised as **primary producers**.
- Some cyanobacteria have the ability for **Nitrogen Fixation** and some cyanobacteria engage in **symbiotic relationships with plants**, providing

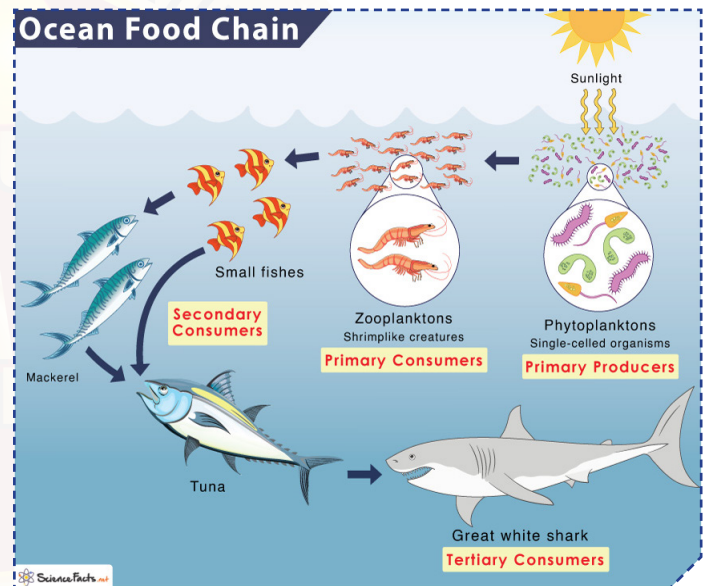
nitrogen in exchange for a protected environment.

### Diatoms

- Diatoms are a group of **single-celled, photosynthetic microalgae** with **glass-like cell walls**.
- They are **primary producers** in **aquatic ecosystems**, producing food through photosynthesis, thus they play a crucial role in **carbon cycle**, where they contribute significantly to **ocean productivity**.

### Foraminifera

- Foraminifera are a diverse group of **single-celled, aquatic organisms** that **form shells**, or tests, typically made of **calcium carbonate**.
- Foraminifera can be **planktonic** (floating in the water column) or **benthic** (dwelling on the seafloor), which can be seen from **polar regions to tropical seas**.
- They are **not primary producers** in the food chains of the ocean.



3. In case of which one of the following biogeochemical cycles, the weathering of rocks is the main source of release of nutrients to enter the cycle?

- a) Carbon cycle
- b) Nitrogen cycle
- c) Phosphorus cycle ✓
- d) Sulphur cycle

Difficulty level: Easy

## EXPLANATION

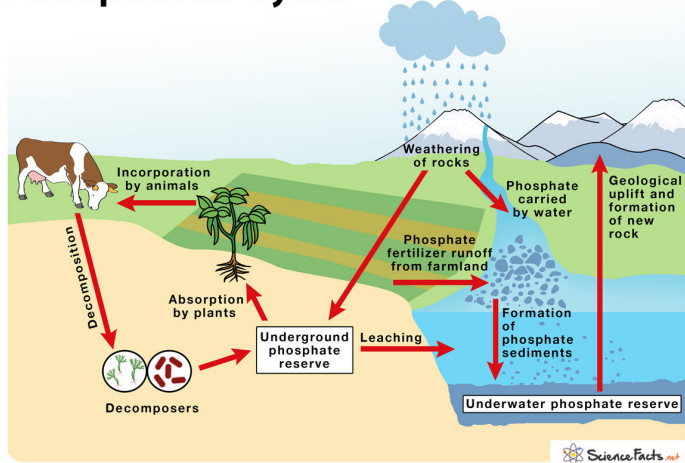
### Biogeochemical cycles (nutrient cycles)

- It describes the **movement of chemical elements through different matters**, such as the atmosphere, soil, rocks, bodies of water, and organisms. They are important for living organisms which includes the **water, carbon, nitrogen, phosphorus, and sulfur cycles**.

#### Phosphorus cycle:

- The phosphorus cycle is an extremely **slow process**, as various weather conditions helps to **wash the phosphorus found in rocks into the soil** and **weathering of rocks** is the main source of release of nutrients to enter the cycle.
- The main biological function of phosphorus is that it is **required for the formation of nucleotides**, which comprise DNA and RNA molecules.
- Phosphorus plays a **central role in aquatic ecosystems and water quality**. It is the main cause of **excessive growth of rooted and free-floating microscopic plants** (phytoplankton bloom) in lakes which leads to **eutrophication**.

### Phosphorus Cycle



#### Carbon cycle:

- The carbon cycle is the process that **moves carbon between plants, animals, and microbes; minerals in the earth; and the atmosphere**. Carbon is the **fourth most abundant element** in the universe. With its ability to **form complex molecules** such as **DNA** and **proteins**, **carbon makes life on Earth possible**. Carbon in the form of **carbon dioxide (CO<sub>2</sub>)** helps to **control the Earth's temperature**.
- On Earth, **most carbon is stored in rocks and sediments**, while the **rest is located in the ocean, atmosphere, and in living organisms**. These are the reservoirs, or sinks, through which carbon cycles.

- Carbon is **released back into the atmosphere when organisms die, volcanoes erupt, fires blaze, fossil fuels are burned** etc.
- Fossil fuels** formed millions of years ago from the **carbon-rich remains of animals and plants**, through **decomposition, compression and heating**. **When fossil fuels are burned**, the **stored carbon and other greenhouse gases** are **released into the atmosphere**.

#### Nitrogen cycle:

- It is the process by which **nitrogen is converted into multiple chemical forms** as it circulates among atmospheric, terrestrial, and marine ecosystems.
- In nature, **lightning** and **ultraviolet radiation** provide enough energy to convert nitrogen (N<sub>2</sub>) to nitrogen oxides (NO, NO<sub>2</sub>, N<sub>2</sub>O). **Industrial combustions, forest fires, automobile exhausts** and **thermal power-generating stations** are also sources of atmospheric nitrogen oxides.
- The cycle can be divided into several processes, including **nitrogen fixation, assimilation, ammonification, nitrification, and denitrification**.

#### Sulphur cycle:

- Sulphur is mainly contained in **organic** (coal, oil, peat) and **inorganic** (pyrite rock, sulphur rock) **soil deposits** in the form of sulphates, sulphides, and organic sulphur.
- It is **released by weathering of rocks, erosional runoff and decomposition of organic matter** and is carried to terrestrial and aquatic ecosystems in the salt solution.
- It is important in geology as it **affects many minerals** and in **life** because sulphur is an essential element, being a **constituent of many proteins** and cofactors.

## RELATED PYQs

- Q1. Which of the following adds/add carbon dioxide to the carbon cycle on the planet Earth?
- Volcanic action
  - Respiration
  - Photosynthesis
  - Decay of organic matter

Select the correct answer using the code given below.

- 1 and 3 only
- 2 only
- 1, 2 and 4 only
- 1, 2, 3 and 4

[2014]

4. Which of the following are detritivores?

- 1) Earthworms
- 2) Jellyfish
- 3) Millipedes
- 4) Seahorses
- 5) Woodlice

Select the correct answer using the code given below.

- a) 1, 2 and 4 only
- b) 2, 3, 4 and 5 only
- c) 1, 3 and 5 only ✓
- d) 1, 2, 3, 4 and 5

Difficulty level: Moderate

**EXPLANATION**

**Detritivores**

- Detritivores are **heterotrophic animals** that **feed on dead**, particulate, organic material. They are an important part of **land** and **marine** ecosystems and are found in various invertebrate and vertebrate groups.
- All the detritivores **contribute to decomposition** and the **nutrients cycles**. These organisms are often called "**bottom-feeders**". They may also obtain nutrition by **coprophagy** (feeding strategy involving the consumption of faeces).
- **Examples of detritivores:** Earthworms, Millipedes, Woodlice, Crabs, Lobsters, Sea stars, Sea cucumbers etc.

**Decomposers**



**Jellyfish**

- They are **carnivores** and excellent predators. In fact, they are more closely related to corals, sea anemones than fish. They have a **sexual mode of reproduction**.

**Sea horse**

- Sea horse is a carnivore organism and is found mainly in **shallow tropical and temperate salt water** throughout the world. They are **secondary consumers** and **do not have teeth**. Primarily they **feed on planktons**, small fish and small crustaceans.
- **IUCN STATUS: Threatened**

5. Which of the following have species that can establish symbiotic relationships with other organisms?

- 1) Cnidarians
- 2) Fungi
- 3) Protozoa

Select the correct answer using the code given below.

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

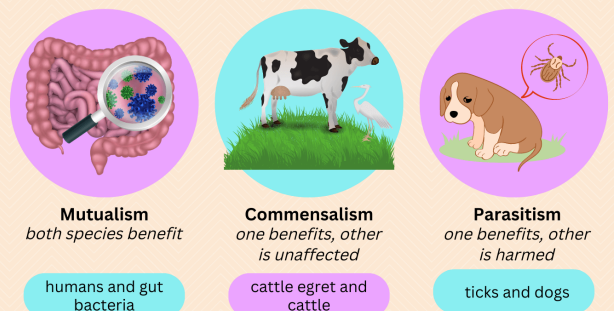
Difficulty level: Moderate

**EXPLANATION**

- Symbiosis is a term describing **any relationship or interaction between two dissimilar organisms**. Any association between two species populations that live together is symbiotic, whether the species benefit, harm, or have no effect on one another.

**Symbiosis**

Symbiosis is an ecological relationship between organisms of different species.



## Cnidarians

- They are also called **coelenterate members** of the **phylum cnidaria**.
- Cnidarians include **corals, hydras, jellyfish, Portuguese men of war, sea pens, sea fans** etc.
- These animals are most abundant in **tropical waters**.
- The relation between **cnidarians** and **dinoflagellate algae** is termed “**symbiotic**” because both the animal host and the algae are benefiting from the association (mutualistic interaction).

**Coelenterates** are **multi cellular** organisms having a sack like body with a single opening (mouth) which occurs in polyp and medusa form.

## Fungi

- These are **multicellular eukaryotic organisms** that are **heterotrophs** and have important roles in nutrient cycling in an ecosystem.
- They **reproduce both sexually and asexually**.
- They have several mutualistic relationships with other organisms. For example: **Lichen** is a symbiotic partnership between fungus and alga.

## Protozoa

- Protozoa are **single celled eukaryotes** that feed on organic matters.
- **Termites have a mutualistic relationship with protozoa** that lives in the gut of insects.

## RELATED PYQs

Q1. With reference to the food chains in ecosystems, which of the following kinds of organisms is/are known as decomposer organism/organisms?

1. Virus
2. Fungi
3. Bacteria

Select the correct answer using the codes given below.

- 1 only
- 2 and 3 only
- 1 and 3 only
- 1, 2 and 3

[2013]

## 6. Which one of the following is a filter feeder?

- 1) Cat fish
- 2) Octopus
- 3) Oyster ✓
- 4) Pelican

Difficulty level: Moderate

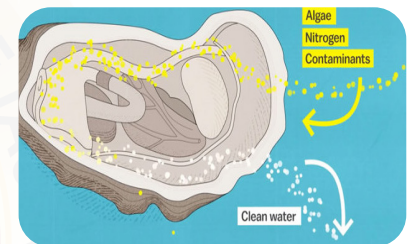
## EXPLANATION

### Filter feeders

- An **aquatic** animal, subset of **suspended feeding organism** that feeds on particles or small organisms strained out of water by circulating them through its specialized filtering structures.
- Examples: **Clams, Krill, Sponges, Oyster**.
- They play an important role in **clarifying water** and **bioaccumulation**.
- They are considered as **ecosystem engineers** and **indicator organisms**.

### Oysters

- Oysters are commonly **lives in marine or brackish habitats**.
- Oysters are efficient **filter feeders** that helps in **removing excess nitrogen** from waters by incorporating it into their shells and tissue as they grow.
- They detects **hydrocarbons, oil** and can serve as **early warning givers on pollution** in the ocean.



### Octopus

- They are **carnivore, invertebrate** species.
- Generally found in **all oceans** and are found in all **tropical, subtropical** and **temperate waters**.
- **All octopuses are venomous**, but only the **blue-ringed octopuses** are known to be **deadly to humans**.
- **IUCN: Least concern**

### Catfish

- It represent one of the **largest group of fresh water fishes**.
- Most species of catfish are **nocturnal** and primarily bottom dwellers or **benthic** species.

- They are **invasive** and inhabited in all continents except Antarctica.

## Pelican

- They are in genus of **large water birds**.
- There are **eight living pelican species** having a patchy global distribution.
- The **Grey Pelican [Spot billed pelican]** is the most threatened one, listed in **schedule IV** of **Wildlife Protection Act, 1972**.
- **Kolleru lake (Andhra Pradesh)** famous for the grey pelican, where mainly found in peninsular India and Southeast Asia.
- **IUCN STATUS: Near Threatened**

### Type of the questions: Current Affairs

1. 'R2 Code of Practices' constitutes a tool available for promoting the adoption of
  - a) Environmentally responsible practices in electronics recycling industry ✓
  - b) Ecological management of 'Wetlands of International Importance' under the Ramsar Convention
  - c) Sustainable practices in the cultivation of agricultural crops in degraded lands
  - d) 'Environment Impact Assessment' in the exploration of natural resources

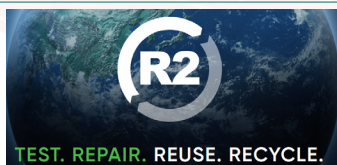
Difficulty level: Hard

Relevance: SERI has launched the latest R2 Standard for electronics reuse and recycling.

## EXPLANATION

### R2 Code of Practices

- **Responsible Recycling (R2)** is a set of guidelines used by **electronics recyclers** to promote better environmental, health and safety, and security practices when **recycling end-of-life electronics**.
- The standard was created by **Sustainable Electronics Recycling International (SERI)**.
- An electronic item is considered **end-of-life (EOL)** once it becomes non-functional and beyond economic repair.



## SERI

It is a multistakeholder, collaborative, **non governmental** organisation focused on **minimising risks posed by used and end-of-life electronics**, while also **maximising the social and economic value** presented by this equipment.

## Regenerative Agriculture

Regenerative agriculture focuses on **working with nature**, limiting costly artificial inputs and mimicking natural ecosystems within an agricultural setting. It draws its practices from Agroecology, Permaculture and Conservation Agriculture; its objective is to **restore soil health**.

2. With reference to furnace oil, consider the following statements:

- 1) It is a product of oil refineries.
- 2) Some industries use it to generate power.
- 3) Its use causes sulphur emissions into the environment.

Which of the statements given above are correct?

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

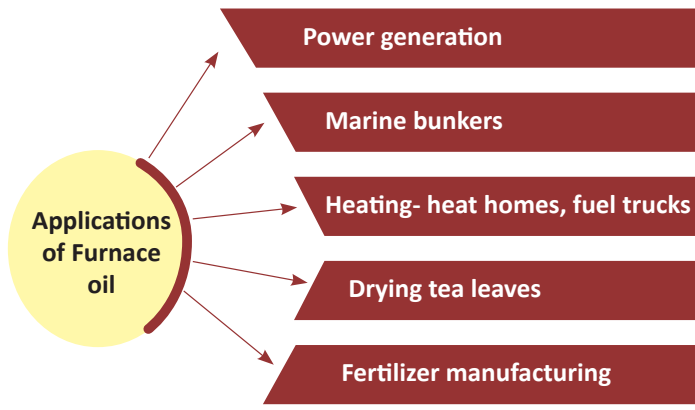
Difficulty level: Easy

Relevance: Furnace oil from Titanium factory was spilled into the sea in Kerala.

## EXPLANATION

### Furnace oil (fuel oil/heating oil)

- Furnace Oil, also known as Hevy oil, Bunker fuel, Marine fuel, is a fraction obtained from **petroleum distillation**, either as a distillate or a residue.
- It is typically a **low-grade fuel oil** and is commonly used in furnaces, boilers, and industrial heating systems to generate heat.
- It is a **non-renewable fossil fuel** that **produces greenhouse gases** and **harmful particles** when burned. These emissions include: Carbon dioxide, **Sulphur**, Methane, Nitrous oxide, Aromatic hydrocarbons.



In **2017 Supreme Court order** banned the use of **furnace oil** in Delhi NCR because it contributes to **high SO<sub>2</sub> emission** and **secondary sulphate formation** as particulate matter (PM).

- 3. What is blue carbon?**
- Carbon captured by oceans and coastal ecosystems ✓
  - Carbon sequestered in forest biomass and agricultural soils
  - Carbon contained in petroleum and natural gas
  - Carbon present in atmosphere

**Difficulty level:** Easy

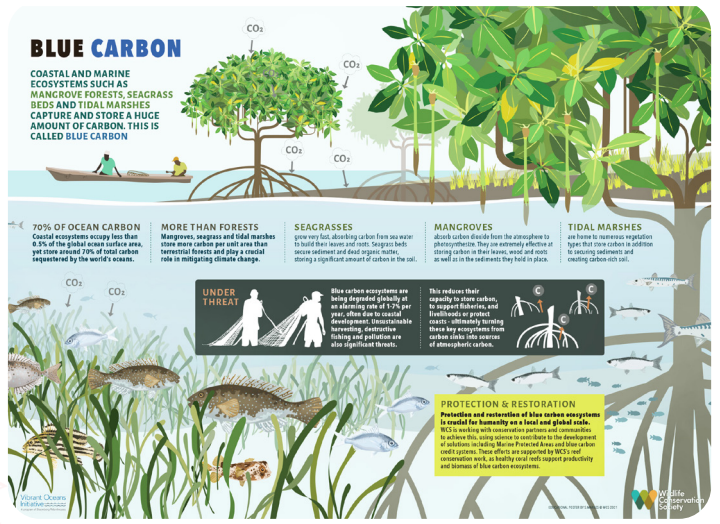
**Relevance:** Centre unveils draft 'Blue Economy' policy. The role of Blue carbon in mitigating climate changes has been discussed in news.

**EXPLANATION**

**Blue carbon**

- Carbon stored in **coastal and marine ecosystems** like **mangroves, seagrasses, and salt marshes** is called blue carbon.
- These ecosystems **sequester and store more carbon per unit area than terrestrial forests**. They are now being recognized for their role in mitigating climate change.

**Blue Carbon Initiative (BCI):** Co-organized by **Conservation International, IUCN**, and the Intergovernmental Oceanographic Commission of the UNESCO (**IOC-UNESCO**), works to develop management approaches, financial incentives and policy mechanisms for ensuring the conservation, restoration and **sustainable use of coastal blue carbon ecosystems**.



**Green carbon**

- Carbon stored in **terrestrial ecosystems like forest and soils** is called green carbon.

**Fossil carbon**

- Carbon contained in **petroleum and natural gas** is called fossil carbon.

- 4. Which one of the following is used in preparing a natural mosquito repellent?**

- Congress grass
- Elephant grass
- Lemongrass ✓
- Nut grass

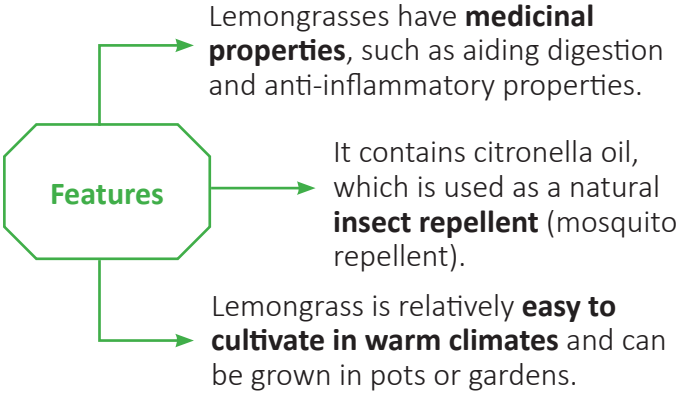
**Difficulty level:** Moderate

**Relevance:** Articles related to mosquito-borne diseases are frequently seen in the news due to the spread of dengue fever and malaria.

**EXPLANATION**

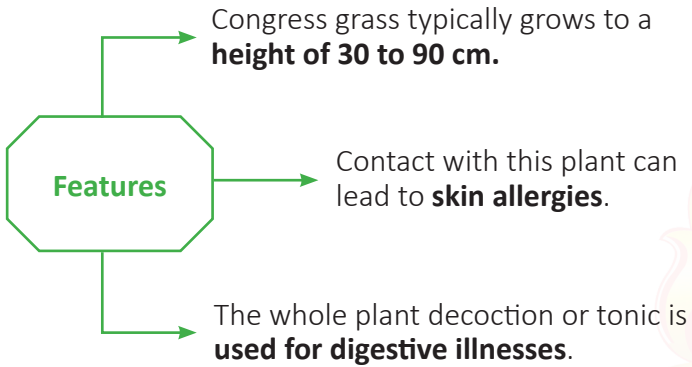
**Lemon grass (Cymbopogon citratus)**

- Lemongrass is a **tropical herb** known for its **lemony flavour** and aroma.



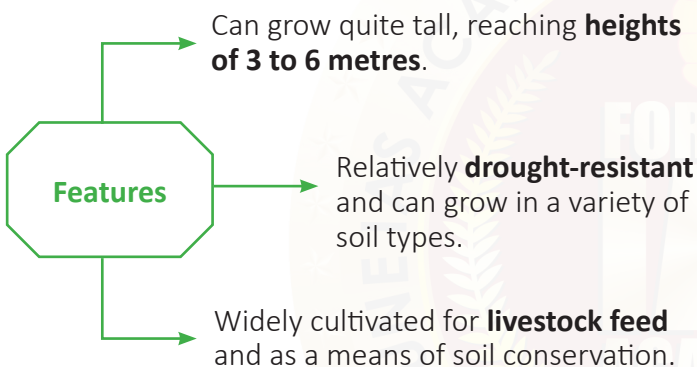
## Congress grass (*Parthenium hysterophorus*)

- It is an **invasive weed** that is **native to the American tropics**, known for its rapid spread and negative impacts.
- Also known as **gajar ghas** due to its appearance like **carrot plant**.



## Elephant grass (*Pennisetum purpureum*)

- Elephant grass, also called as **Napier grass** or **Uganda grass**, is a species of **perennial tropical grass** native to the **African grasslands**.



## Nut grass (*Cyperus rotundus*)

- Nut grass, also known as **nut sedge** or **purple nutsedge** is a type of **perennial weed** that is often **considered as an infest** by gardeners and farmers.
- It is known for its **underground rhizomes**, which are small, **nut-like structures** that make it **difficult to eradicate** once it becomes established in an area.

5. With reference to the "New York Declaration on Forests", which of the following statements are correct?

- It was first endorsed at the United Nations Climate Summit in 2014
- It endorses a global timeline to end the loss of forests
- It is a legally binding international declaration

4) It is endorsed by governments, big companies and indigenous communities

5) India was one of the signatories at its inception

Select the correct answer using the code given below.

- 1, 2 and 4 ✓
- 1, 3 and 5
- 3 and 4
- 2 and 5

Difficulty level: Hard

**Relevance:** In the **Glasgow Leader's Declaration on Forest and Land use**, held in November, 2021, more than 100 global leaders pledged to halt and reverse deforestation and land degradation by the end of 2030 (**India is not a signatory**). This agreement significantly broadens the scope of commitment made by 40 countries in the "2014 New York Declaration of Forests."

## EXPLANATION

### New York declaration on forest

- It is a **voluntary** and **non-legally binding political declaration** which focuses on **halving the rate of deforestation by 2020, to end it by 2030**.
- It aims to **restore 350 million hectares of forest and croplands** and by providing **financial support**.
- It was spurred by the **United Nations Secretary General's Climate summit held in New York in 2014** which mainly acted as a global declaration to end the loss of forest.
- The declaration was **endorsed by a range of governments, companies, indigenous groups, and non-governmental organisations**, all of whom committed to taking action to combat deforestation and promote the sustainable use of forest.
- India is not a signatory** of the declaration.

6. Magnetite particles, suspected to cause neurodegenerative problems are generated as environmental pollutants from which of the following?

- Brakes of motor vehicles
- Engines of motor vehicles
- Microwave stoves within homes
- Power plants
- Telephone lines

Select the correct answer using the code given below:

- a) 1, 2, 3 and 5 only
- b) 1, 2 and 4 only ✓
- c) 3, 4 and 5 only
- d) 1, 2, 3, 4 and 5

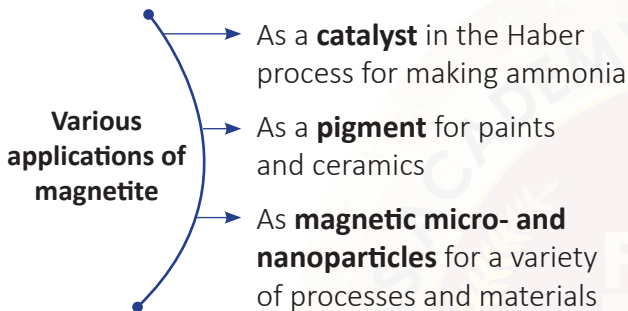
Difficulty level: Hard

**Relevance:** Nanoparticles has been in news due to the influence of toxic air pollution particles found in human brains.

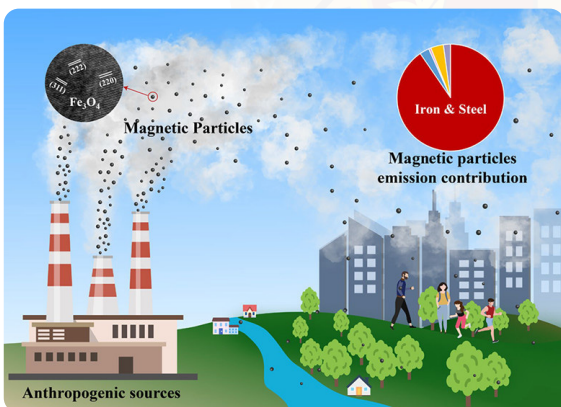
## EXPLANATION

### Magnetite

- Magnetite is a **black, magnetic mineral** and it is the most commonly mined **ore of iron** and has the **highest iron content (72.4%)**.



### Magnetite as a pollutant



- Magnetite can have potentially large impacts on the brain due to its **unique combination of redox activity, surface charge, and strongly magnetic behavior**.
- Magnetite particles are commonly **found in the friction materials used in vehicle brakes** and vehicle brake systems are the major **source of airborne magnetite** at the road side.

- **Engines of motor vehicles** generate magnetic particles due to the **presence of high-powered magnets** which generate magnetic flux.
- **Power plants release metal content** along with ash. Use of coal in power plants is a major source of **combustion** associated with magnetite fine particles.

- Magnetite is **not typically used in microwave ovens or stoves within homes**. Microwave ovens operate on the principle of electromagnetic radiation to heat food.
- Magnetite is **not typically used in telephone lines or telecommunication infrastructure**. Telephone lines are primarily made of copper or fibre optic capability.

7. The 'Common Carbon Metric', supported by UNEP, has been developed for
- a) assessing the carbon footprint of building operations around the world ✓
  - b) enabling commercial farming entities around the world to enter carbon emission trading
  - c) enabling governments to assess the overall carbon footprint caused by their countries
  - d) assessing the overall carbon foot-print caused by the use of fossil fuels by the world in a unit time

Difficulty level: Hard

**Relevance:** A study based on issue in reporting of Carbon emissions in countries had seen in news.

## EXPLANATION

### Common Carbon Metric

- It is the **calculation used to define measurement, reporting, and verification for GHG emissions associated with the operation of buildings** types of particular climate regions.
- It **does not include value-based interpretation** of the measurements and it is **not a building rating tool**. It is consistent with methods for **assessing the environmental performance of buildings used globally**.

- While **all stages of a building's life-cycle** (including construction and demolition) **produce carbon emissions**, the **building's operational phase accounts for 80-90% of emissions** resulting from energy use mainly for heating, cooling, ventilation, lighting and appliances. Therefore, this is the stage of the building's life-cycle that is the focus of the Common Carbon Metric.

**8. In the context of India's preparation for Climate-Smart Agriculture, consider the following statements:**

- The 'Climate-Smart Village' approach in India is a part of a project led by Climate Change, Agriculture and Food Security (CCAFS), an international research programme.**
- The project of CCAFS is carried out under Consultative Group on International Agricultural Research (CGIAR) headquartered in France.**
- The International Crops Research Institute for the Semi-Arid Tropics (ICRISAT) in India is one of the CGIAR'S research centres.**

Which of the statements given above are correct?

- 1 and 2 only
- 2 and 3 only
- 1 and 3 only
- 1, 2 and 3 ✓

Difficulty level: Hard

**Relevance:** The challenges faced by Indian agriculture due to climate change has been discussed in the news. Climate-Smart Village approach is a major solution towards climate- proofing of Indian agriculture.

### EXPLANATION

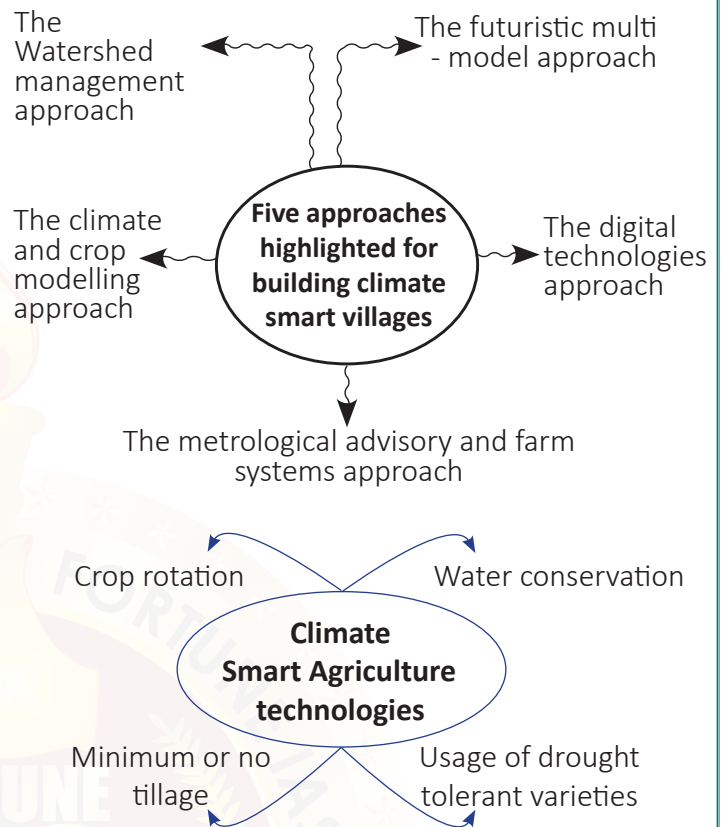
#### Climate Smart Agriculture

- Climate-Smart Agriculture (CSA) is an approach that helps guide actions **to transform agri-food systems towards green and climate resilient practices**. CSA supports to achieve internationally agreed goals such as the **SDGs** and the **Paris Agreement**.

#### Climate-Smart Village approach

- The **Climate- Smart Village (CSV) approach**, pioneered by the **CGIAR** (Consultative Group on International Agricultural Research) Research Program on Climate Change, Agriculture and Food Security (CCAFS) and partners.

- The CSV concept was developed in **2012**.
- CCAFS Climate-Smart Villages (CSVs) have successfully **combined global knowledge with local action to help farmers** sustainably produce more food, while curbing greenhouse gas emissions and increasing resilience to climate change.



#### CGIAR

- CGIAR is a **global partnership headquartered in France** that unites international organisations engaged in **research about food security**.

#### ICRISAT (International Crops Research Institute for the Semi-Arid Tropics)

- It is the **only CGIAR institute** headquartered in India (**Hyderabad**).
- ICRISAT works in **agricultural research for development across the drylands of Africa and Asia**.

#### RELATED PYQs

Q1. With reference to the 'Global Alliance for Climate-Smart Agriculture' (GACSA) which of the following statements is/are correct?

- GACSA is an outcome of the climate summit held in Paris in 2015

2. Membership of GACSA does not create any binding obligations

3. India was instrumental in the creation of GACSA

Select the correct answer using the code given below

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

[2018]

9. With reference to 'palm oil', consider the following statements:

- 1) The palm oil tree is native to Southeast Asia.
- 2) Palm oil is a raw material for some industries producing lipstick and perfumes.
- 3) The palm oil can be used to produce biodiesel.

Which of the statements given above are correct?

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

Difficulty level: Moderate

Relevance: In 2021, India imported \$8.72B in Palm Oil, becoming the largest importer of Palm Oil in the world.

### EXPLANATION

#### Oil palm

- The tree is **native to Africa** but was brought to South-East Asia just over 100 years ago as an ornamental tree crop.
- Now, **Indonesia and Malaysia make up over 85% of global supply.**
- Palm oil is an **edible vegetable oil** that comes from the fruit of oil palm trees.
- It can be used to produce **biodiesel** and is a raw material for some industries **producing lipstick and perfumes.**
- India buys palm oil mainly from **Indonesia, Malaysia and Thailand.**
- India mainly **exports** palm oil to **Nigeria, Bangladesh and Ethiopia.**
- Compared to other oilseeds such as soybeans,



rapeseed or sunflower, oil palm is the **most efficient and cost-effective biodiesel feedstock** measured in terms of oil yield per unit hectare of cultivation land area per annum.

#### Problems with Palm oil cultivation

- A **major driver of deforestation** of the world's most biodiverse forests. Eg: Rainforest in Southeast Asia, Latin America and Africa.
- **Destroying habitat** of Orangutan, Pygmy elephant and Sumatran rhino.
- **Exploitation** of workers and child labour.

The **Roundtable on Sustainable Palm Oil (RSPO)** was formed in **2004** in response to increasing concerns about the impacts palm oil was having on the environment and on society.

10. Consider the following statements :

- 1) Moringa (drumstick tree) is a leguminous evergreen tree.
- 2) The Tamarind tree is endemic to South Asia.
- 3) In India, most of the tamarind is collected as minor forest produce.
- 4) India exports tamarind and seeds of moringa.
- 5) Seeds of moringa and tamarind can be used in the production of biofuels.

Which of the statements given above are correct?

- a) 1, 2, 4 and 5
- b) 3, 4 and 5 ✓
- c) 1, 3 and 4
- d) 1, 2, 3 and 5

Difficulty level: Moderate

Relevance: Moringa and Tamarind was in news for its health benefits and also its exports have been promoting by APEDA.

### EXPLANATION

- Moringa and tamarind are popularly known as the '**trees of life for Indians**'. **India meets 80% of world's moringa demand and 50% of tamarind demand.**

#### Moringa

- The Moringa tree is a flowering plant **native to South Asia** and **thrives best in a sub-tropical climate**, referred to as the '**Miracle Tree**'.



- It requires **little water** to grow and can help **restore degraded soil**.
- It **purifies water, reserves deforestation, improves soil fertility, fights malnutrition, acts as an income for rural communities and improves their food security**.
- The seed of moringa contains **vitamins C and E, anti-diabetic, anti-cholesterol and anti- microbial properties**.

### Tamarind [Tamarindus Indica]

- Tamarind is a **tropical hardwood tree native to Africa** but also grows in India, Pakistan, and many other tropical regions.
- It is sometimes referred to as the **“Indian date”**.
- It contains vitamins, minerals, amino acids and beneficial plant compounds.
- The **fruit itself doesn't contain lead. However, because it is acidic, it may lead to leech from certain ceramic vessels into food**.
- In the **absence of reliable farm varieties of tamarind, the tree remains a minor forest produce**.



- India exports tamarind and seeds of moringa.
- Seeds of moringa and tamarind can be used in the **production of biofuels**.

#### 11. Consider the following statements:

##### Statement 1:

The United Nations Capital Development Fund (UNCDF) and the Arbor Day Foundation have recently recognized Hyderabad as 2020 Tree City of the World.

##### Statement 2:

Hyderabad was selected for the recognition for a year following its commitment to grow and maintain the urban forests.

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

- Both Statement 1 and Statement 2 are correct and Statement 2 is the correct explanation for statement 1
- Both statement 1 and Statement 2 are correct but Statement 2 is not the correct explanation for Statement 1

- Statement 1 is correct But Statement 2 is not correct
- Statement 1 is not correct but Statement 2 is correct ✓

Difficulty level: Moderate

**Relevance:** Hyderabad city has been recognised as a '2020 Tree City of the World' and Mumbai has been recognised as the "2021 Tree City of the World".

## EXPLANATION

### Tree cities of the World Programme



- The programme was launched at the **first World Forum on Urban Forests** held in October **2018** in Mantua, Italy.
- The Tree Cities of the World programme, led by **Food and Agriculture Organization of the United Nations (FAO) and the Arbor Day Foundation**, is an initiative to **recognise cities and towns across all continents that meet core standards for the care and planning of urban trees and forests**.

### Hyderabad's Recognition

- Hyderabad achieved this recognition through its **Haritha Haram programme**. This programme aims to **increase the green cover of the state** from the existing **24% to 33%** by planting and nurturing millions of saplings every year.

**Mumbai** has been included in the World Tree City 2022 list, for the second consecutive year, after 2021.

### UN Capital Development Fund (UNCDF)

- Established in **1966** by the **UN General Assembly** to **assist developing countries in the development of their economies** by supplementing existing sources of capital assistance by means of **grants and loans**.

### India and UNCDF

- The **Odisha government** has signed an agreement **with the UNCDF** to empower women economically and together launched **Mission Shakti Living Lab**, which focuses on welfare of women.



## Urban forestry

- It is a networks or systems **comprising all woodlands, groups of trees, and individual trees located in urban and peri-urban areas**; they include, therefore, forests, street trees, trees in parks and gardens, and trees in derelict corners.
- Urban forests are the **backbone of the green infrastructure**, bridging rural and urban areas and ameliorating a city's environmental footprint.

Type of the questions: Conceptual

1. Consider the following animals:

- 1) Hedgehog
- 2) Marmot
- 3) Pangolin

To reduce the chance of being captured by predators, which of the above organisms rolls up/roll up and protects/protects its/their vulnerable parts?

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

Difficulty level: Moderate

### EXPLANATION

#### Hedgehog

- They are **nocturnal** animals with short limbs and a body low to the ground.
- **To protect them from predators they roll up** in the form of a ball and the predator will feel the full brunt of its sharp spine and leave it alone.



- **IUCN status: Least concern**

#### Pangolin

- These **solitary, nocturnal** animals are easily recognized by their **full armour of scales**. Pangolins are the **only mammal which is fully covered with scales** to protect themselves from predators.
- **IUCN status: Endangered**



## Marmot

- They are very **large members of the squirrel family**.
- They frequently live-in mountainous regions, forest edges, meadows and tundra regions and are **herbivores**.
- They **make whistling sounds in the presence of danger**.
- **IUCN status: Least concern**



Type of the questions: Application

1. Why is there a concern about copper smelting plants?

- 1) They may release lethal quantities of carbon monoxide into environment.
- 2) The copper slag can cause the leaching of some heavy metals into environment.
- 3) They may release sulphur dioxide as a pollutant.

Select the correct answer using the code given below.

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

Difficulty level: Moderate

**Relevance:** Verdict on sterilite copper smelting plant in Tamil Nadu and its associated pollution had been frequently seen in news.

### EXPLANATION

#### Smelting

- It is a process in which **ore is heated to high temperatures to extract the metal** from it.

#### Copper smelting plant

- It is an **industrial facility** where copper containing ores are smelted to extract copper from them.

## Pollutants from copper smelting plants

### Sulfur Dioxide

- **Combustion of sulfur-containing ores** in copper smelting can release sulfur dioxide.
- It may **contribute to acid rain** and **respiratory issues**.

### Particulate Matter

- The smelting process can generate particulate matter in the form of **dust and tiny particles**.

### Heavy Metals

- Copper smelting can release heavy metals such as **lead, arsenic, and cadmium**.

### Greenhouse Gases

- Smelting operations can lead to the release of greenhouse gases, such as **carbon dioxide (CO<sub>2</sub>)**, contributing to climate change.

Carbon monoxide (CO) can be generated as a byproduct in the copper smelting process, but it is **not typically released in lethal quantities**.

## 2022-PRELIMS PREVIOUS YEAR QUESTIONS

### Type of the questions: Factual

1. Among the following crops, which one is the most important anthropogenic source of both methane and nitrous oxide?

- a) Cotton
- b) Rice ✓
- c) Sugarcane
- d) Wheat

Difficulty level: Easy

### EXPLANATION

- **Rice cultivation** is indeed an important anthropogenic source of both **methane (CH<sub>4</sub>)** and **nitrous oxide (N<sub>2</sub>O) emissions**.

#### Methane (CH<sub>4</sub>) Emissions:

- Rice is cultivated in flooded fields, creating **anaerobic (low-oxygen) conditions** in the soil. In such conditions, methane-producing microbes (methanogens) produce methane.

#### Nitrous Oxide (N<sub>2</sub>O) Emissions:

- Application of **synthetic nitrogen-based fertilisers** to rice fields can result in the release of nitrous oxide.

#### Cotton

- The Cotton plant (**Gossypium**) is a **shrub-like, woody plant** known for its cotton fibers, is one of the world's leading agricultural crops, is plentiful and economically produced, making cotton products relatively inexpensive.
- Cotton fabrics can be extremely durable and **resistant to abrasion**. It is comfortable to wear because it absorbs and releases moisture quickly.

#### Sugarcane

- Sugarcane is a tall, tropical, and subtropical plant known for its sweet, juicy stems, which are a primary **source of sugar production**.
- It is a **perennial** (can grow and harvested over multiple years) and **water intensive crop** (requires large amount of water for their cultivation).

## RELATED PYQs

Q1. In the cities of our country, which among the following atmospheric gases are normally considered in calculating the value of Air Quality Index?

1. Carbon dioxide
2. Carbon monoxide
3. Nitrogen dioxide
4. Sulfur dioxide
5. Methane

Select the correct answer using the code given below.

- a) 1, 2 and 3 only
- b) 2, 3 and 4 only
- c) 1, 4 and 5 only
- d) 1, 2, 3, 4 and 5

[2016]

Q2. In the context of mitigating the impending global warming due to anthropogenic emissions of carbon dioxide, which of the following can be the potential sites for carbon sequestration?

1. Abandoned and uneconomic coal seams
2. Depleted oil and gas reservoirs
3. Subterranean deep saline formalities

Select the correct answer using the codes given below.

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

[2017]

Q3. Which of the following statements are correct about the deposits of 'methane hydrate'?

1. Global warming might trigger the release of methane gas from these deposits
2. Large deposits of 'methane hydrate' are found in Arctic Tundra and under the seafloor
3. Methane in the atmosphere oxidizes to carbon dioxide after a decade or two

Select the correct answer using the code given below:

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

[2019]

Q4. Consider the following:

1. Carbon monoxide
2. Methane
3. Ozone
4. Sulphur dioxide

Which of the above are released into the atmosphere due to the burning of crop/biomass residue?

- a) 1 and 2 only
- b) 2, 3 and 4 only
- c) 1 and 4 only
- d) 1, 2, 3 and 4

[2019]

2. "If rainforests and tropical forests are the lungs of the Earth, then surely wetlands function as its kidneys." Which one of the following functions of wetlands best reflects the above statement?

- a) The water cycle in wetlands involves surface runoff, subsoil percolation and evaporation.
- b) Algae form the nutrient base upon which fish, crustaceans, molluscs, birds, reptiles and mammals thrive.
- c) Wetlands play a vital role in maintaining sedimentation balance and soil stabilisation.
- d) Aquatic plants absorb heavy metals and excess nutrients. ✓

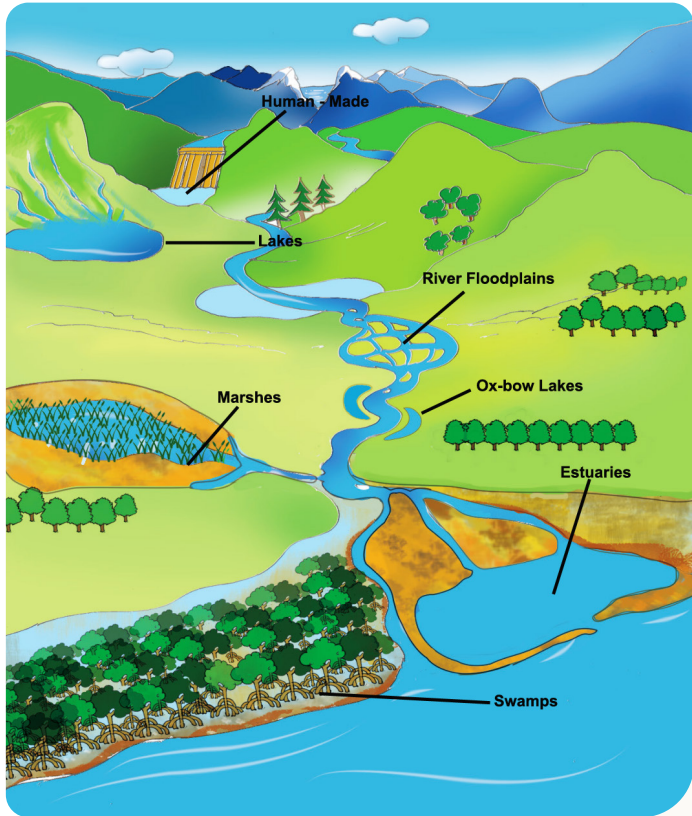
Difficulty level: Easy

## EXPLANATION

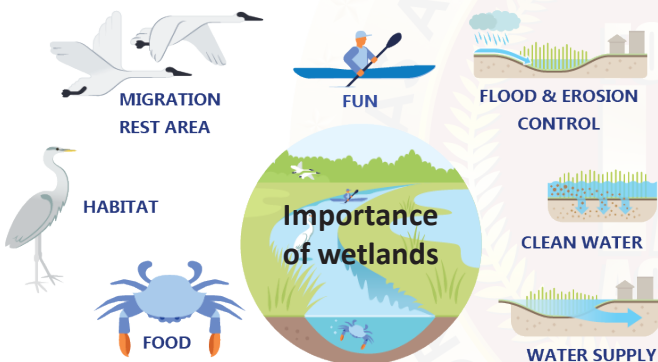
### Wetlands

- It is a distinct ecosystem that is **flooded or saturated by water**, either **permanently or seasonally**. It can be **natural, manmade, freshwater or brackish**.
- Wetlands are **transition zones**. They are **neither totally dry land nor totally underwater**; they have characteristics of both.
- Wetland plants are called **hydrophytes**. Plants that live in wetlands are **uniquely adapted** to their watery (hydric) soil which includes **mosses or grasses** to **sturdy vegetation** with trees.
- It **exists in many kinds of climates**, on every continent except Antarctica.
- Wetlands go by many names, such as **swamps, peatlands, sloughs, marshes, muskegs, bogs, fens, potholes, and mires**.
- Examples: **Sunderbans, Chilika Lake**, etc.

## Pictographic representation of wetlands



- The aquatic plants **absorb heavy metals and excess nutrients** and also **filter water** hence known as "**kidneys of the ecosystem**".



**Tropical rain forest** is called the "**lungs of earth**" because plants and trees take in carbon dioxide and release oxygen back into the air in their process of photosynthesis.

## RELATED PYQs

Q1. Consider the following statements:

- Under Ramsar Convention, it is mandatory on the part of the Government of India to protect and conserve all the wetlands in the territory of India
- The Wetlands (Conservation and Management) Rules, 2010 were framed by the Government of India based on the recommendations of Ramsar Convention

3. The Wetlands (Conservation and Management) Rules, 2010 also encompass the drainage area or catchment regions of the wetlands as determined by the authority

Which of the statements given above is/are correct?

- 1 and 2 only
- 2 and 3 only
- 3 only
- 1, 2 and 3

[2019]

3. Consider the following:

- Carbon monoxide
- Nitrogen oxide
- Ozone
- Sulphur dioxide

Excess of which of the above in the environment is/are cause(s) of acid rain?

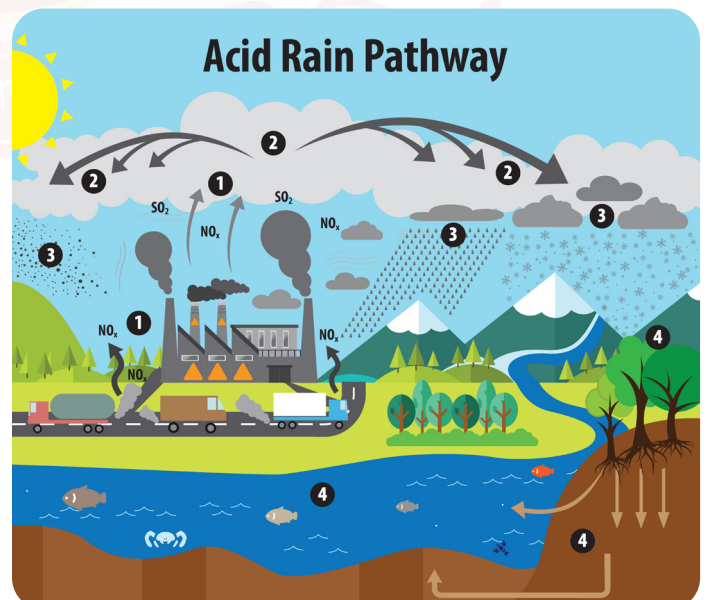
- 1, 2 and 3
- 2 and 4 only ✓
- 4 only
- 1, 3 and 4

Difficulty level: Moderate

## EXPLANATION

### ACID RAIN

- It includes **any form of precipitation with acidic components**, such as **sulfuric or nitric acid** that fall to the ground from the atmosphere in **wet or dry forms**. This can include **rain, snow, fog, hail or even dust that is acidic**.



## What Causes Acid rain?

Acid rain results when **sulphur dioxide (SO<sub>2</sub>)** and **nitrogen oxides (NO<sub>x</sub>)** are **emitted into the atmosphere** and **transported by wind and air currents**.

The SO<sub>2</sub> and NO<sub>x</sub> react with water, oxygen and other chemicals to form sulfuric and nitric acids.

These then mix with water and other materials before falling to the ground.

### Sources of SO<sub>2</sub> and NO<sub>x</sub> that cause acid rain:

- ◇ Natural sources:
  - » Volcanoes
  - » Forest fires
- ◇ Anthropogenic sources:
  - » Burning of fossil fuels
  - » Vehicles and heavy equipment
  - » Manufacturing, oil refineries and other industries
- Acid rain affects nearly everything. **Plants, soil, trees, buildings and even statues** can be transformed by this precipitation.

## RELATED PYQs

Q1. Acid rain is caused by the pollution of environment by

- a) carbon dioxide and nitrogen
- b) carbon monoxide and carbon dioxide
- c) ozone and carbon dioxide
- d) nitrous oxide and sulphur dioxide

[2013]

## Type of the questions: Current Affairs

1. "System of Rice Intensification" of cultivation, in which alternate wetting and drying of rice fields is practised, results in:

- 1) Reduced seed requirement
- 2) Reduced methane production
- 3) Reduced electricity consumption

Select the correct answer using the code given below:

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

Difficulty level: Moderate

Relevance: This technique is in the news for sometime in the context of advancement of rice cultivation in India.

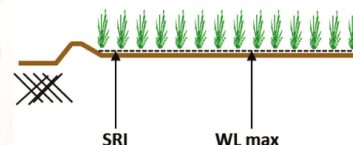
## EXPLANATION

### System of Rice Intensification (SRI)

- SRI is an innovative and **sustainable** method of rice cultivation that aims **to improve rice yields** and **reduce the environmental impact of rice farming**.

#### Features

- In SRI, rice seedlings are planted with **greater spacing between them** to provide each plant with **better access to nutrients and light**, resulting in **reduced seed requirements**.
- In this method, the **soil is kept aerated** through **intermittent wetting and drying**, which **reduces water usage** and **minimises methane emissions** due to the intermittent exposure of soil to air.
- SRI promotes the **use of stress-tolerant rice varieties** that **require fewer inputs** such as water and fertilisers, leading to **reduced energy consumption**.



2. "Climate Action Tracker", which monitors the emission reduction pledges of different countries is a:

- a) Database created by coalition of research organisations ✓
- b) Wing of "International Panel of Climate Change"
- c) Committee under "United Nations Framework Convention on Climate Change"
- d) Agency promoted and financed by the United Nations Environment Programme and World Bank

Difficulty level: Hard

**Relevance:** The term climate action tracker has been in news because the data from climate action tracker reveals emission pathways for the world's 10 biggest polluters.

### EXPLANATION

- Climate Action tracker is a research group with the aim of **monitoring government action** to achieve their **reduction of greenhouse gas emissions** with regard to international agreements.
  - It is **tracking climate action in 32 countries** responsible for **over 80% of global emission**.
  - It is a collaboration of two organisations, **Climate Analytics** and **New climate Institute**.
  - It further develops sectoral analysis to illustrate required pathways for meeting the global temperature goals.
3. Consider the following statements:
- 1) "The Climate Group" is an international non-profit organisation that drives climate action by building large networks and running them.
  - 2) The International Energy Agency in partnership with the Climate Group launched a global initiative "EP100".
  - 3) EP100 brings together leading companies committed to driving innovation in energy efficiency and increasing competitiveness while delivering on emission reduction goals.
  - 4) Some Indian companies are members of EP100.
  - 5) The International Energy Agency is the Secretariat to the "Under2 Coalition".

Which of the statements given above are correct?

- a) 1, 2, 4 and 5
- b) 1, 3 and 4 only ✓
- c) 2, 3 and 5 only
- d) 1, 2, 3, 4 and 5

Difficulty level: Moderate

**Relevance:** Two leading cement companies- Dalmia cement and JSW cement companies committed to the climate groups flagship initiatives RE100, EV100 and EP100.

### EXPLANATION

#### Climate group

- The climate group is a non-profit organisation that works with **business and government leaders aiming to address climate change**.
- The group has programmes focusing on **renewable energy** and **reducing greenhouse gas emission**.
- The climate group is the secretariat to the "Under 2 Coalition" which aims at **reducing the greenhouse gas emission to net zero level by 2050**.

#### EP100

- It is a **global corporate energy efficiency initiative, led by Climate Group**, bringing together 125 ambitious businesses committed to improving their energy efficiency.
- It offers a forum for **sharing best practice** and showcasing the leadership of companies making progress towards **public commitments on energy productivity**.
- EP100 is a global initiative started by Climate Group **not in partnership with International Energy Agency**.
- Dalmia cement, Godrej and Boyce, JSW cement, Mahindra heavy engines, Swaraj engines, Ultra-Tech cement are the Indian companies that are members of EP100.

4. In the context of WHO Air Quality Guidelines, consider the following statements:

- 1) The 24-hour mean of PM 2.5 should not exceed 15  $\mu\text{g}/\text{m}^3$  and annual mean of PM2.5 should not exceed 5  $\mu\text{g}/\text{m}^3$ .
- 2) In a year, the highest levels of ozone pollution occur during the periods of inclement weather.
- 3) PM10 can penetrate the lung barrier and enter the bloodstream.
- 4) Excessive ozone in the air can trigger asthma.

Which of the statements given above are correct?

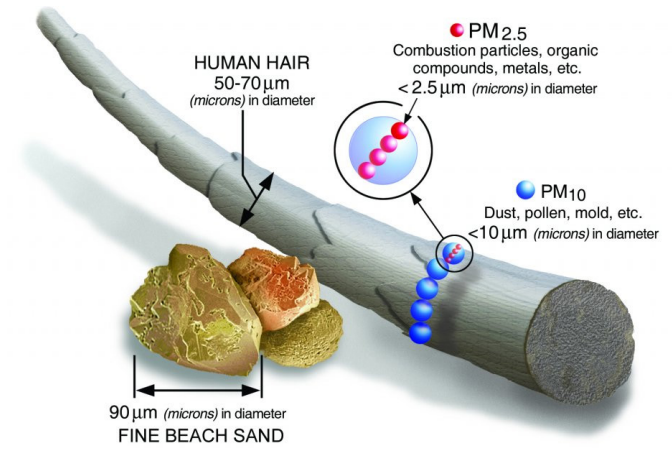
- a) 1, 3 and 4
- b) 1 and 4 only ✓
- c) 2, 3 and 4
- d) 1 and 2 only

Difficulty level: Moderate

**Relevance:** The World Health Organization's new air quality guidelines, called Global Air Quality Guidelines, have been released in 2021.

### EXPLANATION

- The World Health Organization's Air quality Guidelines (AQG) serve as a **global target** for national, regional and city governments to work towards improving their citizen's health by **reducing air pollution**.
- Although the guidelines are **neither standards nor legally binding criteria**, they are designed to **offer guidance** in reducing the health impacts of air pollution based on expert evaluation of current scientific evidence.
- According to WHO Air Quality Guidelines, the **annual mean of PM 2.5 should not exceed 5 micrograms** per cubic metre of air, while the **24-hour average should not exceed 15 micrograms per cubic metre**.
- **PM 2.5** are **capable of penetrating the lung barrier** and **entering the blood stream**.
- The **highest amount of ozone pollution occurs during sunny weather conditions**.
- Ozone pollution is caused by pollutants emitted by cars, power plants, industrial boilers, refineries, chemical plants etc. that **chemically react in the presence of sunlight**.
- **Increased amounts of ozone** in the atmosphere can affect human health **causing asthma, reduce lung function, and cause lung disease**.



Fine Particulate Matter (PM <sub>2.5</sub> ) HOW IT AFFECTS YOU AND WHAT CAN BE DONE ABOUT IT.		
<b>Where does PM<sub>2.5</sub> come from?</b> VEHICLE EMISSIONS CONSTRUCTION INDUSTRIES FOREST FIRES RESIDENTIAL BURNING AGRICULTURAL BURNING	<b>How can PM<sub>2.5</sub> affect my health?</b> DECREASED LUNG FUNCTION ASTHMA ATTACKS & BRONCHITIS IRREGULAR HEARTBEATS HEART ATTACKS EXACERBATES PRE-EXISTING HEALTH CONDITIONS	<b>Prevention &amp; reduction strategies</b> CHECK YOUR LOCAL AIR QUALITY IF ALERT LEVELS ARE HIGH BIKE, WALK, OR USE PUBLIC TRANSIT STOP IDLING VEHICLES LIMIT INTENSE ACTIVITIES NEAR BUSY ROADS ADHERE TO LOCAL BURN BANS CONSIDER INDOOR ALTERNATIVES

5. With reference to "Gucchi" sometimes mentioned in the news, consider the following statements:

- 1) It is a fungus.
- 2) It grows in some Himalayan Forest areas.
- 3) It is commercially cultivated in the Himalayan foothills of north-eastern India.

Which of the statements given above is/are correct?

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

Difficulty level: Moderate

**Relevance:** GI tag has been sought for Guichi, one of the coolest mushrooms in the world and it was in news because it's for the first time in India, world's costliest mushroom was artificially cultivated in Himachal Pradesh.

### EXPLANATION

#### Guchhi Mushroom

- Guchhi mushroom is a **species of fungus** in the family **Morchellaceae** of the Ascomycota. They are **pale yellow in colour** raised on a **large white stem**.

- They **grow as clusters in decaying wood** and are mostly cultivated in parts of India like **Himachal Pradesh, Uttarakhand** and **Jammu Kashmir**.



- They are **mostly growing wild only** in some regions of Kashmir, and Himachal and **they cannot be cultivated commercially**.

6. "Biorock technology" is talked about in which one of the following situations?

- Restoration of damaged coral reefs ✓
- Development of building materials using plant residues
- Identification of areas for exploration/extraction of shale gas
- Providing salt licks for wild animals in forests/protected areas

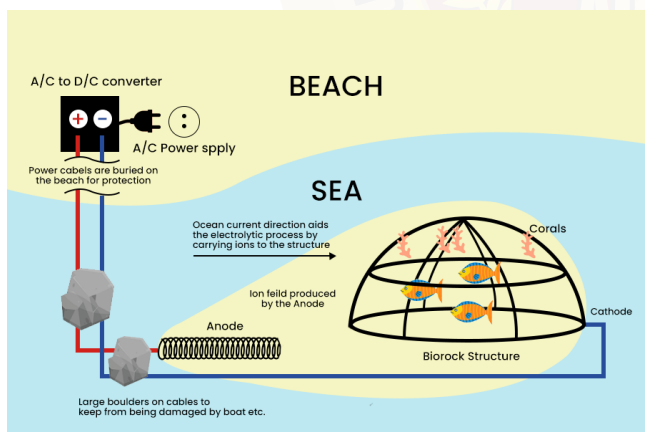
Difficulty level: Moderate

**Relevance:** The Zoological Survey of India with the help from Gujarat forest dept is attempting for the first time a process to restore coral reefs using biorock technology.

## EXPLANATION

### Biorock technology

- Biorock technology is used **to protect coral reefs by building rock-like materials** beneath the **ocean**.



- By applying **low-voltage** electric current through seawater, causes to the deposition of **crystalline salts** of minerals which is mostly in the form of **calcium carbonate**, builds a certain structure on the waterbed similar to the naturally produced coral reefs.
- It is very **strong** and **longlasting** that helps in **restoring the coral reefs** from mass extinction due to **global warming**.

### Coral reefs

- Corals are known as the '**rain forest of the sea**'.
- They share **symbiotic relation with zooxanthellae**, helps in **photosynthesis** and aids in **colour formation** of corals.
- There are two types of corals: **hard corals and soft corals**. **Only hard corals can form reefs**.
- Coral reefs are built by tiny animals known as **polyps**.
- **Reef-building corals**, also known as **hermatypic corals**, can take on a variety of shapes.
- Coral reef in India are mainly found in **Gulf of Kutch, Gulf of Mannar, Palk Bay, Andaman and Nicobar, Lakshadweep**.
- **Shallow water, clean water, rich supply of nutrients**, etc are ideal condition for its growth.



7. Which of the following is not a bird?

- Golden Mahseer ✓
- Indian Nightjar
- Spoonbill
- White Ibis

Difficulty level: Moderate

**Relevance:** Recently Blue-finned Mahseer, which was on the **IUCN's red list of endangered species**, has moved to the 'least concern' status. However, the Golden Mahseer is still on that list.

## EXPLANATION

### Golden Mahseer

- The Golden Mahseer, one of Asia's most iconic **freshwater fish**, often referred to as '**Tiger among fish**'.
- The fish is characterised by their **golden colour on the dorsal side, large scales** and **thick powerful lips** with relatively **longer barbels** (sensory hair-like organs in front of the mouth).



- Out of the 47 species of Mahseer that exist in the world, **India is home to 15** (for eg: **Tor moyarensis**, confined to the Moyar river of Tamil Nadu).
- In India, the Golden Mahseer inhabits the **Himalayan foothills**, the **Indus**, **Ganga** and **Brahmaputra basins** and can also be found in **Balamore, Cauvery, Tambraparni, and Kosi Rivers**.
- **IUCN STATUS: Endangered**

### Indian Nightjar

- These bird species are distributed in **Afghanistan, Iran, Indian subcontinent, Myanmar, Thailand, Cambodia, Vietnam and Laos**.
- They are **crepuscular**, active in the twilight before dawn and dusk.
- The Indian nightjar is a **non- migrant resident bird**.
- **IUCN STATUS: Least Concern**



### Spoonbill

- These are **long-legged wading birds**, found in **estuaries**, saltwater areas and lakes.
- They **feed by sweeping the long bill** from side to side in the mud or shallow water and thereby catching mostly small fish and crustaceans.
- **Eurasian spoonbill -> IUCN STATUS: Least Concern**



### White Ibis

- These are **wetland birds**. They use freshwater marshes, coastal estuaries, mangroves, flooded pastures, mudflats, and swamps.
- They have **reddish pink legs and bills**.
- **IUCN STATUS: Least Concern**

8. The "Miyawaki method" is well known for the:

- Promotion of commercial farming in arid and semi-arid areas
- Development of gardens using genetically modified flora
- Creation of mini forests in urban areas ✓
- Harvesting wind energy on coastal areas and on sea surfaces

**Difficulty level:** Moderate

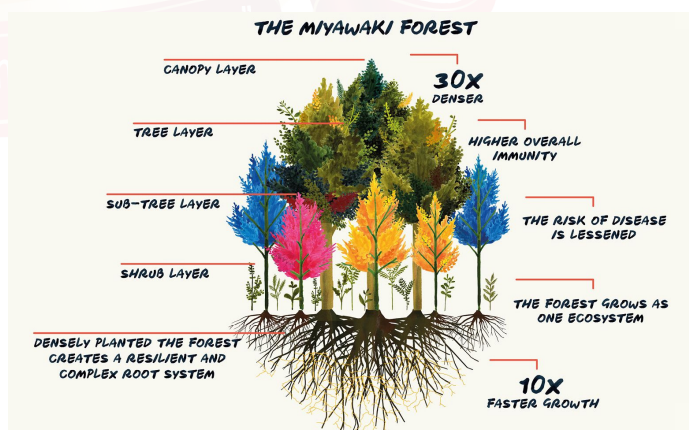
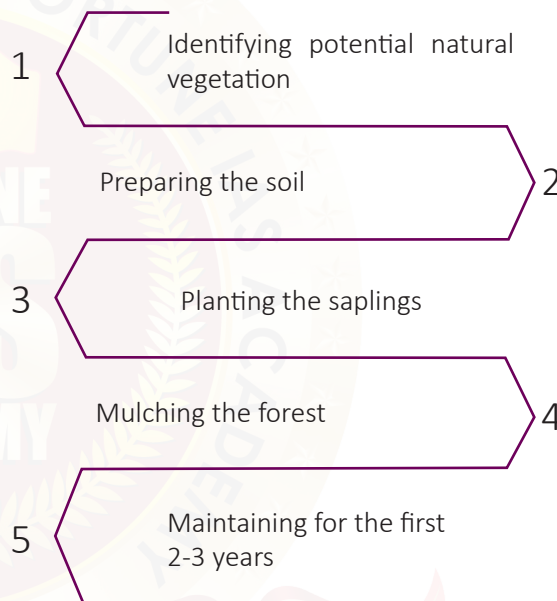
**Relevance:** Prime Minister Narendra Modi inaugurated Smurti Van (A dense forest made through Miyawaki method by the NGO Enviro Creators Foundation) on the Bhujjiya hill, Gujarat.

## EXPLANATION

### Miyawaki method

- The Miyawaki method is one of the most effective **tree planting methods for creating forest cover quickly on degraded land** and is based on natural reforestation principles.
- This method of afforestation was developed by the Japanese botanist **Professor Akira Miyawaki**.
- Aims to **create 100% organic, dense and diverse pioneer forests** in as little as 20-30 years.

### Miyawaki process



- This method isn't just unique because **it restores native habitats using native trees**; the afforestation principles are based on an understanding of how these species would interact in a natural forest.

- Since they're quick to establish, maintenance-free after the first two-to-three years, and **can be created on sites as small as 3 sq m**, Miyawaki forests are viable solutions for cities looking to rapidly build climate resilience.

#### 9. Consider the following statements:

- 1) The India Sanitation Coalition is a platform to promote sustainable sanitation and is funded by the Government of India and the World Health Organisation.
- 2) The National Institute of Urban Affairs is an apex body of the Ministry of Housing and Urban Affairs in Government of India and provides innovative solutions to address the challenges of Urban India.

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 ✓

Difficulty level: Hard

**Relevance:** The India Sanitation Coalition was in news in the context of the Swachh Bharat Mission- Urban 2.0 (SBM-U 2.0) 2021- 2026' announcement by the central government.

### EXPLANATION

#### India Sanitation Coalition (ISC)

- Launched in **June 2015**, at **Federation of Indian Chamber Commerce and Industry (FICCI)**.
- It enables and supports **safe and sustainable sanitation** by bringing multiple organisations on a common platform through a range of catalytic actions.
- **Urban WASH** (Water, Sanitation and Hygiene) challenges are specifically related to overcrowded slums, inadequate treatment of grey water and black water as well as a proper stream of waste management.

#### National Institute of Urban Affairs (NIUA)

- NIUA is India's leading **national think tank on urban planning and development**
- It provides innovative solutions to address the challenges of a fast urbanising India, and pave the way for more **inclusive and sustainable cities** of the future.

- NIUA was established as an **autonomous body** in **1976** under the aegis of the **Ministry of Housing and Urban Affairs (MoHUA)**. Then the institute was registered as a society under the **Societies Registration Act of 1860**.

#### 10. Which one of the following best describes the term "greenwashing"?

- a) Conveying a false impression that a company's products are eco-friendly and environmentally sound ✓
- b) Non-inclusion of ecological/environmental costs in the Annual Financial Statements of a country
- c) Ignoring the consequences disastrous ecological while infrastructure development undertaking
- d) Making mandatory provisions for environmental costs in a government project/ programme

Difficulty level: Moderate

**Relevance:** At UN climate talks, the head of environmental group Greenpeace warned against efforts by countries and corporations to "greenwash" their ongoing pollution of the planet.

### EXPLANATION

#### Greenwashing

- Greenwashing is when an organisation **spends more time and money on marketing itself as environment friendly** than on actually minimising its environmental impact.
- It's a **deceitful market gimmick** used by companies to exaggerate their environment friendly actions and that **would mislead consumers** who prefer to buy goods and services from environmentally conscious brands.



**Green marketing** - Companies sell products or services based on legitimate environmental positives.

## Current relevance

### Greenwashing TechSprint

- RBI invites firms to participate in Greenwashing TechSprint.
- The **RBI is among 13 international regulators taking part** in the first ever Greenwashing TechSprint organised by **Global Financial Innovation Network (GFIN)**.

## Type of the questions: Application

### 1. Consider the following pairs:

Wetland/Lake      Location

- 1) Hokera Wetland - Punjab
- 2) Renuka Wetland - Himachal Pradesh
- 3) Rudrasagar Lake - Tripura
- 4) Sasthamkotta Lake - Tamil Nadu

How many pairs given above are correctly matched ?

- a) Only one pair
- b) Only two pairs ✓
- c) Only three pairs
- d) All four pairs

Difficulty level: Hard

**Relevance:** The ecosystem services of wetlands need to be highlighted in our development policies, urban planning and climate change mitigation.

## EXPLANATION

### Hokera Wetland (Hokersar wetland)

- Hokera Wetland is situated in the **Jammu and Kashmir region**, located just 10 km from the city of Srinagar, near the snow-covered **Pir Panjal** mountain range.
- It is a **natural perennial wetland** within the **Jhelum basin**.
- Declared as **Ramsar site** in 2005.

### Renuka wetland

- Renuka Wetland is located in **Himachal Pradesh, India**.
- It is fed by **freshwater springs** and **inland subterranean karst formations**. A small stream

flows from the lower Himalayan region into the Giri river, feeding the lake.

- Declared as **Ramsar site** in 2005.

### Rudrasagar Lake

- Rudrasagar Lake is located in **Tripura, India**.
- It is a **lowland sedimentation reservoir** in the northeast hills, **fed by three perennial streams** that ultimately flow into the **River Gomti**.
- Rudrasagar Lake is the site of the **Vijayadashami festival**, one of the most important Hindu festivals, featuring various sports events.
- Declared as **Ramsar site** in 2005.

### Sasthamkotta Lake

- Sasthamkotta Lake is located in **Kerala, India**.
- The lake is the **largest freshwater lake in Kerala** and fed by natural springs.
- The water contains no common salts or other minerals and supports no water plants; a **larva called "cavaborus"** abounds and **eliminates bacteria** in the water, thus contributing to its exceptional **purity**.
- Declared as **Ramsar site** in 2002.

## Ramsar sites in India



## RELATED PYQs

Q1. Consider the following statements:

1. Under Ramsar Convention, it is mandatory on the part of the Government of India to protect and conserve all the wetlands in the territory of India
2. The Wetlands (Conservation and Management) Rules, 2010 were framed by the Government of India based on the recommendations of Ramsar Convention
3. The Wetlands (Conservation and Management) Rules, 2010 also encompass the drainage area or catchment regions of the wetlands as determined by the authority

Which of the statements given above is/are correct?

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

[2019]

2. Which one of the following has been constituted under the Environment (Protection) Act, 1986?

- a) Central Water Commission
- b) Central Ground Water Board
- c) Central Ground Water Authority ✓
- d) National Water Development Agency

Difficulty level: Moderate

**Relevance:** The Ministry of Environment, Forest and Climate Change proposed amendments in the Environment Protection Act, 1986.

## EXPLANATION

### Environment (Protection) Act, 1986

- The act was enacted with the objective of providing for the **protection** and **improvement** of the **environment**.
- Act was passed in the wake of **Bhopal Gas Tragedy, 1984** and to achieve **Stockholm declaration (UN Conference on the Human Environment) of 1972**.
- It **empowers the Central Government to establish authorities (under section 3[3])** charged with the mandate of preventing environmental pollution in all its forms.
- **Eco Sensitive Zones** (10 km buffer zones around protected areas) are notified under EPA, 1986.

## Statutory Bodies constituted under EPA

- Central Ground Water Authority (CGWA)
- Genetic Engineering Appraisal Committee (GEAC)
- National Coastal Zone Management Authority (now National Ganga Council)

### Central Ground Water Authority (CGWA)

- Although **Water is a State subject**, the regulation of **groundwater abstraction is being done at both Central and State levels**.
- At the central level, Central Ground Water Authority (CGWA) constituted in January **1997** under the Environment Protection Act, has been vested with responsibility for **regulation and control of groundwater development and management**.
- CGWA has been granted the powers to regulate and control, manage and develop groundwater in the country and to **issue necessary regulatory directions** for the purpose.

### Central Water Commission [CWC]

- A **premier Technical Organization** of India in the field of Water Resources and is presently functioning as an **attached office of the Ministry of Jal Shakti**.
- The Commission is entrusted with the general responsibilities of initiating, coordinating schemes for control and **conservation of water resources throughout the country**.
- CWC is headed by a **Chairman**, with the status of Ex-Officio Secretary to the Government of India.

### Central Ground Water Board [CGWB]

- It is a **scientific department** under the **Ministry of Jal Shakti**.
- CGWB is a multidisciplinary Scientific Organisation with a mandate to "Develop and disseminate technologies for Scientific and **Sustainable development and management of India's Ground Water Resources**, including monitoring exploration, assessment and augmentation".
- It was formed in **1970** by renaming erstwhile **Exploratory Tube well Organisation**.
- Headquarters: **Faridabad** (Haryana)

## National Water Development Agency [NWDA]

- The National Water Development Agency (NWDA), a **Registered Society** under the **Ministry of Jal Shakti**.
- It was set up in the year **1982** to carry out detailed **studies, surveys and investigations** in respect of the **Peninsular Component of National Perspective for Water Resources Development**.
- The **Indian Rivers Inter-link is managed by the NWDA**.

### RELATED PYQs

Q1. Consider the following statements :

1. Animal Welfare Board of India is established under the Environment (Protection) Act, 1986
2. National Tiger Conservation Authority is a statutory body
3. National Ganga River Basin Authority is chaired by the Prime Minister

Which of the statements given above is/are correct?

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

[2014]

Q2. With reference to 'Eco-Sensitive Zones', which of the following statements is/are correct?

1. Eco-Sensitive Zones are the areas that are declared under the Wildlife (Protection) Act, 1972
2. The purpose of the declaration of Eco-Sensitive Zones is to prohibit all kinds of human activities in those zones except agriculture

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

[2014]

Q3. Consider the following statements:

The Environment Protection Act, 1986 empowers the Government of India to

1. state the requirement of public participation in the process of environmental protection, and the procedure and manner in which it is sought
2. lay down the standards for emission or discharge of

environmental pollutants from various sources  
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

[2019]

Q4. Consider the following statements :

1. 36% of India's districts are classified as "overexploited" or "critical" by the Central Ground Water Authority (CGWA).
2. CGWA was formed under the Environment (Protection) Act.
3. India has the largest area under groundwater irrigation in the world.

Which of the statements given above is/are correct?

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

[2020]

3. 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 for 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

Difficulty level: Hard

Relevance: News related to the killing of a Leopard in Gurugram and 50 years of WPA, 1972.

### Wildlife Protection Act, (WPA) 1972

- The Wild Life (Protection) Act, 1972, provides the **legal framework for the protection** of various species of wild animals, management of **their habitat** and also for the regulation and **control of trade in the products derived from** various parts of wild animals.
- The WPA, **provides equal protection for wild animals, irrespective of their location**, inside or outside protected areas.
- As per the law, **wild animals are not the property of the government**, and an animal which is wild in nature and free cannot be in the ownership of either the government or a private party. Any **wild animal killed or wounded in defence of any person** shall be **Government property**.
- 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, the **Chief Wildlife Warden of the State**. This provision is applicable to wild animals listed in **Schedule I** of the WLPA, 1972. **Mere apprehension or fear that a wild animal could endanger human life is not a ground for capture or killing**.
- The **Chief Wildlife Warden**, or an authorised officer, **has the authority to take necessary action** if they are satisfied that a wild animal;
  - » Listed in **Schedule I** is either posing a **threat to human life** or is incurably **disabled or diseased**.
  - » Specified in **Schedule II** is **deemed dangerous to human life, property (including crops)**, or is beyond recovery due to **disability or disease**.
- The **Chief Wildlife Warden** has the authority to **grant permits** for specific purposes, which include **educational activities** and **scientific research**.
- As per the **recent amendment** the protection of wild and captive animals or birds, under the WLPA, 1972, are classified from **Schedules I- IV**.

- **Schedule I:** Animal species that will enjoy the highest level of protection
- **Schedule II:** Animal species that will be subject to a lesser degree of protection
- **Schedule III:** Protected Plant species
- **Schedule IV:** Specimens listed in the Appendices under CITES (scheduled specimens)

- Q1. With reference to 'dugong', a mammal found in India, which of the following statements is/are correct?
1. It is a herbivorous marine animal
  2. It is found along the entire coast of India
  3. It is given legal protection under Schedule 1 of the Wildlife (Protection) Act, 1972

Select the correct answer using the code given below.

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

[2015]

- Q2. According to the Wildlife (Protection) Act, 1972, which of the following animals cannot be hunted by any person except under some provisions provided by law?
1. Gharial
  2. Indian wild ass
  3. Wild Buffalo

Select the correct answer using the code given below.

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

[2017]

- Q3. In India, if a species of tortoise is declared protected under Schedule I of the Wildlife (Protection) Act, 1972, what does it imply?

- a) It enjoys the same level of protection as tiger
- b) It no longer exists in the wild, a few individuals are under captive protection; and now it is impossible to prevent its extinction
- c) It is endemic to a particular region of India
- d) Both (b) and (c) stated above are correct in this context

[2017]

- Q4. If a particular plant species is placed under Schedule VI of The Wildlife Protection Act, 1972, what is the implication?

- a) A licence is required to cultivate that plant
- b) Such a plant cannot be cultivated under any circumstances
- c) It is a Genetically Modified crop plant
- d) Such a plant is invasive and harmful to the ecosystem

[2020]

# 2023-PRELIMS PREVIOUS YEAR QUESTIONS

## Type of the questions: Factual

1. Consider the following fauna:

- 1) Lion-tailed Macaque
- 2) Malabar Civet
- 3) Sambar Deer

How many of the above are generally nocturnal or most active after sunset?

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

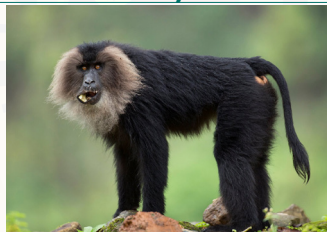
Difficulty level: Moderate

## EXPLANATION

- **Nocturnal animals** are creatures that are primarily active during the night.
- **Diurnal animals** are creatures that are primarily active during the day.

### Lion tailed Macaque (*Macaca silenus*)

- It is a distinctive and endangered species native to the **Western Ghats** of South India.



- Features
- They are **diurnal** animals that live in trees.
  - They **live in groups**, which can consist of **up to 20 individuals**.
  - Lion-tailed macaques are primarily **herbivorous**, feeding on a variety of fruits, leaves, buds, flowers, and occasionally insects.

- **IUCN STATUS: Endangered**

### Malabar civet (*Malabar large-spotted civet*)

- Malabar large-spotted civet, is a rare and **endangered mammal** found in the **Western Ghats** region of India.



- Features
- They are primarily **nocturnal**.
  - They are **solitary** and **secretive** creatures, making them difficult to study and observe.
  - Their diet consists of a variety of small mammals, birds, insects, and fruits.

- **IUCN STATUS: Critically Endangered**

### Sambar Deer

- The sambar deer (*Rusa unicolor*) is a **large and widespread species of deer native** to the Indian subcontinent, Southeast Asia, and parts of southern China.



- Features
- They are majorly **nocturnal** and **crepuscular** (active at dawn and dusk) animals.
  - They are typically **solitary** animals or found in small groups.
  - During the **breeding season, males may engage in vocalizations** and combat to establish dominance.
  - Sambar deer are **herbivores** and primarily graze on a variety of plants, including grasses, leaves, fruits, and shrubs.

- **IUCN STATUS: Vulnerable**

2. Consider the following statements:

- 1) Some mushrooms have medicinal properties.
- 2) Some mushrooms have psycho-active properties.
- 3) Some mushrooms have insecticidal properties.
- 4) Some mushrooms have bioluminescent properties.

How many of the above statements are correct?

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

Difficulty level: Easy

## EXPLANATION

### Mushrooms

- Mushrooms are the **umbrella-shaped fruiting bodies** which belong to kingdom **fungi**.

#### Special properties of mushroom

- Many mushroom species are **edible and are consumed as food**.
  - » Eg: **Button mushrooms**
- Some mushrooms have been used in **traditional medicines**.
  - » Eg: **Reishi and Lion's mane mushrooms**
- Some mushrooms have **psycho-active properties**.
  - » Eg: **Psilocybin mushrooms**
- Some mushrooms have **bioluminescent properties** (ability to produce and emit light).
  - » Eg: **Panellus stipticus**
- Some mushrooms have **insecticidal properties**.
  - » Eg: **Amanita muscaria**
- **All mushrooms are fungi, but not all fungi are mushrooms.**

3. Consider the following statements:

- 1) Some microorganisms can grow in environments with temperature above the boiling point of water.
- 2) Some microorganisms can grow in environments with temperature below the freezing point of water.
- 3) Some microorganisms can grow in a highly acidic environment with a pH below 3.

How many of the above statements are correct?

- a) only one
- b) only two
- c) all three ✓
- d) none

Difficulty level: Moderate

## EXPLANATION

### Microorganism

- A microorganism or microbe is an organism of **microscopic size**, which may exist in its single celled form or as a colony of cells.
- They can have very **different habitats**, and **live everywhere from the poles to the equator, deserts, geysers, rocks and in deep seas**.
- The organisms that live on **extremely high temperatures** are called **Thermophiles**.
- The organisms with the ability to grow and thrive in environments with **temperature above the boiling point of water** are called **Extremophiles**.
  - » Example: **Pyrolobus fumarii**
- Organisms that grow in environments with temperature **below the freezing point** of water are called **cryophiles**.
  - » Example: **Psychrophilic bacteria**
- Organisms that can grow in a **highly acidic environment** with a pH below 3 are called **acidophiles**. They are mainly seen in acidic soils, volcanic areas etc.

4. Consider the following statements :

Once the Central Government notifies an area as a 'Community Reserve'

- 1) the Chief Wildlife Warden of the State becomes the governing authority of such forest
- 2) hunting is not allowed in such area
- 3) people in such areas are allowed to collect non-timber forest produce
- 4) people of such areas are allowed traditional agricultural practices

How many of the above statements are correct?

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

Difficulty level: Moderate

## EXPLANATION

- **Conservation reserves and community reserves** are **protected areas** of India which typically **act as buffer zones** between established national parks, wildlife sanctuaries and reserved and protected forests of India.

- These protected area categories were **first introduced in the Wildlife (Protection) Amendment Act of 2002.**

### Community Reserve

- The **State Government may declare any community land or private land with the consent of the inhabitants**, (not comprised within a National Park, sanctuary or a conservation reserve), as a community reserve for protecting fauna, flora and traditional or cultural conservation values and practices.
- Once **forest land has been declared as a community reserve**, it goes from being **governed by local village councils to coming under the forest department.**
- The **State Government shall constitute a Community Reserve management committee**, which shall be the authority responsible for conserving, maintaining and managing the community reserve.
- **No change in the land use pattern** shall be made within the community reserve except in accordance with a **resolution passed by the management committee.** And **approval** of the same shall be given **by the state government.**
- After a **forest has been made into a community reserve, people cannot hunt there, nor can they use it for agricultural practices**, leave alone jhum cultivation

### Conservation reserve

- The **State Government** may, after having **consultations with the local communities**, declare any area owned by the Government as conservation reserve for protecting landscapes, seascapes, flora and fauna and their habitat.
- The State Government shall constitute a **conservation reserve management committee to advise the Chief Wildlife Warden** to conserve, manage and maintain the conservation reserve.
- When areas are marked as conservation areas, it becomes mandatory for **any developmental projects to get clearance from National Board for Wildlife and State Board of Wildlife** as per the **Forest Conservation Act, 1990.**

## Type of the questions: Current Affairs

1. Consider the following statements:

**Statement-I:**

Marsupials are not naturally found in India.

**Statement-II:**

Marsupials can thrive only in montane grasslands with no predators.

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

- Both Statement-I and Statement-II are correct and Statement-II is the correct explanation for Statement-I
- Both Statement-I and Statement-II are correct and Statement-I is not the correct explanation for Statement-I
- Statement-I is correct but Statement-II is incorrect ✓
- Statement-I is incorrect but Statement-II is correct

Difficulty level: Moderate

Relevance: Marsupials like kangaroos are being smuggled into India.

## EXPLANATION

### Marsupials

- Marsupials are a group of mammals **characterised by their unique reproductive system.** They give birth to undeveloped live babies, which then continue to develop in a pouch on the mother's abdomen.



### Features

- They are called **pouched mammals** because they have a pouch, or marsupium, where they **carry and nurse their young.**
- Marsupials have a **very short gestation period.**
- The **majority of marsupial species are native to Australia.** They are **not seen in India naturally.**

2. 'Invasive Species Specialist Group' (that develops Global Invasive Species Database) belongs to which one of the following organisations?

- a) The International Union for Conservation of Nature ✓
- b) The United Nations Environment Programme
- c) The United Nations World Commission for Environment and Development
- d) The World Wide Fund for Nature

Difficulty level: Hard

**Relevance:** Preventing the introduction of invasive alien species and managing their impacts is essential to halting biodiversity loss. This issue is also critical to human health, food security, livelihoods and economies.

### EXPLANATION

#### Invasive Species Specialist Group (ISSG)

- It is a global **network of scientific and policy experts** that **focuses on the issue of invasive species**.
- It is part of the **International Union for Conservation of Nature (IUCN)**.

**United Nations World Commission for Environment and Development, (Brundtland Commission)-1983**

- The Brundtland Commission is most famous for introducing the concept of **sustainable development**.

3. Which of the following organisms perform waggles dance for others of their kin to indicate the direction and the distance to a source of their food?

- a) Butterflies
- b) Dragonflies
- c) Honey Bees ✓
- d) Wasps

Difficulty level: Moderate



**Relevance:** A new study revealed that honey bees communicate through waggles dance.

### EXPLANATION

#### Waggle dance

- It is a unique and fascinating form of communication **used by honey bees to convey information** about the location of food sources, particularly nectar and pollen, to other members of the hive.



Butterflies 	Wasp 
Have large and colorful wings <b>covered with scales</b>	Have membranous wings <b>without scales</b>
They are primarily <b>herbivorous</b> , feeding on nectar and plant material	Wasps are <b>carnivorous</b> , preying on other insects or scavenging.
<b>Do not possess stingers</b> or any means of defense	Many wasp species have <b>stingers</b> and can deliver painful stings
Butterflies are <b>important pollinators</b> , contributing to the reproduction of many plant species	Wasps often serve as <b>predators, controlling other insect populations</b>
<b>Diurnal</b>	<b>Diurnal and Nocturnal</b>

### RELATED PYQs

Q1. Due to some reasons if there is a huge fall in the population of a species of butterflies, what could be its likely consequence/consequences?

1. Pollination of some plants could be adversely affected
2. There could be a drastic increase in the fungal infection of some cultivated plants
3. It could lead to a fall in the population of some species of wasps, spiders and birds

Select the correct answer using the code given below.

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

[2017]

4. Consider the following statements regarding mercury pollution :

- 1) Gold mining activity is a source of mercury pollution in the world.
- 2) Coal-based thermal power plants cause mercury pollution.
- 3) There is no known safe level of exposure to mercury.

How many of the above statements are correct?

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

Difficulty level: Moderate

**Relevance:** Recently, Indonesia has introduced a global declaration tackle illegal trade of mercury. News that Brazil is pushing out illegal gold miners from its Yanomami territory. The region is heavily affected by mercury poisoning.

## EXPLANATION

### Mercury

- Mercury, a **neurotoxin** occurs **naturally in the earth's crust**, but human activities, such as **mining and fossil fuel combustion**, have led to widespread global mercury pollution.
  - It is a **highly toxic element**; there is **no known safe level of exposure**.
  - Natural sources of mercury: **Volcanic eruptions and emissions from the ocean**.
  - Globally, **artisanal and small-scale gold mining (ASGM) is the largest source of anthropogenic mercury emissions**, followed by **stationary combustion of coal**. Other large sources of emissions are **non-ferrous metals production and cement production**.
  - Mercury may have **toxic effects on the nervous, digestive and immune systems**, and on lungs, kidneys, skin and eyes.
  - It is considered by **WHO** as one of the **top ten chemicals** or groups of chemicals of **major public health concern**.
- ◇ People are mainly exposed to **methylmercury**, an **organic compound**, when they eat **fish and shellfish** that contain the compound. **Ethylmercury** is **used as a preservative** in some vaccines and **does not pose a health risk**.

## RELATED PYQs

Q1. Consider the following statements:

1. Coal ash contains arsenic, lead and mercury.
2. Coal-fired power plants release sulphur dioxide and oxides of nitrogen into the environment.
3. High ash content is observed in Indian coal.

Which of the statements given above is/are correct?

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

[2020]

5. With reference to green hydrogen, consider the following statements :

- 1) It can be used directly as a fuel for internal combustion.
- 2) It can be blended with natural gas and used as fuel for heat or power generation.
- 3) It can be used in the hydrogen fuel cell to run vehicles.

How many of the above statements are correct?

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

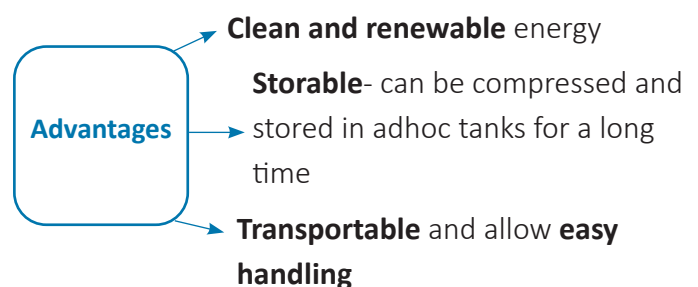
Difficulty level: Easy

**Relevance:** EU-India hold First Green Hydrogen Forum in New Delhi.

## EXPLANATION

### Green Hydrogen

- Hydrogen that is **obtained through electrolysis powered by renewable energies** such as wind or solar. (Electrolysis involves using an electrical current to break down the water molecule into oxygen and hydrogen by electrodes.)
- When the Green Hydrogen turns into energy, the **only by-product of the process is water**, resulting in a clean, sustainable source of energy.



## Uses

- It can be **used directly as a fuel for internal combustion**.
- For **reducing GHG emissions**, it can be **blended with natural gas** and used as a fuel for heat or power generation.
- **Hydrogen fuel cells** are devices that convert hydrogen and oxygen into electricity. Green hydrogen can be used in these cells to run vehicles.
- Use in the chemical industry for **manufacturing ammonia and fertilisers**.

## Disadvantages

More expensive to produce than grey hydrogen.

Implementation requires significant investments.

- Green hydrogen is the **only type of hydrogen produced in a climate-neutral manner** making it **critical to reach net zero** emission targets.

## 6. Consider the following statements:

### Statement-I:

Carbon markets are likely to be one of the most widespread tools in the fight against climate change.

### Statement-II:

Carbon markets transfer resources from the private sector to the State.

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

- Both Statement-I and Statement-II are correct and Statement-II is the correct explanation for Statement-I
- Both Statement-I and Statement-II are correct and Statement-II is not the correct explanation for Statement-I
- Statement-I is correct but Statement-II is incorrect ✓
- Statement-I is incorrect but Statement-II is correct

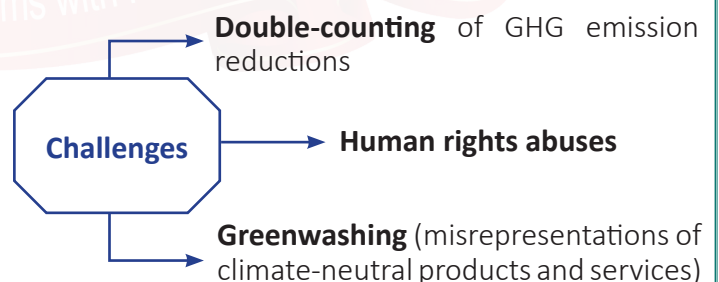
Difficulty level: Moderate

**Relevance:** The Parliament has passed the Energy Conservation (Amendment) Bill, 2022 in order to establish Carbon Markets in India and specify a Carbon Trading Scheme. The Bill amends the Energy Conservation Act, 2001.

## EXPLANATION

### Carbon markets

- Carbon markets are a tool for **putting a price on carbon emissions**. They are likely to be one of the most **widespread tools in the fight against climate change**.
- The **supply and demand decide the price** at which such carbon savings are sold in the form of fungible certificates called **carbon credits**. **One carbon credit is equivalent to one tonne of saved carbon emissions**.
- Let's say, for every 1,000 tonnes of steel a company produces, it emits 100 tonnes of carbon dioxide from burning fossil fuel. To reduce carbon emissions, the company invests in a new technology that burns less fossil fuel for every tonne of steel it produces. It makes a **carbon saving**.
- There are **companies that are finding it difficult to invest in carbon-saving technologies** but are also under obligation (or voluntary target) to reduce greenhouse gas emissions. **They buy this 'carbon saving' and take credit for the reduction in emissions** against their targets.
- There comes the idea of a carbon market where **those who have reduced their emissions earn savings, and those who have exceeded their emission limit get to buy savings from others**, and match their needs or targets.
- Carbon trading **started formally in 1997** under the United Nations' **Kyoto Protocol**.



.....  
: In India, the **Bureau of Energy Efficiency** functioning :  
: under the **Ministry of Power** has been tasked to :  
: **develop the Carbon trading scheme**. :  
:.....

7. Consider the following statements:

- 1) In India, the Biodiversity Management Committees are key to the realisation of the objectives of the Nagoya Protocol.
- 2) The Biodiversity Management Committees have important functions in determining access and benefit sharing, including the power to levy collection fees on the access of biological resources within its jurisdiction.

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

Difficulty level: Moderate

**Relevance:** Govt to strengthen biodiversity management committees in local bodies and they are frequently seen in news.

## EXPLANATION

### Biodiversity Management Committees

- Biodiversity Management Committees (BMCs), established under **Biological Diversity Act, 2002**, are **local units of conservation** that promote the **conservation, sustainable use, and documentation of biological diversity**.
- One of the critical roles of BMCs is to facilitate access and benefit sharing in line with the provisions of the Nagoya Protocol.

### Constitution

- It is **mandatory for every local self-governing institution in both rural and urban areas to constitute BMC**.
- BMC is a **7-member committee** which is elected by the local body.
- **Tenure:** Co-terminus with the local body

### Mandate of Biodiversity Management Committees

- To **prepare the Peoples' Biodiversity Register (PBR) in consultation with local people** (A PBR comprehensively documents information on the availability and knowledge of local biological resources).

### Powers/Roles and Financing of a BMC

- **Eco-restoration** of the local biodiversity, management of sacred groves and sacred water bodies, conservation of traditional varieties/breeds of economically important plants and animals and **regulation of access to biological resources for commercial purposes**.
- The **independent powers to levy charges by way of collection fees from persons collecting biological resources** from their territorial jurisdiction.

### NAGOYA PROTOCOL

- The Nagoya Protocol on **Access and Benefit-Sharing**, which was negotiated within the framework of the **Convention on Biological Diversity**, regulates **access to genetic resources** and the fair and equitable sharing of benefits arising from their utilisation.

## Type of the questions: Conceptual

1. Consider the following statements regarding the Indian squirrels:

- 1) They build nests by making burrows in the ground.
- 2) They store their food materials like nuts and seeds in the ground.
- 3) They are omnivorous.

How many of the above statements are correct?

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

Difficulty level: Hard

## EXPLANATION

### Indian squirrels

- Indian squirrels including the Indian palm squirrel, Malabar giant squirrel **do not typically build nests by making burrows in the ground**. They



are **arboreal species** (Animals that live in the trees) and **live mostly on trees**.

- They are primarily **omnivorous** and they also feed on vegetarian diets consisting of fruits, nuts, seeds etc.
- **To overcome the colder months** squirrels, **collect extra nuts** during spring and summer and **store** them in the ground.

• **IUCN STATUS: Near threatened**

2. Which one of the following makes a tool with a stick to scrap insects from a hole in a tree or a log of wood?

- a) Fishing cat
- b) Orangutan ✓
- c) Otter
- d) Sloth bear

Difficulty level: Moderate

### EXPLANATION

#### Orangutan

- Orangutans are the **largest arboreal animals** and they **spend more than 90% of their hours in trees**.



- Orangutans might reach into a hole with its finger and a stick held in its hand will reach farther or into narrow openings.

• **IUCN STATUS: Endangered**

• **CITES: Appendix 1**

#### Fishing cat

- Fishing cats are **nocturnal** in nature and they spend most of their lives in areas of **dense vegetation close to water bodies** and they are **excellent swimmers**.



- They can be seen in **eastern ghats, flood plains, mangrove forest** etc.

• **IUCN STATUS: Vulnerable**

• **CITES: Appendix 2**

• **WPA, 1972 Schedule 1**

#### Otters

- Otters are largely **solitary, semi-aquatic mammals** that get most of their food from rivers or sea and are **carnivores** in nature.



- In India it is mainly found in **cold hills and mountain streams**. It has **sensitive whiskers** around the snout **to help to detect the prey**.

• **IUCN STATUS: Near threatened**

• **CITES: Appendix 1**

• **WPA, 1972 Schedule 2**

#### Sloth bears

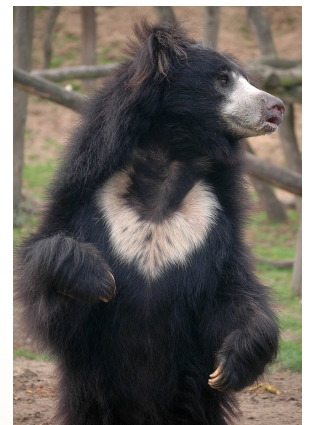
- Sloth bears are **solitary creatures** and are generally **nocturnal**.

- They have **long shaggy fur**, around the face and **long-sickle shaped claws**.

• **IUCN STATUS: Vulnerable**

• **CITES: Appendix 1**

• **WPA, 1972 Schedule 1**



3. Consider the following:

- 1) Aerosols
- 2) Foam agents
- 3) Fire retardants
- 4) Lubricants

In the making of how many of the above are hydrofluorocarbons used?

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

Difficulty level: Hard

### EXPLANATION

#### Hydrofluorocarbons

- Hydrofluorocarbons are **man made organic compounds** that contain **fluorine** and **hydrogen atoms**.

- They were **developed to replace stratospheric ozone depleting substances (Chlorofluorocarbons)** introduced in the **Montreal protocol**.
- Hydrofluorocarbons are manufactured mainly for use as **refrigerants** in refrigeration, air conditioning and heat pumps. They are also used in **foams, aerosols, fire protection and solvents**.
- In 2019, the **Kigali amendment** to the Montreal protocol came into effect to begin **phasing down hydrofluorocarbon globally by 85% in 2050**. It is expected **to avoid up to 0.5 degree celsius warming**.

- Biofilters are **not primarily designed to treat solid wastes** like uneaten fish feed.
- They are designed **to remove pathogens** from recycled solutions by filtration and by exposing these pathogens for extended periods of time to unfavourable conditions reducing their viable population.
- They **convert ammonia present in fish waste to nitrate**.
- Aquaculture systems **try to manage and minimise the amount of phosphorus in water**.

### Type of the questions: Application

1. With reference to the role of biofilters in Recirculating Aquaculture System, consider the following statements:

- 1) Biofilters provide waste treatment by removing uneaten fish feed.
- 2) Biofilters convert ammonia present in fish waste to nitrate.
- 3) Biofilters increase phosphorus as nutrient for fish in water.

How many of the statements given above are correct?

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

Difficulty level: Hard

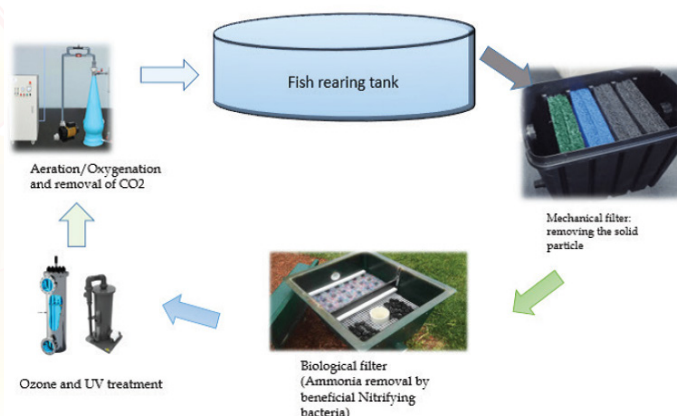
**Relevance:** Aquaculture is a rapidly expanding industry around the world. Recirculating Aquaculture system was a significant innovation towards furthering the growth of the aquaculture industry. A new study found that Biofilters are a critical component in treating the water as a part of Recirculating Aquaculture system.

### EXPLANATION

#### Recirculating Aquaculture System (RAS)

- RAS is a technology where **water is recycled and reused** after **mechanical and biological filtration** and **removal of suspended matter**.
- **Biofiltration** is a pollution control technique using a bioreactor **containing living material to capture and biologically degrade pollutants**.

#### Recirculating Aquaculture System



2. Consider the following heavy industries:

- 1) Fertiliser plants
- 2) Oil refineries
- 3) Steel plants

Green hydrogen is expected to play a significant role in decarbonizing how many of the above industries?

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

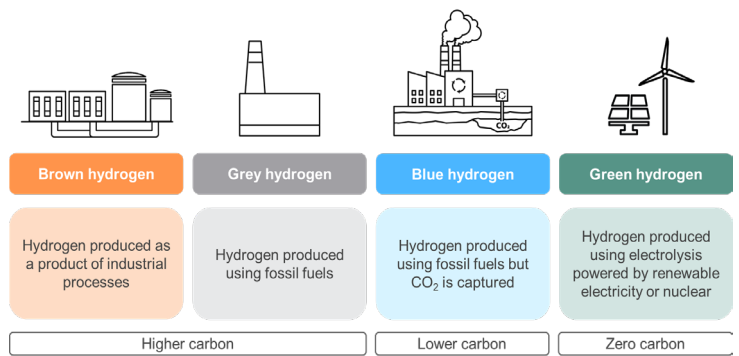
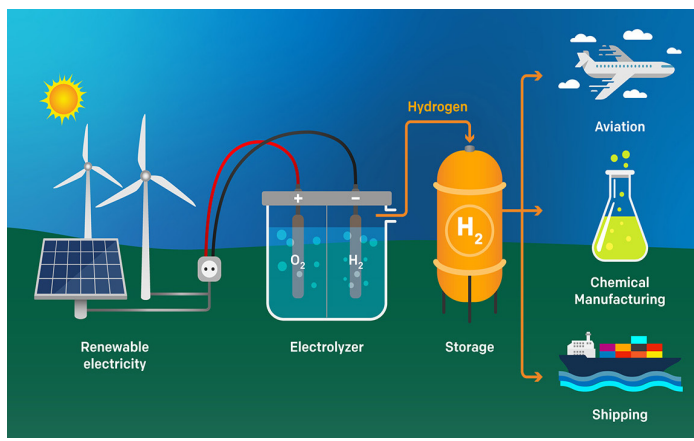
Difficulty level: Moderate

**Relevance:** India introduced the National Green Hydrogen Mission. It has been discussed in the news regarding its application and significance in the era of transformation towards green energy.

### EXPLANATION

#### Green Hydrogen

- This technology is based on the **generation of hydrogen** (a **universal, light and highly reactive fuel**) through a chemical process known as **electrolysis** using the electricity obtained from **renewable energy**.



## Green Hydrogen in heavy industries

- Hydrogen is used as a **raw material**, in the **chemical industry to manufacture ammonia and fertilisers**, in the **petrochemical industry for petroleum refining** and in **metallurgy to obtain steel**.
- The use of hydrogen in **these three industries produces a large amount of carbon dioxide emissions**. For example, **steel manufacturing accounts for 6 to 7 % of global CO<sub>2</sub> emissions**, two to three times the emissions from all global aviation. We could use **green hydrogen as a raw material and produce emissions-free steel**, an important step towards the urgent decarbonisation of these industries.

## Green Hydrogen for energy storage

- Green hydrogen can serve as an energy storage system thanks to its **large volume and long life** similar to the way in which we now use strategic oil or natural gas reserves. In doing so, we could **supply reserves of renewable hydrogen to support the electricity grid**.

## Green Hydrogen as a clean, renewable fuel

- The use of green hydrogen as a fuel will be one of the keys in helping **to decarbonise transport**, especially long-haul and air transport.
- Very cheap but highly polluting fuels are usually used in **maritime transport**, so green hydrogen offers a decisive **alternative for long-haul vessels**.
- In **aviation**, green hydrogen can be the basis for **synthetic fuels** that radically reduce emissions from this sector. It will also be essential for other means such as rail or heavy goods transport by road.

# SUMMARY

Analyzing the trends in previous years' UPSC Prelims questions from 2021 to 2023 provides valuable insights into the distribution of questions across syllabus topics, the varying levels of question difficulty, and the extent to which current affairs play a significant role in the examination.

## **SUBJECT EMPHASIS:**

---

- Ecosystem
- Important Acts
- Pollution
- Flora and Fauna
- Sustainable Development initiatives
- Protected areas
- Biodiversity conservation measures
- Bio-geochemical cycles

## **CURRENT AFFAIRS FOCUS:**

---

- Greater attention should be directed towards topics that have remained in the news for an extended period and are closely related to both the syllabus and the foundational aspects of Environment and Ecology. Special emphasis should be given to the "Down to Earth" magazine as many current affairs questions have been asking from it.
  - » Species seen in news- Oranguttan, Pangolin etc.
  - » Protected areas - Their location, geographical features, keystone species, major rivers or mountains etc.
    - » Eg- Kuno National park, kuno river flows through it, famous for cheetah rehabilitation
  - » Pollution and Mitigation strategies used by various organisations.
    - » Eg- Climate Action Tracker
  - » Important conventions and their outcomes.
    - » Eg- COP 27
  - » Key terms.
    - » Eg- R2 code of practices

# SUMMARY

## TREND ANALYSIS:

---

- Certain topics are gaining relevance due to their current significance, and there is a possibility that these topics might be repeated in the forthcoming exams.
  - Examples:
    - » Pollution - Global warming, Climate change, Green House Gas emissions
    - » Flora and Fauna
    - » Biodiversity conservation
    - » Conceptual part of Ecosystem and types of Ecosystems
    - » Protected areas that frequently seen in news
    - » Biodiversity acts and their major amendments: Eg- Wildlife Protection Act, 1972
    - » Important climatic summits and environmental organisations
    - » Increasing focus towards sustainable development and its initiatives

Prelims preparation acts as the initial gateway to our aspirations of a career in civil services. As the saying goes, the first step is often the most challenging. To reach our desired destination, it's crucial to make the right, and most importantly, smart choices. At **Fortune IAS Academy**, we aim to simplify this challenging exam stage through our test series program, leading you along the correct path to achieve your goals.