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GS PAPER 1

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Compiled by Arvind KrS

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Year-wise UPSC Prelims Environment questions with answers and explanations

Prelims 2026 Edition · Compiled November 2026

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PRELIMS RESEARCH | GS PAPER 1 | ENVIRONMENT

UPSC Prelims Research: Environment 2026

All 9 Environment questions of UPSC Civil Services Preliminary Examination 2026, General Studies Paper 1, with the correct answer and an explanation of every option.

1. Consider the following statements with reference to India's response to climate change:

I. India's Long-Term Low Emission Development Strategy (LT-LEDS) is a crucial tool for achieving net-zero emissions by 2070.

II. India's 4th Biennial Update Report (BUR-4) submitted in December, 2024 recorded around 8% decrease in Greenhouse gas emissions in 2020 over 2019.

III. Climate-resilient development necessarily depends on quick and short-term achievement of emission reduction targets.

Which of the following relationships among the above statements is/are correct?

1. Statement I is empirically supported by statement II.

2. Statement III contradicts the approach implicit in statement I.

3. Statement I and statement III together establish the premise of long-term sustainability.

Select the answer using the code given below :

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

Answer: (b) 1 and 2

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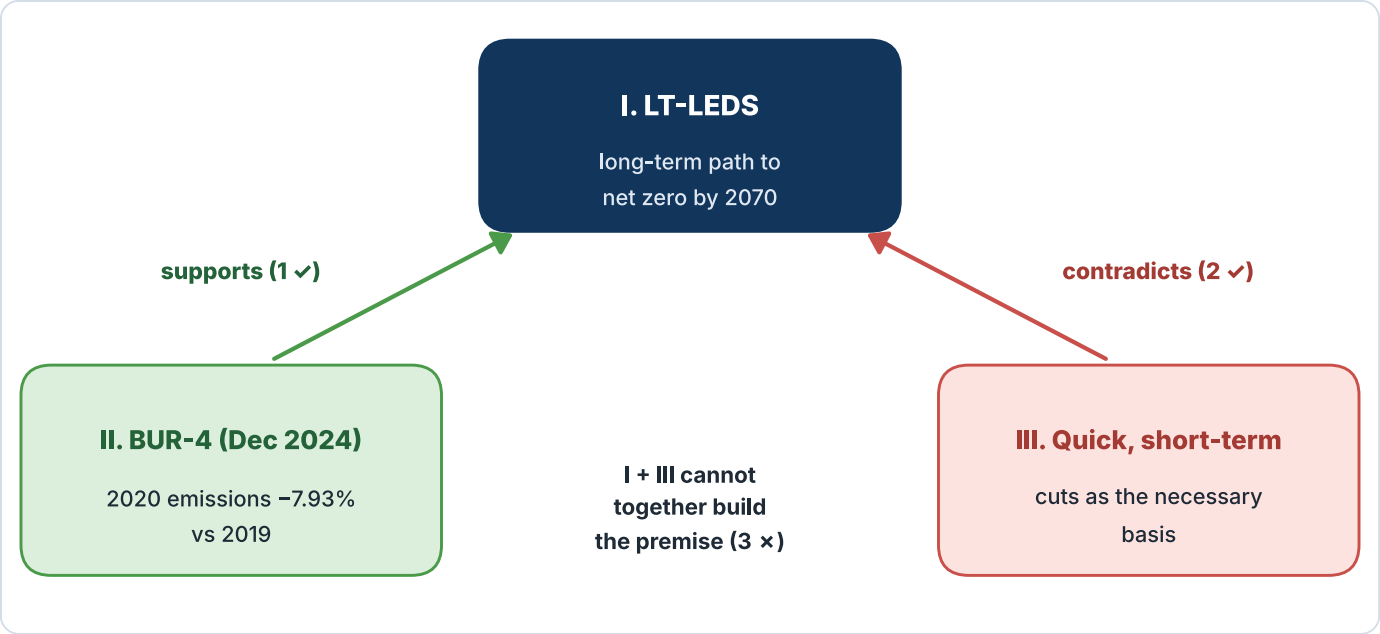
Long-Term Low Emission Development Strategy (LT-LEDS)



How the three statements on India's climate response relate

- India submitted its **LT-LEDS** to the **UNFCCC at COP27 (Sharm el-Sheikh, November 2022)**, as invited under **Article 4.19 of the Paris Agreement**. It sets out the pathway to India's goal of **net-zero emissions by 2070**, announced at **COP26 (Glasgow, 2021)** as part of the **Panchamrit**.
- It rests on **climate justice** and **Common But Differentiated Responsibilities and Respective Capabilities (CBDR-RC)**, and on the principle of **LiFE (Lifestyle for Environment)**.
- **Seven key transitions**: low-carbon development of the **electricity** system; integrated, efficient and inclusive **transport**; **urban** design and energy-efficient buildings; decoupling **industrial** growth from emissions; **carbon dioxide removal** and engineering solutions; enhancing **forest and vegetation cover**; and the **economic and financial** aspects of low-carbon development.
- So statement I is a fair description: the LT-LEDS is a **gradual, long-term** roadmap that balances development with decarbonisation.

Biennial Update Report-4 (BUR-4)

- India submitted its **fourth Biennial Update Report** to the UNFCCC on **30 December 2024**. It contains the national **greenhouse gas inventory for 2020**.
- Total emissions (excluding LULUCF) in 2020 were about **2,959 million tonnes CO2e**, a **decrease of 7.93% over 2019**; including LULUCF, net emissions were about **2,437 MtCO2e**. The **energy sector** contributed about **75.66%** of emissions.
  - The **emission intensity of GDP** fell by **36% between 2005 and 2020**, and non-fossil sources reached a large share of installed power capacity, showing progress toward the NDC targets.

Evaluating the relationships

- **Relationship 1 is correct**: the fall in emissions recorded in BUR-4 (and the decline in emission intensity) is **empirical evidence** that India's low-emission strategy is moving in the stated direction, so statement II supports statement I. (The 2020 drop was also influenced by the pandemic, but it is still reported data.)

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- **Relationship 2 is correct**: statement I reflects a **long-term, phased** approach to net zero (by 2070) that balances growth, energy security and equity. Statement III says climate-resilient development **necessarily depends on quick, short-term** cuts, which **contradicts** this approach.
- **Relationship 3 is incorrect**: since statement III conflicts with statement I, the two **cannot together** establish a premise of long-term sustainability. Climate-resilient development combines **mitigation and adaptation** over the long term; it is not built on quick short-term targets alone.

Item	Key fact
LT-LEDS	Submitted at COP27 (2022); pathway to net zero by 2070; seven transitions
BUR-4	Submitted 30 Dec 2024; 2020 emissions down 7.93% from 2019
Emission intensity of GDP	Down 36% between 2005 and 2020
Updated NDC (2022)	45% cut in emission intensity by 2030 (from 2005); 50% power capacity from non-fossil sources by 2030

2. With respect to the Western Hoolock Gibbons, which of the following statements is/are correct?

1. A Sanctuary in North-east India is home to this ape species listed as Endangered in the International Union for Conservation of Nature (IUCN) Red List.

2. They have specialized brachiation and can easily swing between trees.

3. They possess a strong and heavy build like gorillas, yet are remarkably agile tree climbers.

Select the answer using the code given below:

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

> **Answer: (b) 1 and 2**

Western Hoolock Gibbon (Hoolock hoolock)

- The **hoolock gibbon** is the **only ape found in India**. Two species are recognised: the **western hoolock gibbon (Hoolock hoolock)**, found in the North-Eastern States **south of the Brahmaputra and east of the Dibang**, and the **eastern hoolock gibbon (Hoolock leuconedys)**, found in parts of **Arunachal Pradesh** (and Myanmar, China).
- **Conservation status**: western hoolock gibbon: **IUCN Endangered**; listed in **Schedule I of the Wildlife (Protection) Act, 1972**. The eastern hoolock gibbon is **Vulnerable** on the IUCN list.



Range of the western and eastern hoolock gibbons in North-East India

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- **Statement 1 is correct**: the **Hollongapar Gibbon Sanctuary** (Jorhat district, **Assam**) is named after the gibbon and has the largest population of the species in India. It is an isolated patch of semi-evergreen forest, surrounded by tea gardens.
- **Statement 2 is correct**: gibbons move by **brachiation**, swinging arm over arm through the canopy with **long arms, hook-shaped hands and ball-and-socket wrist joints**. They can cover up to about **10 m in a single swing**, and rarely come to the ground.
- **Statement 3 is incorrect**: gibbons are **'lesser apes'**, small and **light-bodied**, weighing only about **6 to 9 kg**. Their light build is what makes brachiation possible; **heavy apes like gorillas** (great apes) move mostly on the ground by knuckle-walking.
- Other features: they live in **small family groups** (a monogamous pair with offspring), are **arboreal and diurnal**, and are known for their **loud songs** (duets) at dawn. Males are black with white brows; females are buff or golden-brown.
- Threats: **habitat loss and fragmentation** (tea plantations, shifting cultivation, roads), hunting and the **lack of canopy connectivity**; canopy bridges have been tried in Hollongapar.

---

3. Which of the following best explain(s) the rationale for protecting mangrove ecosystems in the context of climate resilience?

1. Mangroves reduce tidal energy and store freshwater, making them ideal sites for paddy cultivation in saline estuarine belts.

2. Their salt-sensitive roots filter seawater, making mangroves key to converting coastal land into freshwater aquaculture zones.

3. By withstanding tidal surges and offering biomass resources, mangroves function both as natural bio-shields and livelihood bases for rural communities.

Select the answer using the code given below

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

> **Answer: (d) 3 only**

Mangroves

- Mangroves are **salt-tolerant (halophytic)** trees and shrubs of the **intertidal zone** of tropical and subtropical coasts. They have **pneumatophores** (breathing roots), **stilt or prop roots**, **salt-excreting leaves** and **vivipary** (seeds germinate on the parent tree).
- India has about **4,992 sq km** of mangroves (**India State of Forest Report 2023**), about **0.15%** of its area. **West Bengal (Sundarbans)** has the largest share, followed by **Gujarat** and the **Andaman and Nicobar Islands**.

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Mangroves and climate resilience

- **Statement 3 is correct:**
  - **Bio-shield**: their dense roots **absorb wave and tidal energy**, reducing the impact of **cyclones, storm surges and tsunamis** and preventing **coastal erosion**. During the **1999 Odisha super cyclone** and the **2004 tsunami**, villages behind mangroves suffered far less damage.
  - **Livelihoods**: mangroves are **nurseries for fish, crabs and prawns**, and provide fuelwood, fodder, honey, timber and tannins to coastal communities.
  - **Blue carbon**: mangroves store up to **four times more carbon** per hectare than most tropical forests, much of it in their soils.
- **Statement 1 is incorrect**: mangroves **reduce tidal energy**, but they grow in **saline, waterlogged** soils and do **not store freshwater**. Clearing mangroves for paddy defeats the purpose of protecting them; the rationale for protection is not paddy cultivation.
- **Statement 2 is incorrect**: mangrove roots are **salt-tolerant**, not salt-sensitive. Some species exclude salt at the root (**ultrafiltration**), but this does not turn coastal land into **freshwater aquaculture** zones. In fact, conversion of mangroves into **shrimp and fish ponds** is a major cause of mangrove loss.
- Related initiatives: **MISHTI** (Mangrove Initiative for Shoreline Habitats and Tangible Incomes, 2023) for planting mangroves along India's coast, and the **Mangrove Alliance for Climate (MAC)** launched at **COP27**, which India joined.

---

4. Which of the following statements with regard to the arrival of Amur Falcons at Doyang Lake in Nagaland each year from Mongolia is/are correct?

1. It showcases how sustained local conservation efforts can contribute to the arrival and protection of international migratory birds.

2. It reflects the global success of advanced tracking technologies that guide migratory birds back to their stopover sites.

3. It confirms that Amur Falcons have adapted to permanent residency in India due to favourable habitat changes.

Select the answer using the code given below:

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

> **Answer: (a) 1 only**

Amur Falcon (Falco amurensis)

- A small raptor that breeds in **south-eastern Siberia, Mongolia and northern China** (the **Amur river** region). It makes one of the **longest migrations of any raptor**, about **22,000 km** a year, to its wintering grounds in **southern Africa** (South Africa, Botswana, Zambia, Mozambique).

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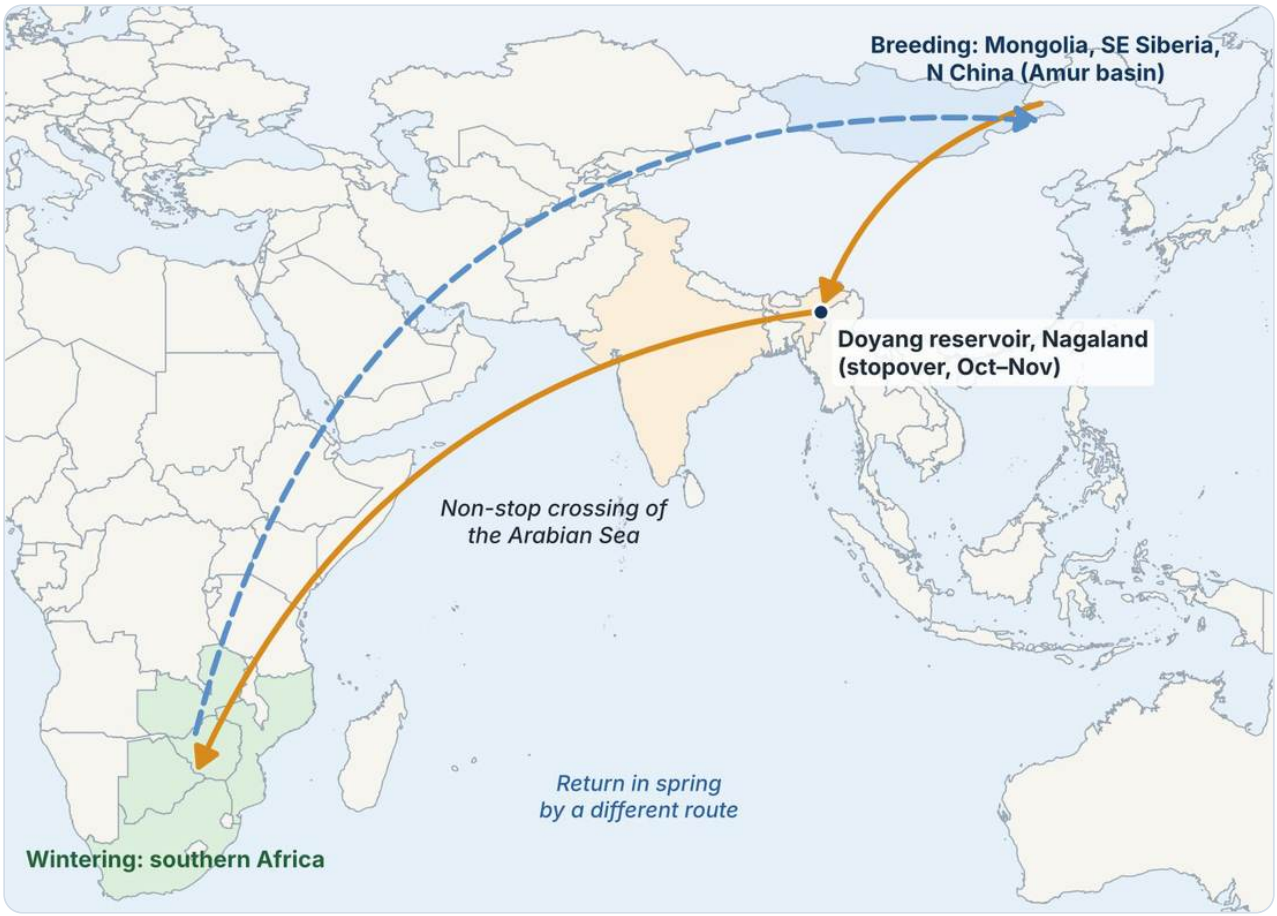
- In **October-November** lakhs of falcons stop over in **Nagaland** (especially around the **Doyang reservoir, Wokha district**), Manipur and Assam to feed on **termites and dragonflies** before crossing the **Arabian Sea** to Africa. The dragonflies also migrate across the sea, which makes the crossing possible.
- IUCN status: **Least Concern**. It is protected under **Schedule I of the Wildlife (Protection) Act, 1972** and the **Convention on Migratory Species (CMS)**.



Migration of the Amur Falcon through Nagaland

From massacre to protection

- In **2012**, conservation groups documented the **killing of an estimated 1,20,000 to 1,40,000 falcons** in a season around Doyang for meat. Following this, **community-led conservation** began: villages such as **Pangti** passed resolutions banning hunting, eco-clubs and awareness campaigns were run, and former hunters became **protectors and guides**.
- Pangti is now called the '**Falcon Capital of the World**'; Nagaland holds an annual **Amur Falcon Festival**. Hence **statement 1 is correct**.
- **Statement 2 is incorrect**: satellite tags (fitted on falcons named Naga, Wokha, Pangti, Chiuchiu and others by the Wildlife Institute of India and the Nagaland Forest Department) **only track** the birds' routes for research. Tracking technology does **not guide** birds; they navigate by instinct, the Earth's magnetic field, the sun and stars.
- **Statement 3 is incorrect**: Amur Falcons are **passage migrants** in India, staying only a few weeks to refuel. They have **not become resident**; they continue to Africa and return to breed in East Asia.

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5. With reference to Madhav National Park, which of the following statements is/are correct?

1. It was declared a Tiger Reserve in India in 2025.

2. Sakhya Sagar, which is designated as a Ramsar Site, is situated within this National Park.

3. Its area is shared between Madhya Pradesh and Rajasthan.

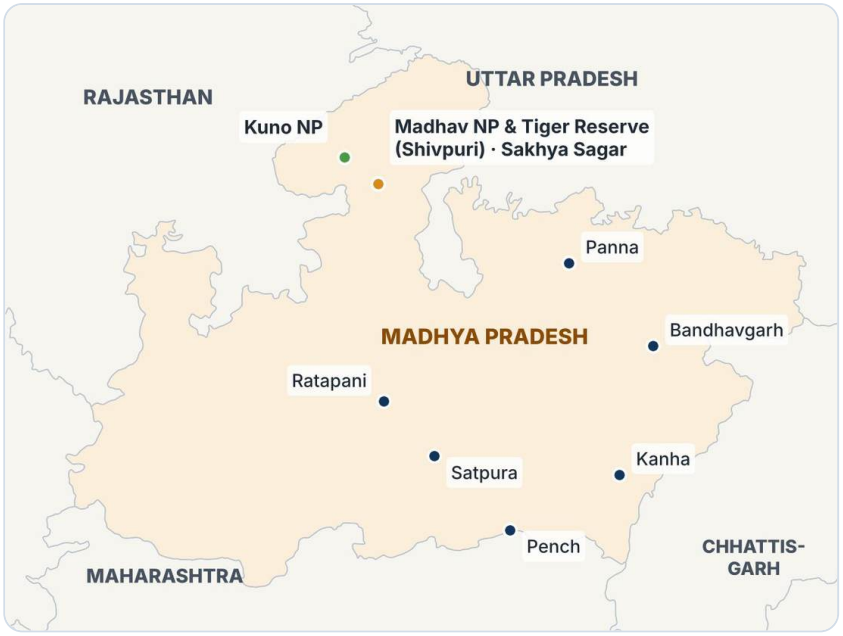
Select the answer using the code given below:

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

Answer: (b) 1 and 2

Madhav National Park

- Located in **Shivpuri district, Madhya Pradesh**, in the **Vindhyan hills** (northern edge of the Central Highlands), on the **Agra-Mumbai road**. It was the **summer hunting ground of the Scindia rulers** of Gwalior and of the Mughal emperors; it became a **national park in 1959**.
- **Statement 1 is correct**: in **March 2025** Madhav National Park was notified as **India's 58th Tiger Reserve** and the **9th in Madhya Pradesh**. Tigers were reintroduced here in **2023** under a **tiger reintroduction project**.



Madhav National Park and the other tiger reserves of Madhya Pradesh

- **Statement 2 is correct**: **Sakhya Sagar**, a reservoir created on the **Manier river** in **1918**, lies **within the park** and was designated a **Ramsar Site in August 2022**. It supports **mugger crocodiles**, turtles, and resident and migratory birds. Nearby **Madhav Sagar** is another reservoir in the park.
- **Statement 3 is incorrect**: the park lies **entirely in Madhya Pradesh**. It is close to the Rajasthan border, but its area is not shared with Rajasthan. (**Kuno National Park**, the cheetah site, is nearby in Sheopur district.)
- Vegetation: **northern tropical dry deciduous mixed forests** and **dry thorn forests**; fauna includes nilgai, chinkara, chowsingha, sambar, chital, leopard and sloth bear.

Madhya Pradesh tiger reserves (9)	Notes
Kanha, Pench, Bandhavgarh, Panna, Satpura	Older reserves
Sanjay-Dubri, Veerangana Durgavati (Nauradehi)	Added 2008 and 2023

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Ratapani (December 2024), Madhav (March 2025)	Newest: Madhav is India's 58th

6. Consider the following statements about Rhynchostylis retusa (Foxtail orchid):

1. It is an epiphytic orchid.

2. The species is endemic to North-east India.

3. It is the State flower of Arunachal Pradesh and Assam.

Which of the statements given above is/are correct?

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

> **Answer: (b) 1 and 3**

Foxtail Orchid (Rhynchostylis retusa)

- **Statement 1 is correct**: it is an **epiphytic orchid**, growing on the trunks and branches of trees (not as a parasite; it takes only support). It has thick **velamen-covered aerial roots** that absorb moisture from the air.
- It bears **long, dense, drooping racemes** of small white flowers spotted with pink or purple, which look like a **fox's tail**, hence the name. It flowers in the **pre-monsoon season (April-June)** and is fragrant.
- **Statement 2 is incorrect**: the species is **not endemic** to North-East India. It is widely distributed across **tropical Asia**: the **Himalayan foothills, the Western and Eastern Ghats, Sri Lanka, Myanmar, Thailand, Indo-China, southern China, Malaysia, Indonesia and the Philippines**.
- **Statement 3 is correct**: it is the **State flower of Assam**, where it is called **'Kopou phul'** and is worn by women in the **Bihu** dance, and of **Arunachal Pradesh**.
- It is used in traditional medicine (for wounds and rheumatism). Like all orchids, it is listed in **CITES Appendix II**, which regulates international trade in wild-collected plants.

7. At the United Nations Ocean Conference (UNOC) held in June, 2025 in France, the Food and Agricultural Organization (FAO) of the United Nations demonstrated its leading voice on marine and ocean issues, especially on sustainable fisheries and aquaculture for resilient "Blue Transformation".

Which of the following combinations about the "Four Betters" proposed by FAO for "Blue Transformation" is correct?

(a) Better production, better nutrition, better environment and better ocean
(b) Better production, better nutrition, better environment and better life

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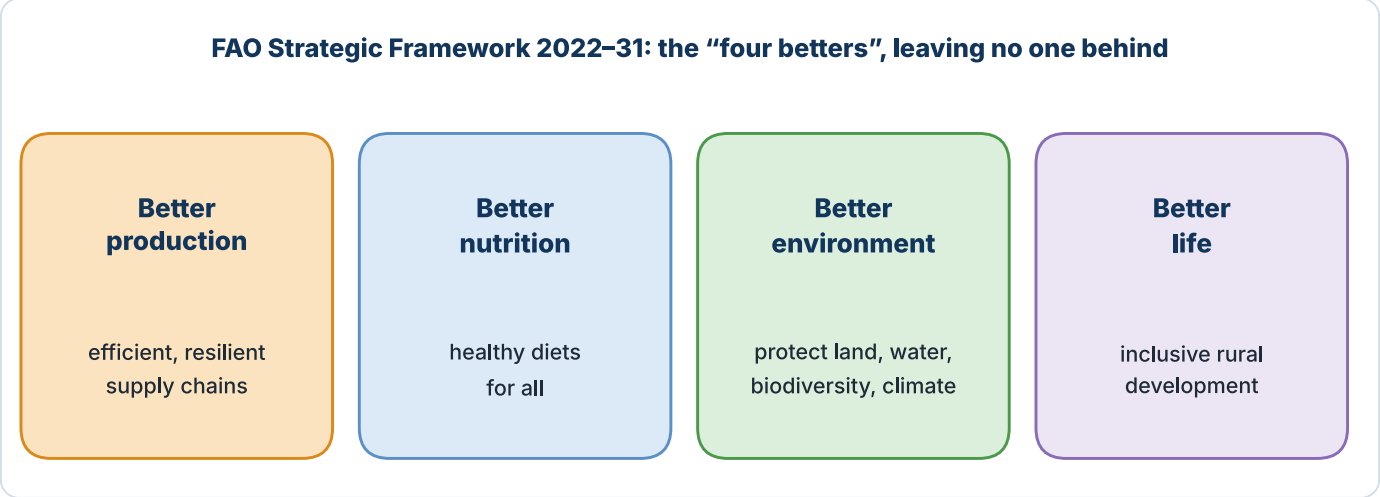
(c) Better coral reefs, better nutrition, better environment and better life
(d) Better estuaries, better nutrition, better environment and better mangrove vegetation

Answer: (b) Better production, better nutrition, better environment and better life

The FAO's 'Four Betters'



The FAO's four betters

- The **FAO Strategic Framework 2022-2031** aims to support the **2030 Agenda** through the transformation to **more efficient, inclusive, resilient and sustainable agrifood systems** for the **four betters**: **better production, better nutrition, a better environment and a better life**, **leaving no one behind**.
- The four betters reflect the **economic, social and environmental** dimensions of agrifood systems and are linked to **SDG 1 (No Poverty), SDG 2 (Zero Hunger) and SDG 10 (Reduced Inequalities)**, and to the broader SDGs.

Blue Transformation

- **Blue Transformation** is the FAO's **roadmap (2022-2030)** for **aquatic food systems**, approved by the **Committee on Fisheries (COFI)**. Its three global objectives:
  - **Sustainable aquaculture expansion and intensification**, to meet the growing demand for aquatic food.
  - **Effective management of all fisheries**, to keep stocks healthy and livelihoods secure.
  - **Upgraded value chains**, to ensure the social, economic and environmental viability of aquatic food systems.
- The **third UN Ocean Conference (UNOC3)** was held in **Nice, France, in June 2025**, co-hosted by **France and Costa Rica**, under the theme of accelerating action for **SDG 14 (Life below Water)**. It adopted the **'Our Ocean, Our Future: United for Urgent Action'** declaration (the **Nice Ocean Action Plan**).
- Options (a), (c) and (d) replace 'better life' or 'better production' with ecosystem names (ocean, coral reefs, estuaries, mangroves), which are **not** part of the four betters.

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8. Which one of the following is the first Plan Vivo certified Reducing Emissions from Deforestation and Forest Degradation (REDD+) project in India?

(a) Uttarakhand REDD+ project
(b) ICFRE-ICIMOD Transboundary REDD+ project in North-Eastern Himalayas
(c) Khasi Hills Community REDD+ project
(d) Sikkim Mamley Kamrang Community REDD+ project

> **Answer: (c) Khasi Hills Community REDD+ project**

REDD+

- **REDD+** is a framework under the **UNFCCC** (agreed in the **Warsaw Framework, COP19, 2013**, and recognised in **Article 5 of the Paris Agreement**) that rewards developing countries for **reducing emissions from deforestation and forest degradation**, plus **conservation, sustainable management of forests and enhancement of forest carbon stocks** (the '+').
- India prepared a **National REDD+ Strategy (2018)**; the **Indian Council of Forestry Research and Education (ICFRE)** is the nodal body for its technical work.

Khasi Hills Community REDD+ Project (Meghalaya)

- Started in **2011** in the **East Khasi Hills** with the **Ka Synjuk ki Hima Arliang Wah Umiam Mawphlang Welfare Society**, a federation of traditional Khasi kingdoms (**Himas**), with support from the **Community Forestry International** and others.
- In **2016** it became **India's first community-based REDD+ project certified under the Plan Vivo Standard**, which allows it to **sell carbon credits** (Plan Vivo Certificates) in the **voluntary carbon market**.
- It works through **community forest management**: protecting and regenerating forests, **controlling fire and grazing**, promoting alternative livelihoods (such as cookstoves, poultry and piggery), and sharing carbon revenue with village communities.
- **Plan Vivo** is a **voluntary carbon standard** (run by the Plan Vivo Foundation, Scotland) for **community-led** land use and forestry projects, with a strong emphasis on **livelihoods and benefit sharing**.

Why the other options are incorrect

- **ICFRE-ICIMOD** (option b) worked on **REDD+ capacity building** and a **pilot in the North-Eastern Himalaya (Mizoram)**, not a Plan Vivo certified project. Options (a) and (d) are not India's first Plan Vivo certified REDD+ project.

9. Which of the following statements in relation to NIRANTAR (National Institute for Research and Application of Natural Resources to Transform, Adapt and Build Resilience), a platform of institutions under the Ministry of Environment, Forest and Climate Change, is/are correct?

1. Ecosystem Survey and Analysis is a vertical under this platform, the lead institute of which is Botanical Survey of India, Kolkata.

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2. Research and Management of Ecosystem Service is a vertical under this platform, the lead institute of which is Central Zoo Authority, New Delhi.

3. Capacity Development Support is a vertical under this platform, the lead institute of which is Indian Institute of Forest Management, Bhopal.

Select the answer using the code given below :

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

Answer: (b) 1 and 3 only

NIRANTAR

- **NIRANTAR** is a **coordination platform** of the **research, survey and training institutions** of the **Ministry of Environment, Forest and Climate Change (MoEFCC)**. It brings them under **thematic verticals**, each led by one institution, to avoid duplication, pool expertise and give science-based support to policy. Its portal is run by the **ICFRE**.
- Its verticals include **Ecosystem Survey and Analysis**, **Research and Management of Ecosystem Service**, **Capacity Development Support** and **Climate Change Support**.

Evaluating the statements

- **Statement 1 is correct**: the **Ecosystem Survey and Analysis** vertical is led by the **Botanical Survey of India (BSI), Kolkata**. Its member institutes are the **Forest Survey of India, BSI, Zoological Survey of India, National Museum of Natural History** and the **National Biodiversity Authority**. Its mandate is survey, assessment and analytics on forests, flora, fauna and other natural resources.
- **Statement 2 is incorrect**: the **Research and Management of Ecosystem Service** vertical is led by the **Indian Council of Forestry Research and Education (ICFRE), Dehradun**, not the Central Zoo Authority. Its mandate is research for long-term ecological stability and sustainable management of ecosystem services.
- **Statement 3 is correct**: the **Capacity Development Support** vertical is led by the **Indian Institute of Forest Management (IIFM), Bhopal**, which works on research, education and training for forest and natural-resource managers.

Vertical	Lead institute	Statement
Ecosystem Survey and Analysis	Botanical Survey of India, Kolkata	1: Correct
Research and Management of Ecosystem Service	ICFRE, Dehradun	2: Incorrect
Capacity Development Support	IIFM, Bhopal	3: Correct

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UNIT 02 | 5 CHAPTERS

Prelims 2017–2021

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PRELIMS RESEARCH | GS PAPER 1 | ENVIRONMENT

UPSC Prelims Research: Environment 2018

All 10 Environment questions of UPSC Civil Services Preliminary Examination 2018, General Studies Paper 1, with the correct answer and an explanation of every option.

Q. In which one of the following States is Pakhui Wildlife Sanctuary located?

(a) Arunachal Pradesh

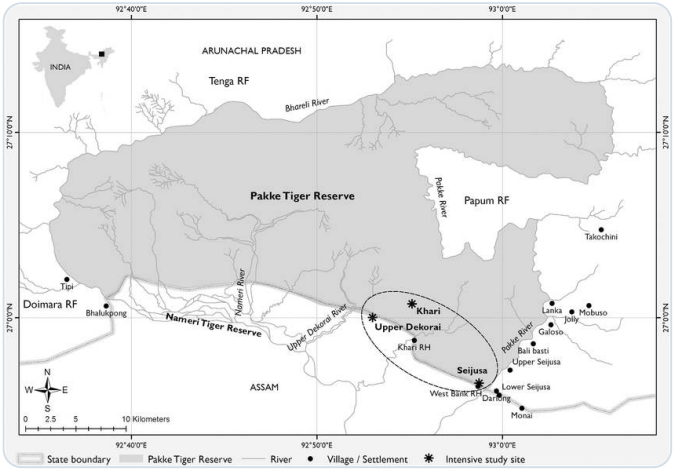
(b) Manipur

(c) Meghalaya

(d) Nagaland

Answer: (a) Arunachal Pradesh

Notes:



- **Pakke Wildlife Sanctuary**, also known as **Pakhui Wildlife Sanctuary**, is in the **East Kameng district of Arunachal Pradesh in Northeast India.**
  - It is bounded by **Bhareli or Kameng River in the west and north**, and by **Pakke River in the east.**
  - It is surrounded by contiguous forests on most sides.
  - To the **east lies Papum Reserve Forest**,
  - Towards the **south and south-east, the sanctuary adjoins reserve forests and Assam's Nameri National Park**,
  - To the **west, it is bounded by Doimara Reserve Forest** and **Eaglenest Wildlife Sanctuary;**
  - and to the **north by Shergaon Forest Division**.
- **Keibul-Lamjao (Loktak Lake) National Park** is located in the state of Manipur.

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- **Siju Bird Sanctuary, Balpakram National Park and Nokrek Biosphere Reserve** are located in Meghalaya.
- **Fakim Wildlife Sanctuary, Rangapahar Wildlife Sanctuary, Singphan Wildlife Sanctuary** are located in Nagaland.

Q. Consider the following statements:

1. The definition of "Critical Wildlife Habitat" is incorporated in the Forest Rights Act, 2006.
2. For the first time in India, Baigas have been given Habitat Rights.
3. Union Ministry of Environment, Forest and Climate Change officially decides and declares Habitat Rights for Primitive and Vulnerable Tribal Groups in **any part of India**.

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

> **Answer: (a) 1 and 2 only**

Notes:

- The definition of '**critical wildlife habitat' is incorporated only in the Scheduled Tribes and Other Traditional Forest Dwellers (Recognition of Forest Rights) Act, 2006.**
- Union **Ministry of Tribal Affairs is the nodal ministry** and officially decides and declares Habitat Rights for Primitive and Vulnerable Tribal Groups in any part of India.
- For the first time **habitat rights have been given to Baigas under the Forest Rights Act of 2006.**
  - Baiga tribals become India's first community to get habitat rights.
- **Critical wildlife habitats (CWH) are defined under the Forest Rights Act, 2006**, as the "**areas of national parks and sanctuaries where it has been specifically and clearly established, case by case, on the basis of scientific and objective criteria, that such areas are required to be kept as inviolate for the purposes of wildlife conservation."**

Q. Which of the following is/are the possible consequence/s of heavy sand mining in riverbeds?

1. Decreased salinity in the river
2. Pollution of groundwater
3. Lowering of the water-table

Select the correct answer using the code given below.

(a) 1 only
(b) 2 and 3 only

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(c) 1 and 3 only
(d) 1, 2 and 3

Answer: (b) 2 and 3 only

Notes:

- Heavy sand mining in riverbeds leads to the **increase of velocity of the flowing water, thereby eventually erode the river banks.**
- Sand aquifer helps in recharging the water table; **its progressive depletion in the river is accompanied by the lowering of the water table in the nearby areas.**
- As the **turbidity increases at the mining site, saline water intrusion takes along the coastal aquifers thereby polluting the ground water.**
- It **also leads to an imminent danger of saline water ingress into fresh water.**

Impact of Sand Mining on the Environment

- **Excessive sand mining can alter the river bed, force the river to change course, erode banks, and cause flooding.**
- **It causes river and estuary deepening, as well as the expansion of river mouths and coastal inlets.**
- **It may also result in saline water intrusion from the nearby sea.**
- Instream mining can have far-reaching consequences that extend beyond the immediate mine sites.
- Every year, many hectares of fertile streamside land are lost, as well as valuable timber resources and wildlife habitats in riparian areas. Degraded stream habitats reduce fisheries productivity, biodiversity, and recreational potential.
- Sand mining is a direct cause of erosion and has an impact on local wildlife.
- Various animals rely on sandy beaches for nesting clutches, and mining has nearly wiped out gharials (a crocodile species) in India.
- **Sand mining in Chambal has had an impact on the population of Gharials**, a critically endangered species (a National Chambal Sanctuary has been established for their conservation).
- **Mining harms wildlife by removing basking and egg-laying habitat.**
- Turbidity in the water is caused by the disturbance of underwater and coastal sand, which is harmful to organisms that require sunlight, such as coral.
- **It can also devastate fisheries, causing financial hardship for the operators.**
- As the amount of sand reaching the oceans changes, rivers are unable to replenish the sand on beaches and in deltas.
- **Increased riverbed and bank erosion raises the concentration of suspended solids in the water both at the excavation site and downstream. Suspended solids can harm water users and aquatic ecosystems.**

Q. Consider the following statements:

1. Most of the world's coral reefs are in tropical waters.

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2. More than one-third of the world's coral reefs are located in the territories of Australia, Indonesia and Philippines.
3. Coral reefs host far more number of animal phyla **than** those hosted by tropical rainforests.

Which of the statements given above is/are correct?

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

Answer: (d) 1, 2 and 3

Notes:

- **Most of the world's coral reefs are located within the tropical zone between 30° N and 30° S latitude**.
- Conditions for the growth of **Coral Reefs:**
  - It required a preferred temperature range of approximately **22° to 30° C.**
  - For the growth of coral, the **depth of the water should not exceed 200m.**
  - **Corals can live only in saline waters, and the average salinity should be between 27 to 40%** for their proper growth.
- **More than one-third of the world's coral reefs** are located in territories of **Australia, Indonesia, and the Philippines**.
- The coral reefs are most commonly grown in the **Pacific and the Indian Ocean**, due to their shallow, warm, and clean water.
- Some scientists estimate that more than **25,000 described species from thirty-two of the world's thirty-three animal phyla live in reef habitats – four times the number of animal phyla found in tropical rain forests.**

Q. "Momentum for Change: Climate Neutral Now" is an initiative launched by

(a) The Intergovernmental Panel on Climate Change

(b) The UNEP Secretariat

(c) The UNFCCC Secretariat

(d) The World Meterological Organisation

Answer: (c) The UNFCCC Secretariat

Notes:

United Nations Environment Programme

- The UNEP is a leading global environmental authority established on 5th June 1972.

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- **Functions:** It sets the global environmental agenda, promotes the sustainable development within the **United Nations** system, and serves as an authoritative advocate for global environment protection.
- **Major Reports: Emission Gap Report, Global Environment Outlook, Frontiers, Invest into Healthy Planet.**
- **Major Campaigns: Beat Pollution, UN75, World Environment Day, Wild for Life.**
- **Headquarters:** Nairobi, Kenya.

UNFCCC

- UNFCCC was signed in 1992 at the **United Nations Conference on Environment and Development also known as the Earth Summit,** the Rio Summit or the Rio Conference.
  - India is among the select few countries to have hosted the COP of all three Rio conventions on climate change (UNFCCC), biodiversity (CBD) and land **(United Nations Convention to Combat Desertification)**.
- The UNFCCC entered into force in 1994 and has been **ratified by 197 countries**.
- It is the parent treaty of the **2015 Paris Agreement**. It is also the parent treaty of the **1997 Kyoto Protocol**.
- The UNFCCC secretariat (UN Climate Change) is the United Nations entity tasked with supporting the global response to the threat of climate change. It is **located in Bonn, Germany**.
- Its objective is to achieve stabilisation of greenhouse gas concentrations in the atmosphere at a level that would prevent dangerous repercussions within a time frame so as to **allow ecosystems to adapt naturally and enable sustainable development**.
- **The UNFCCC secretariat launched its Climate Neutral Now initiative in 2015.**
- It is an initiative launched to urge individuals, companies, and governments to measure their climate footprint, reduce their greenhouse gas emissions as much as possible.
- **The secretariat in 2016 launched a new pillar under its Momentum for Change initiative focused on Climate Neutral Now, as part of larger efforts to showcase successful climate action around the world.**
- Climate neutrality is a three-step process, which requires individuals, companies, and governments to:
  - Measure their climate footprint;
  - Reduce their emissions as much as possible;
  - Offset what they cannot reduce with UN certified emission reductions.

Intergovernmental Panel on Climate Change

- It is the **international body for assessing the science related to climate change.**
- It was **set up in 1988** by the **World Meteorological Organization (WMO)** and **United Nations Environment Programme (UNEP)** to provide policymakers with regular assessments of the scientific basis of climate change, its impacts and future risks, and options for adaptation and mitigation.
- IPCC assessments **provide a scientific basis for governments at all levels to develop climate related policies,** and they underlie negotiations at the UN Climate Conference – the **United Nations Framework Convention on Climate Change (UNFCCC).**

Q. Which of the following statements best describes "carbon fertilization"?

(a) Increased **plant growth** due to increased concentration of carbon dioxide in the atmosphere.

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(b) Increased **temperature** of Earth due to increased concentration of carbon dioxide in the atmosphere.

(c) Increased **acidity of oceans** as a result of increased concentration of carbon dioxide in the atmosphere.

(d) Adaptation of **all living beings** on Earth to the climate change brought about by the increased concentration of carbon dioxide in the atmosphere.

> **Answer: (a) Increased plant growth due to increased concentration of carbon dioxide in the atmosphere.**

Notes:

- **Carbon Fertilization:**
  - It is the **artificial enrichment of the atmosphere of greenhouses with carbon dioxide**.
  - It is the phenomenon that the **increase of carbon dioxide in the atmosphere increases the rate of photosynthesis in plants.**
  - Impact of carbon fertilization:
    - **Increase in the photosynthetic rate**
    - **Increases the water use efficiency**
    - Plants distribute a **greater proportion of photosynthate to roots** under a high concentration of atmospheric carbon dioxide.
    - The r**eproductive biomass growth, as well as vegetative biomass growth**, is usually increased by elevated carbon dioxide.

Q. With reference to the circumstances in Indian agriculture, the concept of "Conservation Agriculture" assume significance. Which of the following fall under the Conservation Agriculture?

1. Avoiding monoculture practices
2. Adopting minimum tillage
3. Avoiding the cultivation of plantation crops
4. Using crop residues to cover soil surface
5. Adopting spatial and temporal crop sequencing/crop rotations

Select the correct answer using the code given below:

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

> **Answer: (c) 2, 4 and 5**

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Notes:

- According to Food and Agricultural Organization of the United Nations, Conservation agriculture (CA) can be defined as "**a concept for resource-saving agricultural crop production that strives to achieve acceptable profits together with high and sustained production levels while concurrently conserving the environment**"
- Conservation agriculture systems utilize soils for the production of crops with the aim of reducing excessive mixing of the soil and maintaining crop residues on the soil surface in order to **minimize damage to the environment.**
- **The 3 principles of CA are:**
  - **minimun tillage and soil disturbance**
  - **permanent soil cover with crop residues and live mulches**
  - **crop rotation and intercropping**

Q. Which of the following leaf modifications occur (s) in the desert areas to inhibit water loss?

1. Hard and waxy leaves
2. Tiny leaves
3. Thorns instead of leaves

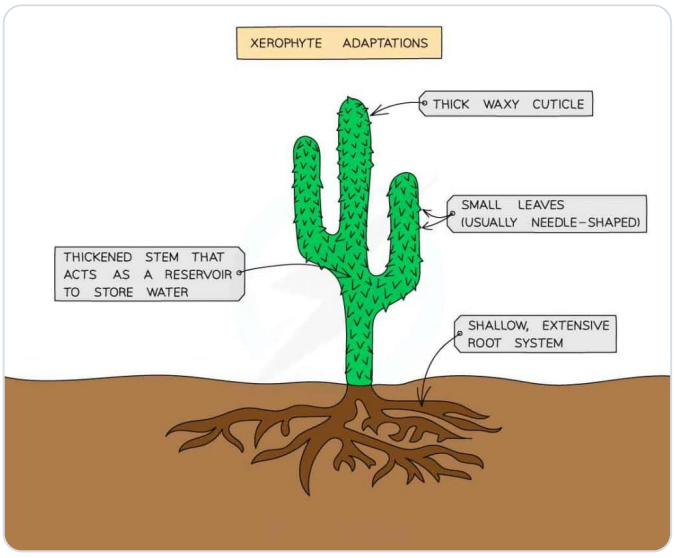
Select the correct answer using the code given below:

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

Answer: (d) 1, 2 and 3

Notes:

- There are **some plants that grow in extremely dry conditions throughout the year**.
- Structural adaptations are important to plant survival in the desert.
- For this purpose, **they undergo some morphological adaptations** in the xerophyte stem.
- These are as follows:
  - The **stems of woody xerophytes** are comparatively **stunted, hard, and rigid**. They may be covered with thick bark. e.g. **Acacia arabica**.



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- **Wax coatings on leaves prevent water loss** through evaporation because the loss of water from both the surface and the inside of leaves occurs in the hot desert.
- The stem is covered by **hairs or waxy coating**.
- **The main stem and branches** may **occur thick, fleshy, flattened, and have a green modified structure called phylloclade**.
- Leaves are also **smaller on desert plants**, further **reducing the possibility of water loss.**
- Phylloclades are found in succulent xerophytes. They **do photosynthesis**. e.g. **Opuntia, Cacti** etc.
- Usually, in phylloclade bearing xerophytes, **leaves are modified into spines** that are known **to check the rate of transpiration**.
- They have **hard, thick coatings** and some are **covered in prickly spines** to prevent water loss.
- It is to **protect them from animals** who might try to chew through them to get to their moisture.
- The stem may occur as an **underground modified structure** to store food and takes part in reproduction. **e.g. Saccharum.**

Q. How is the National Green Tribunal (NGT) different from the Central Pollution Control Board (CPCB)?

1. The NGT has been established by an Act **whereas** the CPCB has been created by an executive order of the Government.
2. The NGT provides environmental justice and helps reduce the burden of litigation in the higher courts whereas the CPCB promotes cleanliness of streams and wells, and aims to improve the quality of air in the country.

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

> **Answer: (b) 2 only**

Notes:

- The **National Green Tribunal (NGT)** is a **statutory body** that was **established in 2010** by the **National Green Tribunal Act**.
  - It was set up to handle cases and speed up the cases related to environmental issues.
  - The Tribunal **shall not be bound by the procedure** laid down **under the Code of Civil Procedure, 1908**, but shall be **guided by principles of natural justice**.
  - **New Delhi** is the **Principal Place of Sitting** of the Tribunal and **Bhopal, Pune, Kolkata,** and **Chennai** shall be the **other 4 places** of sitting of the Tribunal.

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- The **Central Pollution Control Board (CPCB)**, the **statutory organization**, was constituted in **September 1974** under the **Water (Prevention and Control of Pollution) Act, 1974**.
  - Further, CPCB was entrusted with the **powers and functions** under the **Air (Prevention and Control of Pollution) Act, 1981**.
  - **Principal Functions** of the CPCB, as spelled out in the **Water (Prevention and Control of Pollution) Act, 1974**, and the **Air (Prevention and Control of Pollution) Act, 1981**,
    - to promote cleanliness of streams and wells in different areas of the States by prevention, control and abatement of water pollution, and
    - to improve the quality of air and to prevent, control or abate air pollution in the country.

Q. Which of the following has/have shrunk immensely/dried up in the recent past due to human activities?

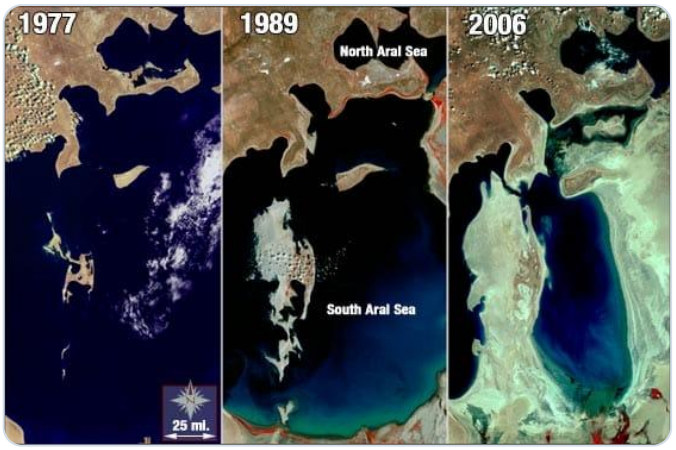
1. Aral Sea
2. Black Sea
3. Lake Baikal

Select the correct answer using the code given below:

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

> **Answer: (a) 1 only**

Notes:



- The Aral Sea is a **saline lake** located in **Central Asia** that was once the **world's fourth-largest salt lake**.
- In the 1960s the Aral Sea, which was the drainage basin for Kyrgyzstan, Turkmenistan, Tajikistan, Uzbekistan, Pakistan, Afghanistan, and Kazakhstan, began to shrink as the Soviet Union began to divert water for agricultural purposes.
- As per **NASA**, over the **last 50 years**, the **Aral Sea has shrunk by about 75%** of its original size mainly because of **water diversion for agricultural usages in surrounding areas**.
- The **depth of the Aral Sea** has also **decreased** from **68 meters in the 1960s** to at **less than 10 meters** in the present day.

Aral Sea

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