

**Increasing greenhouse gas emissions may threaten satellites:**

- Increasing levels of human-caused GHGs emissions in atmosphere may reduce total number of satellites that can safely orbit Earth by up to 66% of current carrying capacity by end of century, under a high-emissions scenario.
- **An increasing amount of greenhouse gases in atmosphere can shrink Earth's upper atmosphere** - consisting of mesosphere (50-85 km) and thermosphere (85-600 km) - as incoming infrared radiation is reflected into space, **resulting in a cooling and contracting effect.**
- **This contraction reduces density of Earth's orbital space,** lengthening amount of time space debris remains in orbit as drag with atmosphere is reduced.

**Melioidosis:**

- A recent study has revealed that melioidosis disease in Odisha has clear seasonality, with infections peaking during and after monsoon season.
- It is also called **Whitmore's disease.**
- **Bacterial infectious disease** caused by **Burkholderia pseudomallei.**
- This bacteria lives in **surface water (streams, rivers, lakes) and soil, mostly in tropical or subtropical areas.**
- **Endemic in Southeast Asia, northern Australia, much of Indian subcontinent,** southern China, Hong Kong & Taiwan.
- It has high case fatality rate (CFR) ranging from 16% to 50%.
- Both humans and animals can get melioidosis, but **people can't get it from animals.**
- It's spread to people and animals through **direct contact with soil, air, or water contaminated by the bacteria.**
- **Cases may increase after hurricanes, heavy rain,** because bacteria rise to surface of soil.
- It usually affects adults 40 to 60 years old with certain underlying conditions.
- **Children under 15 rarely get melioidosis.**
- **Symptoms:** localised infection (such as cutaneous abscess), pneumonia, meningoenephalitis, sepsis, or chronic suppurative infection.
- It can be **treated with antibiotics.**

**Long-billed Vulture:**

- **Old World vulture native to Asian region** (India, Pakistan, and Nepal).
- Medium-sized and bulky scavenger **feeding mostly on the carcasses of dead animals.**
- **Females are smaller than males.**
- **Habitat:** Usually found in savannas and other open habitats around villages, cities, and near cultivated areas.
- **IUCN Red List: Critically Endangered**
- **Threat:** 97-99% population decrease due to poisoning caused by the veterinary drug diclofenac.
- **Major habitat in India: Moyar River Valley** in Mudumalai Tiger Reserve (Nilgiris District of Tamil Nadu)

**How long does it take for bees to return to restored grasslands?**

- Recovered grasslands need more than 75 years of continuous management to regain their biodiversity because specialised pollinators are slow to return.
- **It takes 75 years of continuous management for plant diversity in recovered grasslands** to finally reach levels comparable to ancient grasslands.

- What drives this lag is not a lower diversity of pollinators in itself, it is the identity of the pollinators.
- Study therefore shows importance of considering pollinator communities for efforts targeting conservation of threatened grassland plants.

**Sanaa and Saada provinces of Yemen:**

- They are the **strongholds of Houthi rebels in Yemen.**



**Who are the Houthis?**

- They are **Zaydi Shias.**
- **Zayadism is a sub-sect of Shia Islam** which believes in following lineage of Prophet Muhammad's family as political leader of state.
- They control **Yemen's capital Sanaa.**
- **Iran, Shia-majority country, is believed to back Houthis,** while its regional rival, Sunni-majority Saudi Arabia (along with Western allies like US) backs Yemen government.

**Starlink:**

- It is a **low-earth orbit constellation of over 7,000 satellites of SpaceX company** that provide internet access to users with ground terminals.
- It is already selling in around 60 countries.
- Service **offers speeds of around 100 megabits per second,** comparable with many home broadband connections.
- **Starlink satellite has a five-year lifespan.**
- Among its competitors are **OneWeb satellite constellation (UK-based OneWeb Group),** Chinese national satellite internet project, and **Amazon's Kuiper Systems.**

**Birefringence:**

- When light passes through a glass prism from air, its path bends due to a property of the glass called **refraction.**
- Amount of bending **depends on material's refractive index.** It is calculated as **ratio of speed of light in vacuum to speed of light in material.**
- **Some materials have more than one refractive index** i.e. they slow passage of light to different degree in two different directions. Such materials are **said to be birefringent.**
- They occur **naturally (mica and quartz)** as well as can be **engineered in lab (barium borate and lithium niobate).**
- **Certain materials' birefringence can also be induced or modified by physically stressing them or exposing them to electric or magnetic fields.**
- **Birefringence arises because material has different crystal structures in different directions, i.e. they are anisotropic.**
- Which ray of light is bent in which direction depends on direction in which it is moving and how it is polarised.

- Polarisation refers to the direction of the electric field.
- **Birefringent materials are used in LCD screens, medical microscopes, optical switches, waveplates, frequency converters, and high-power lasers.**

**Air pollution will lower India's solar generation capacity - study:**

- **Solar cells perform best under bright sunlight.**
- **They also need lower ambient temperature and airflow over them for cooling.** Any imbalance in these factors lowers solar cell performance.
- Researchers have found that solar radiation was main factor affecting solar-cell efficiency, followed by temperature.
- **India has 300 sunny days a year, but their quality is declining due to air pollution.**
- The research concluded that by mid-century, efficiency of solar panels will drop by 2.3% owing to pollution.

**How is a heatwave declared in India?**

- According to IMD, heatwave is declared **when "maximum temperature of a station reaches at least 40 degree C or more for plains & at least 30 degree C or more for hilly regions."**
- **Based on departure from normal temperature, a heatwave is when departure is 4.5 degree C to 6.4 degree C, and a severe heatwave is declared when departure is more than 6.4 degree C.**
- **Based on actual maximum temperature, heatwave exists when maximum temperature is greater than 45 degree C, & severe heatwave when temperature is over 47 degree C.**
- **In coastal areas, if maximum temperature departure is 4.5 degree C or more from normal and actual maximum temperature is 37 degree C or more, heatwave can be declared.**

**menhirs:**

- **Mudumal megalithic menhirs in Telangana's Narayanpet district** will soon be second UNESCO World Heritage Site in state, after being one of six Indian sites to be added to tentative list by World Heritage Centre in 2025.

**What are menhirs?**

- **A menhir is a standing or an upright stone, which is usually tapered at the top.**
- **It is man-made, in that it is sculpted and placed by humans, and usually quite large** - largest surviving menhir, the Grand Menhir Brisé or Great Broken Menhir in Brittany, France, once stood at 20.6 m tall.
- Term 'menhir' is derived from Brittonic "*maen*" meaning "stone", and "*hîr*" meaning "long", and entered archaeological lexicon in late 18th century.
- While exact purpose of many megalithic sites is debated, they likely served ceremonial functions. **Some were markers of graves, while others might have served some astronomical purposes.**
- **Mudumal site has been described as a "megalithic astronomical observatory"** by UNESCO dossier.

**Undocking:**

- Nearly two months after ISRO successfully docked two satellites in space, it carried out an undocking procedure in March 2025. This **makes India fourth country - after US, Russia & China - to boast docking-undocking capabilities.**

- Space docking is essentially a process by which two fast-moving spacecraft are put into same orbit, progressively brought closer, and finally joined together.
- **To demonstrate this capability, ISRO launched the experimental Spadex mission on December 30, 2024.**
- This comprised launching **two 220-kg satellites — SDX01 (Chaser) and SDX02 (Target) — in a 470 km circular orbit,** with a small relative velocity between two.
- **From an initial distance of 20 km in space, these two were progressively brought together and then joined using their extended locking mechanism.**
- **For the mission, ISRO developed its own docking system on the lines of one used at International Space Station. Like ISS system, ISRO's is androgynous — meaning the systems on both the Chaser and Target satellites are identical.** But it has only two motors, compared to the 24 used in the International Docking System Standard.
- **After docking, ISRO scientists demonstrated power sharing capabilities between the two satellites and were able to command it as a single composite structure.**
- Undocking manoeuvre was carried out after two months following extensive on-ground simulations. It went off without a hitch.

**Pig butchering scam:**

- **Indian government brought home 549 citizens who had been deceived with fake job offers and forced into cybercrime activities in scam centres operating in Myanmar, Thailand, Cambodia, and Laos.**
- **Manner in which people are lured into doing such work is described as "Pig butchering scams".**
- **Scammers approach them and make enticing offers – of a job, a romantic relationship, or extraordinary amounts of money to be made through cryptocurrency or other investments.**
- **Initially, offer seems real and some returns are given in case of monetary scams.** This builds trust but eventually, scammer asks victim to click on malicious links or record objectionable photos or videos that are later used to blackmail them.

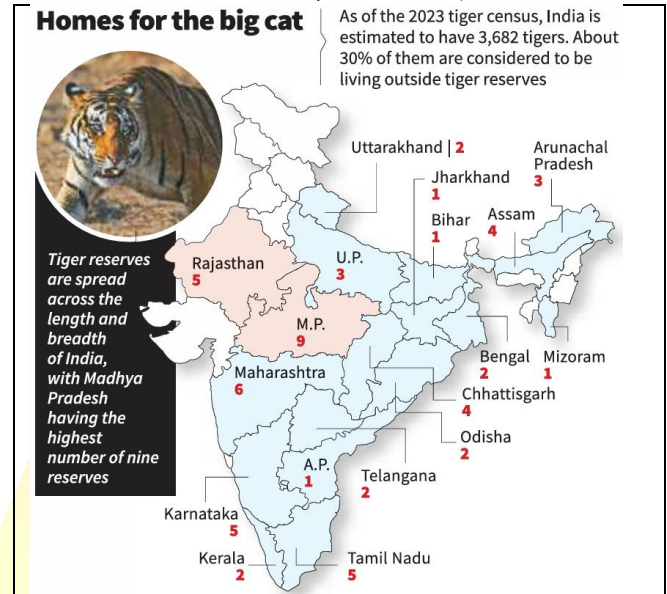
**Why Byrnihat on Assam-Meghalaya border has 'world's worst air'?**

- **According to World Air Quality Report for 2024 published by IQAir, a Swiss company that tracks global air quality, Byrnihat on Meghalaya-Assam border is "most polluted city in the world".**
- **Byrnihat is located around 20 km from Guwahati and 65 km from Shillong, in Meghalaya's Ri-Bhoi district, where the hills of Meghalaya descend into Guwahati.**
- **Residential town is in Meghalaya, and industrial units surrounding it are in both Meghalaya and Assam.**
- **Industries:** production of coke (fuel), cement, ferro alloys, and steel, and in distillation and brickmaking.
- They mushroomed in area **because of proximity to coal reserves in Meghalaya and large urban centre of Guwahati, as well as supply of water from Umtru river.**
- Material is loaded and unloaded from **heavy diesel vehicles, which do not comply with emission norms.**
- **Unpaved roads** in area aggravated **road dust.**
- Experts have also pointed to **area's "bowl-like" topography.** Surrounding hills inhibit dispersal of pollutants in air.

**National Board for Wildlife:**

- More than 10 years after assuming office, Prime Minister chaired his first-ever meeting of the National Board for Wildlife (NBWL), on World Wildlife Day on March 3.
- In meeting held at Gujarat's Gir National Park, NBWL reviewed many flagship wildlife conservation programmes.
- New conservation initiatives for gharials and the Great Indian Bustard were announced, along with expanding Project Cheetah and Project Lion.
- National Board for Wildlife was created in 2003 after amending The Wildlife (Protection) Act, 1972.
- It basically restructured the Indian Board for Wildlife (IBWL), established in 1952.
- NBWL consists of 47 members with Prime Minister as its chairperson & Union environment minister its vice-chairperson.
- Additional Director General of Forests (WL) & Director, Wildlife Preservation is Member-Secretary.
- Ten eminent conservationists, ecologists & five persons from NGOs are also appointed to board.
- It is advisory in nature and advises the GOI in conservation and development of wildlife & forests.
- It has power to review all wildlife-related matters & approve projects in & around national parks & sanctuaries.

- No alternation of boundaries in national parks and wildlife sanctuaries can be done without approval of National Board for Wildlife.
- Wildlife Advisory Board is a statutory body of the state (UT) government with Minister in charge of Forest in the State (UT) is the Chairman (Chief Secretary will be the chairman if the minister's post is vacant).



**PRACTICE MCQs**

Q1. Which of the following statements are correct regarding criteria to declare heat wave in India?

1. Heatwave is declared when maximum temperature of a station reaches at least 40 degree C or more for plains and at least 35 degree C or more for hilly regions.
2. Based on departure from normal temperature, a heatwave is when departure is 4.5 degree C to 6.4 degree C, and a severe heatwave is declared when departure is more than 6.4 degree C.
3. Based on actual maximum temperature, heatwave exists when maximum temperature is greater than 45 degree C, & severe heatwave when temperature is over 47 degree C.
4. In coastal areas, if the maximum temperature departure is 4.5 degree C or more from normal and actual maximum temperature is 35 degree C or more, heatwave can be declared.

Select the correct answer using the code given below:

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

**Answer: B**

Q2. Consider the following statements about the National Board for Wildlife:

1. It is a statutory body set up under the Wildlife (Protection) Act 1972.
2. It has the power to review all wildlife-related matters & approve projects in & around national parks & sanctuaries.
3. No alternation of boundaries in national parks and wildlife sanctuaries can be done without approval of National Board for Wildlife.
4. Its recommendations related to wildlife protection are binding on the government.

How many statements given above are correct?

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

**Answer: C**

Q3. Which of the following correctly describes the term menhirs?

- a) They are traditional water structures in Southern states of India.
- b) They are the species of wild goat found in Tibetan plateau.
- c) They are large stones usually sculpted and placed by humans.
- d) They are the tribal people living in the state of Meghalaya.

**Answer: C**

Q4. The term 'Pig butchering', sometimes seen in the news with reference to –

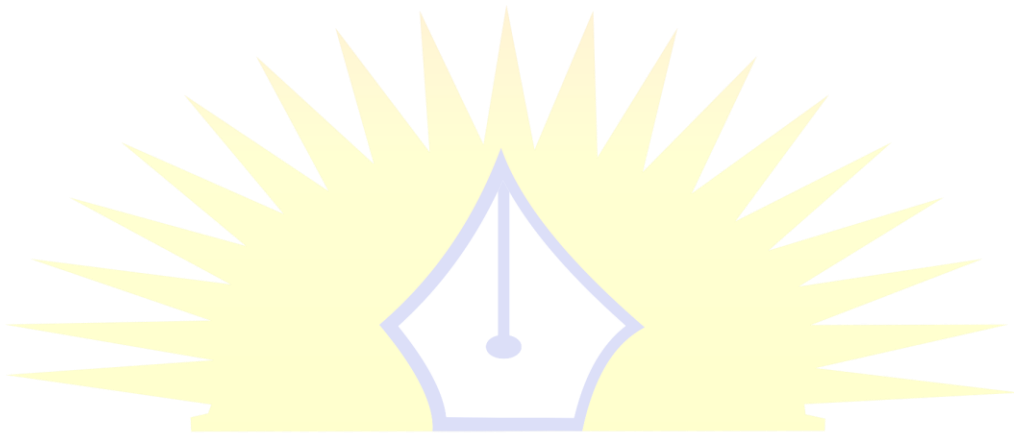
- a) The manner in which people are lured into cybercrime activities.
- b) Illegal migration to foreign countries through dunki route.
- c) Several cyberattacks on one establishment by many attackers.
- d) Methodology used by terrorist organisations to recruit vulnerable youth.

**Answer: A**

Q5. Which of the following statements is correct about Birefringence?

- a) It is the characteristics of luminance by certain organisms.
- b) It refers to the phenomenon of scattering of light.
- c) It is the methodology to calculate the level of toxicity in metals.
- d) It is the property of some materials having more than one refractive index.

**Answer: D**



**LUKMAAN IAS**

*...Celebrating 13 years of its establishment*