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TARGET 2025

ENVIRONMENT

UP TO FEB 2025

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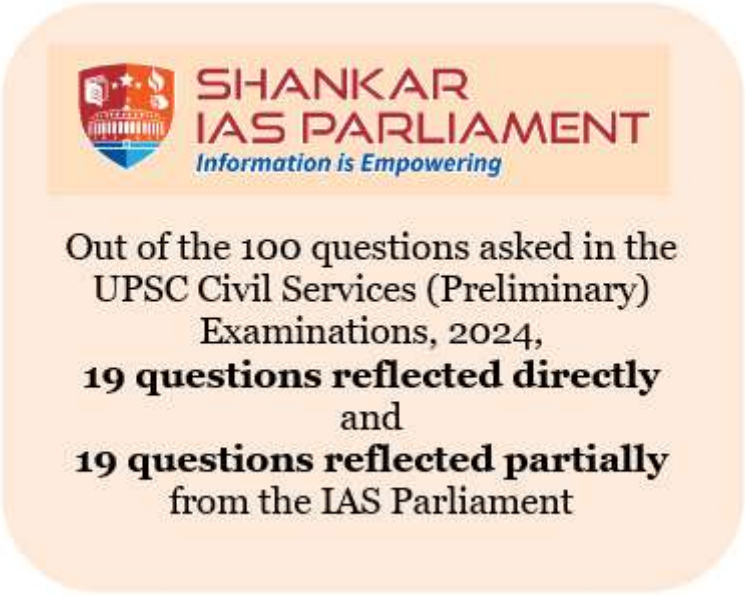

Total number of questions directly reflected from IAS Parliament (including Target 2024 series)	19
Number of questions directly reflected from the Target Series 2024	14
Total number of questions partially reflected from IAS Parliament	19

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TARGET 2025

ENVIRONMENT

1. POLLUTION

1.1 GloLitter Partnership

In Andhra-Odisha coast, ghost gear poses a serious threat to marine life.

- **Objectives** – To *reduce marine litter*.
- To support developing countries in identifying opportunities for the prevention and reduction of marine litter.
- **Total Budget** – Approximately $5 Million.
- **Partnership –** Government of *Norway*, International Maritime Organisation (*IMO*) & Food and Agriculture Organization (*FAO*).

In India, the Fishery Survey of India (FSI) is the lead agency of the GloLitter Partnership and has been working towards reducing Sea Based Litter (SBL).

- **Focus** – It works in *5 key regions*, with a total of 30 countries engaged as either Lead Partner Countries (LPCs) or Partner Countries (PCs).
- **Services** – Equip partner countries with knowledge and tools to address the problems of marine plastic litter.
- Establish *public-private partnerships* to demonstrate best marine plastic litter management solutions.
- *Engage women* in tackling marine plastic litter problems.
- **Impact** – Marine plastic litter originating from the shipping and fisheries sectors is prevented and reduced.

Ghost gear

- It is any fishing equipment that has been *lost, discarded or abandone*d in water bodies.
- It comprised largely of *gill net, nylon and polypropylene rope*.
- **Causes for accumulation** – Getting caught on reefs, rocks and other obstructions on the seafloor
- Adverse weather conditions leading to loss of fishing gear or gear getting cut by marine traffic
- Fishing in deep waters and wear & tear over time.
- **Impact** – Threatens fish, crustaceans, molluscs, elasmobranchii, marine mammals and sea birds.
    - A recent analysis stated that 144 animals belonging to 35 species across India were trapped in derelict fishing gear.
- **Measures** – The World-Wide Fund for Nature-India (WWF-India) initiated project studies across the Andhra Pradesh, Goa and Kerala coasts to understand the extent of the problem.

India is the 2nd largest contributor to mismanaged plastic in the ocean.

1.2 Burp Tax

Recently, New Zealand government announced scrapping the 'burp tax'.

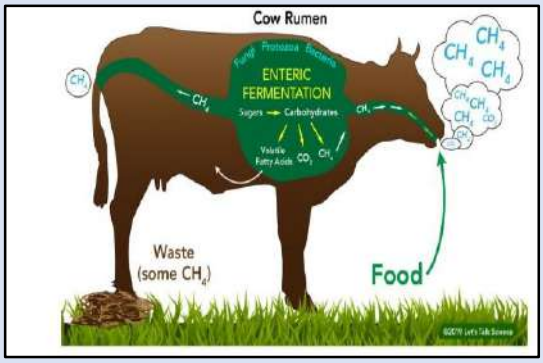
- It is a scheme ***to tax greenhouse gas emissions from livestock***.
- **Aim-** To *curtail methane emissions* from ruminant species, they are hoofed grazing or browsing herbivores that chew cud.
- **Introduced in-** 2022.

- **Methane emission from livestock**- Ruminant animals release methane mainly *through burping* and *during food digestion* in their rumen.
- **Challenges-** Farmers protested against the tax, claiming it would greatly affect their livelihoods.

***Methane** is a potent greenhouse gas responsible for 30% of warming since preindustrial times, second only to carbon dioxide.*

Digestive System of Ruminants

- **Ruminants** - Cows, sheep, goats, and buffaloes have a special type of digestive system that allows them to break down and digest food that non-ruminant species would be unable to digest.
- **Stomachs of ruminants** – They have *4 compartments*, one of which, the rumen, helps them to store partially digested food and let it ferment.
- This *partially digested and fermented food is regurgitated* by the animals who chew through it again and finish the digestive process.



1.3 A study on Plastic Pollution

A recent study says that India has secured the top spot as biggest plastic polluter in the world, releasing 9.3 million tonnes (Mt) annually, amounts to roughly one-fifth of global plastic emissions.

- It defined plastic emissions as materials that have moved from the managed or mismanaged system (controlled or contained state) to the unmanaged system (uncontrolled or uncontained state, the environment).
- **Findings of the study** – Of the unmanaged waste, roughly *43% is the form of unburned debris* and the rest is burnt either in dumpsites or locally.
- Globally, roughly 69% of the world's plastic waste emissions come from 20 countries, of which
  - 4 are low-income countries,
  - 9 are lower-middle-income countries and
  - 7 are upper-middle-income.
- Furthermore, high-income countries have higher plastic waste generation rates, but none are ranked in the top 90 polluters, as *most have 100% collection coverage and controlled disposal*.

Dominant Source in Global North
• Littering

Dominant Source In global South
• Uncollected waste

- **In India** –It is the ***largest plastic polluter*** in the world, releasing 9.3 million tonnes (Mt) annually, amounts to roughly one-fifth of global plastic emissions.
- India's official waste generation rate, approximately ***0.12 kilograms per capita per day***.

1.4 Global Plastics Treaty

In 2022, World Countries agreed to develop a Treaty on plastic pollution by 2024 to reduce greenhouse gas emissions from plastic production, use and disposal.

- It is a ***legally binding agreement*** between over ***175 United Nations*** member countries.
- **Objectives**
  - *Reducing plastic production and e*liminating unnecessary uses
  - Prohibiting certain chemicals and setting recycling goals
  - Addressing the entire lifecycle of plastics
  - Considering impact on vulnerable workers
  - Mandating Chemical testing mandates and regular evaluations to assess progress.

1.5 Toxins of the Bhopal disaster

Hundreds of tonnes of toxic waste have yet to be removed from the premises of Union Carbide even after 40 years of the Bhopal disaster.

- **Bhopal plant**- It is built in late 1960s to manufacture an *insecticide called carbaryl* using a reaction of *methyl isocyanate (MIC) with 1-naphthol.*
- **Methyl Isocyanate (MIC)** (C_2H_3NO) - It is a highly toxic compound, *volatile colorless liquid* that used in the manufacture of pesticides such as carbofuran, carbaryl, and aldicarb.
- It is extremely flammable, and potentially *explosive when mixed with air*.
- It reacts with water at high temperatures and its reaction with water also releases heat.
- **Effect on Humans-** It *doesn't have a particular smell* at concentrations at which other gases may become noticeable.
- It is irritating to the eyes, respiratory tract, and skin.
- High vapor concentrations cause severe pulmonary edema and injury to alveolar walls of lung, severe corneal damage, and death.
- Greenpeace released a report in 1999, which reported the *presence of heavy metals in organic compounds*.

Heavy Metals	Organic Compounds
Mercury	Hexachlorobutadiene
Chromium	Chloroform
Copper	Carbon tetrachloride
Nickel	Trichlorobenzene
Lead	Persistent Organic Pollutants (POPs)

Impact of Heavy Metals

- Heavy metals' density is at least ***5 times that of water***.
- **Mercury**- It damages multiple organs even at low concentrations by accumulating in soft tissue and preventing normal cellular function.
- **Chromium-** The high doses cause various *cytotoxic and genotoxic reactions* that affect the immune system and also cause cancers in the lungs.
- **Copper**- It damages the *liver, the kidneys, and the gastrointestinal system* at high concentration.
- **Nickel**- Its high exposure effects *lung fibrosis, kidney and cardiovascular diseases* and cancer in the respiratory tract.
- **Lead-** It damages chlorophyll and disrupts photosynthesis in the plants and rendering structural damage to cells.
- Lead from inorganic compounds correlated with cancers on the stomach, lungs, kidneys, and brain.

Harmful organic compounds

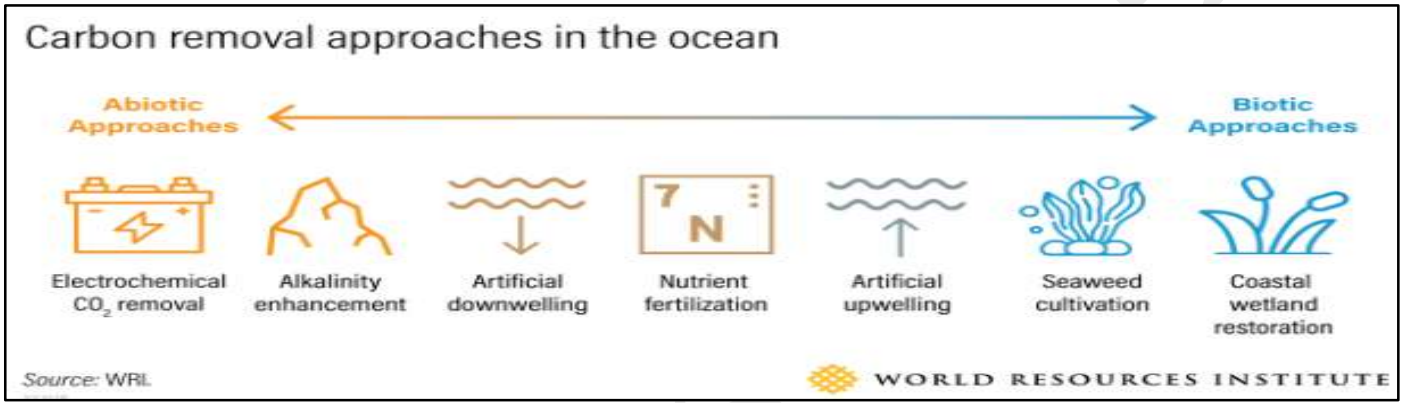
- **Hexachlorobutadiene-** It is a *carcinogen* and corrosive in humans which destroy cells in the kidneys involved in producing urine, and inhibit brain activity.
- **Chloroform-** It is also a *carcinogen* and at a sufficient concentration, it caused an adult to faint, and at higher concentrations cause death.
- **Carbon Tetrachloride-** It damages the liver, nerves, and causing blur vision, cancer, heartbeat irregularity.
- **Trichlorobenzene-** It is a volatile and spread easily through the air, and also found in groundwater and surface water bodies like lakes.
- These *build up in the body's fatty tissues* and at high concentrations damage the liver and kidneys.
- **Persistent Organic Pollutants (POPs) -** It effects include cancer, allergies and hypersensitivity, damage to the central and peripheral nervous systems, reproductive disorders, and disruption of the immune system.

1.6 Ocean Based Carbon Removal

A new study throws light on the limitations of the current approaches of removing carbon dioxide from the ocean.

In total, the ocean holds around 42 times more carbon than the atmosphere.

- **Carbon sequestration by Ocean** – It has already *absorbed 30% of the CO_2* and *90% of excess heat* caused by human activities.
- **Approaches** – By enhancing or accelerating natural biological or chemical processes that sequester carbon in the ocean.
- **Abiotic approaches** – They *harness the physical or chemical* properties of the ocean to remove CO_2 from the air.
    - Alkalinity enhancement, electrochemical CO_2 removal and artificial downwelling
- **Biotic approaches** – They *leverage photosynthesizing organisms* in seawater to take up CO_2 and *store as biomass*.
    - Seaweed cultivation, Ocean fertilization, artificial upwelling and coastal wetland restoration.



Abiotic Approaches in Marine CO_2 Removal

- **Alkalinity enhancement** – *Adding certain minerals* to seawater enable more atmospheric CO_2 to dissolve into the ocean.
- **Electrochemical CO_2 removal –** It *use electricity* to mimic alkalinity enhancement, or directly extract CO_2 from seawater for storage on land.
- **Artificial downwelling** – It *accelerates natural currents* that carry carbon-rich surface water into the deep ocean in the Arctic and Antarctic.

Biotic Approaches in Marine CO_2 Removal

- **Seaweed cultivation** – They are cultivated and then *sunk to the deep ocean* storing a portion of the carbon-rich biomass.
- **Ocean Fertilization** – *Nutrients like iron can be added* to the ocean to spur phytoplankton growth.
- **Artificial upwelling** – It is same as ocean fertilization, but does so by moving deeper, *nutrient-rich water to the surface*.

- **Challenges** – The limited understanding of basic ocean processes is hindering progress in marine CO_2 removal.
- Absorbing excess CO_2 and heat is causing ocean warming, acidification, oxygen loss; changing currents and nutrient cycling; and imperilling plants and animals essential to marine ecosystems.
- They compromise the ocean's ability to provide food, support livelihoods and insulate us from the worst effects of climate change.

1.7 Nitrogen Contamination in Groundwater

An assessment of India's groundwater by the Central Ground Water Board (CGWB) found that several States are grappling with a serious problem of nitrate contamination.

- **Concerns** – The number of districts with excessive nitrate in their groundwater *rose from 359 in 2017 to 440 in 2023*.
- Nearly *56% of India's districts having excessive nitrate* in ground water, defined as having ***more than 45 mg/l (milligram per litre***).
- **Nitrogen in groundwater** – Although nitrate is the main form in which nitrogen occurs in groundwater, dissolved nitrogen also occurs in the form of
  - Ammonium (NH_4^+)
  - Ammonia (NH_3)
  - Nitrite (NO_2^-)
  - Nitrogen (N_2)
  - Nitrous oxide (N_2O)
  - Organic nitrogen.
- **Vulnerable areas** - *Rajasthan, Karnataka and Tamil Nadu.*
- Maharashtra, Telangana, Andhra Pradesh and Madhya Pradesh also show notable levels of nitrate contamination.
- **Impact human health** – It leads to ***methemoglobinemia***, or a reduced ability of red blood cells to carry oxygen.
- **Impact environment** – Once the nitrates in the groundwater rise to the surface and become part of lakes & ponds, *algal blooms emerge.*

Other Major chemical contaminants of Groundwater

- **Contaminants** – Arsenic, iron, fluoride and uranium.
- **Fluoride** – It exceeds the permissible limit in Rajasthan, Haryana, Karnataka, Andhra Pradesh and Telangana.
- **Uranium** – It exceeds 100 ppb (parts per billion) in Rajasthan and Punjab.

*India's degree of **groundwater extraction** is 60.4%, or roughly the same as it has been through the years since 2009. About 73% of the blocks are in the 'safe' zone, meaning that they are replenished enough to compensate for water drawn out.*

***Piezometers** measure groundwater levels and transmit the information digitally to a centralised location.*

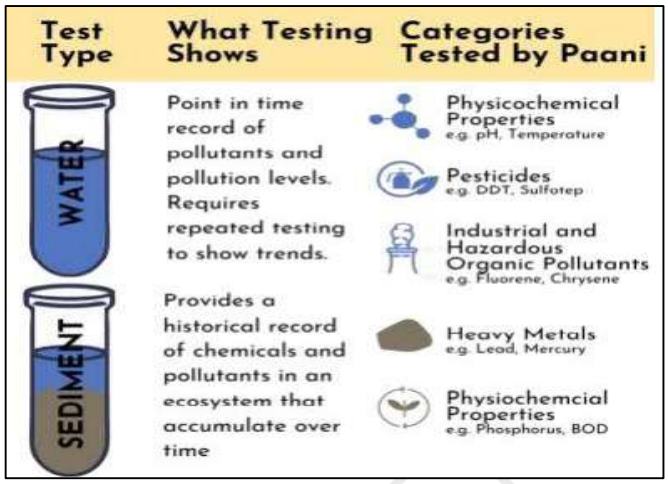
1.8 Physico chemical pollutants in Arkavathi River

A report conducted by Paani.Earth in collaboration with the International Centre for Clean Water on pollution levels in the Arkavati has revealed alarming levels of physicochemical pollutants.

- **Report Findings –** The study quantifies the risks of emerging pollutants from seven sites along the Arkavathi and its tributary, the Vrishabhavathi River.
- Pollution levels in the Arkavati has revealed alarming levels of physicochemical pollutants, pesticides, heavy metals, and hazardous organic compounds.
- The analysis focused on
  - 3 categories for water (Physicochemical Properties, Pesticides, and Industrial and Hazardous Organic Pollutants) and
  - 2 categories for sediment (Heavy Metals, and Physicochemical Properties).
- It exceeds both Indian and international standards and guidelines.
- **Notable High pollutants - Pesticides** - Harmful substances with health impacts such as ***Heptachlor and DDT*** found at levels as high as 25022 times US guidelines.
- **Heavy Metals** - Toxins such as ***Mercury*** found in sediment at levels up to 26 times above Canada's Sediment Quality Guidelines.

The Central Pollution Control Board's Water Quality Criteria focus only on physicochemical properties of water rather than hazardous pollutants.

- **Industrial Pollutants** - ***Polycyclic aromatic hydrocarbons (PAHs)*** from industrial burning such as Dibenz[a,h]anthracene found at 3076 times US guidelines.
- **Nutrients** - Excessive ***phosphorus*** levels causing eutrophic conditions at all sites.
- **Health concerns** – It can cause severe risks to human and aquatic health, including cancer and hormone disruptions.
- Heavy metals also contribute to the ***development of antimicrobial resistance (AMR)***, posing an additional threat to public health and the environment.



1.9 Bacterial mixture for Removal of Organic Pollutants

In a recent study published in the journal Environmental Technology and Innovation, researchers have used the power of specific bacterial species to remove organic pollutants from soil.

- **Bacterial mixture** – Species from the ***genera Pseudomonas and Acinetobacter***, were good at *breaking down aromatic compounds* in contaminated soil and thereby improving soil and plant health.
- **Need** – Soil contaminants are toxic, can inhibit seed germination, reduce plant growth, yield and also accumulate in seeds and plant biomass.
- **Working** - They break down pollutants into simpler, harmless, non-toxic compounds.

*Despite the use of fungicides & disease-resistant cultivars, fungal infections still cause **global crop losses of 10–23% annually**, with key calorie crops in India, like rice and wheat, particularly affected.*

- **Recover soil health** – They fertilise the soil and improve soil health.
- **Inhibit fungi** – They produce substances like *lytic enzymes and HCN (hydrogen cyanide)* that can kill or inhibit the growth of plant pathogenic fungi.
- These bacteria are eco-friendly and target only the harmful fungi.
- **Make nutrients accessible to plants** – They convert insoluble form of essential nutrients like *phosphorus and potassium, into soluble forms* and make them readily available to the plants.
- They produce *siderophores*, which help plants absorb iron in nutrient-limited environments.

- **Improves plant growth & health** – They produce high amount of *growth hormone called indoleacetic acid* (IAA).
- **Boosts yield** - They significantly boost the growth and yield of crops (wheat, mung bean, spinach, fenugreek, etc.) *up to 45-50%.*

1.10 Coral Triangle

A recent report highlighted at the 16th Conference of Parties (COP16) to the Convention on Biological Diversity (CBD) reveals the serious dangers brought by fossil fuel expansion to the Coral Triangle.

- It is one of the most biodiverse marine areas in the world.
- It is often referred to as the ***'Amazon of the seas',*** spanning over 10 million square kilometres.
- **Coverage** – Indonesia, Malaysia, Papua New Guinea, Singapore, the Philippines, Timor-Leste, and the Solomon Islands.

- **Supports biodiversity** – It is *home to 76% of the world's coral species* and supports more than 120 million people who rely on its resources for their livelihoods.

Findings of the report

- **Oil and gas blocks** – More than 100 offshore oil and gas blocks are currently in operation in the Coral Triangle, covering over 120,000 square kilometres, which is about 1% of the Triangle.
- It highlights that significant parts of critical habitats are under threat.
- There are overlaps with oil and gas blocks, affecting 24% of coral reefs, 22% of seagrass areas, and 37% of mangroves.
- **Oil slicks** – Since 2020, 793 oil slicks have been detected in the Coral Triangle, mainly due to ships, with 98% caused by bilge dumping from traveling vessels.
- The total area affected is over 24,000 square kilometres.
- *Princess Empress Oil spill*, occurred in 2023 near the coast of the Philippines.
- This spill adversely *affected more than 20 marine protected areas* (MPA) and impacted 21,000 families, with economic damages reaching about 3.8 billion Philippine pesos (around $68.3 million).
- **LNG** – Currently, there are 19 LNG terminals operating in the Coral Triangle, with more planned for the future.
- It poses more risks to marine ecosystems and increases vessel traffic, raising concerns about potential oil spills and habitat destruction.
- **Noise pollution** – It occurs from shipping and exploration activities that harms marine life, especially species like whales and dolphins that rely on sound for communication, navigation, and finding food.
- Loud noises from seismic exploration and commercial shipping can disrupt these essential functions and lead to changes in behaviour and increased mortality rates in some marine species.

1.11 Moringa oleifera, Mitigator for Harmful Algal Blooms (HABs)

A research team at Clarkson University recently published a study about a plant-based alternative to traditional chemical methods of combating Harmful Algal Blooms (HABs).

- The team's research focuses on using ***Moringa oleifera*** to combat the cyanobacterium that causes HAB known as ***Microcystis aeruginosa.***
- The team comparing it to the traditional chemical method of using aluminum salts.
- **Microcystis aeruginosa** - Microcystis aeruginosa cells, the cyanobacterium that causes HABs contain a family of potent toxins known as microcystins.

> ***Flocculant*** *is the substance that causes particles in liquid to clump together, and the clumped particles are called flocs.*

- It can cause negative health effects in humans, from mild skin rashes to serious illnesses.
- They can also cause severe liver damage and even death in dogs and livestock.
- Any method used to treat harmful algal blooms must ensure that the cells remain intact to prevent the release of these toxins into the aquatic environment.
- **Moringa oleifera** - It is a ***Plant-based alternative*** for harmful algal bloom mitigation.
- The seeds of Moringa oleifera contain proteins that act as natural flocculants.
- Aluminum salts, such as alum (potassium aluminum sulfate) and polyaluminum chloride, are commonly used as flocculants in water treatment processes.
- They effectively aggregate particles, facilitating their removal from water.
- However, their use raises environmental concerns, particularly regarding the formation of toxic sludge.

- This sludge can contain soluble aluminum compounds, which may leach into water bodies, posing risks to aquatic life and potentially entering the food chain.
- **Advantages -** Moringa oleifera offers a biodegradable, plant-based alternative that is less polluting.
- Its use as a flocculant reduces the risk of toxic sludge formation and minimizes environmental impact.

2. RENEWABLE ENERGY

2.1 Bio-bitumen

India plans to start large-scale production of bio-bitumen production from biomass or agricultural waste to reduce imports of the material used for asphalting of roads.

- It is known as biologically sourced bitumen that is derived from ***renewable biological sources*** rather than from fossil fuels.
- **Sources**- It is made using non-petroleum-based renewable resources and can be made from *vegetable oils, synthetic polymers*, or both, making it a more sustainable model long term.
- **Properties-** It retains the characteristics of conventional bitumen, such as durability, waterproofing ability, and adhesion.

> ***Bitumen** is produced through the distillation of crude oil and also occurs naturally.*

- **Advantages-** It has a potential to reduce greenhouse gas emissions and dependency on fossil fuels, offering a more sustainable alternative in construction and infrastructure projects.
- It *doesn't contain any toxic chemicals*, so it is safer for workers and the environment.
- **Applications-** Asphalt paving for roads and as a binding agent in roofing materials and waterproof coatings.

3. CLIMATE CHANGE

3.1 Mammoth

Mammoth, the largest carbon dioxide captures and storage facility of its kind launched its operations.

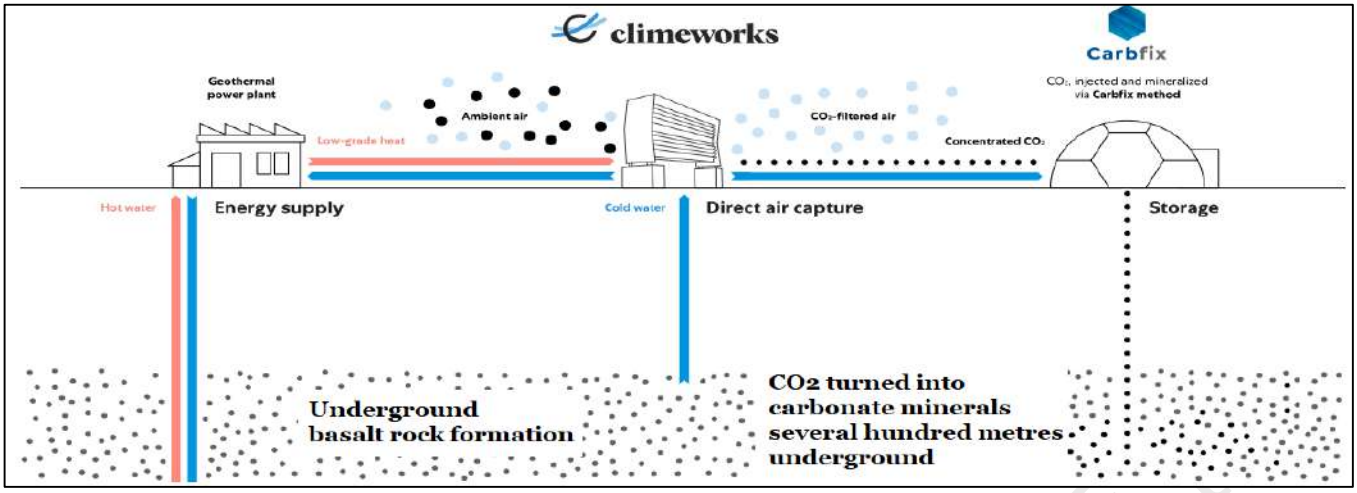
- **Developed by** – Climeworks, a Swiss start-up.
- It is the 2nd commercial ***direct air capture plant*** opened by Climeworks, and is *10 times bigger than its predecessor, Orca*, which started running in 2021.
- **Location** – On a ***dormant volcano in Iceland***, 50 kms from an active volcano.

> *Direct air capture, or DAC, is a technology designed to suck in air and strip out the carbon using chemicals. The carbon can then be injected deep beneath the ground, reused or transformed into solid products.*

- It is chosen for its proximity to the *Hellisheidi geothermal energy plant* necessary to power the facility's fans and heat chemical filters to extract CO_2 with water vapour.
- **Working** – It has 72 industrial fans, intends to *suck 36,000 tonnes of CO_2* from the air annually to bury underground.
- CO_2 is then separated from the steam and compressed in a hangar where huge p ipes crisscross.

> *For the world to achieve 'carbon neutrality by 2050', we should be removing something like 6 to 16 billion tonnes of CO_2 per year from the air.*

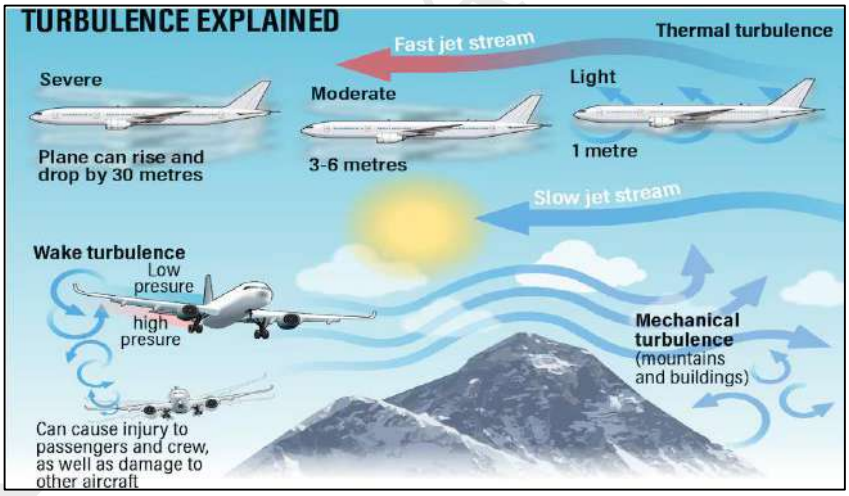
- Finally, the gas is dissolved in water and pumped underground with a "sort of giant SodaStream.
- A well, drilled under a futuristic-looking dome, *injects the water 700 metres down into volcanic basalt* that makes up 90% of Iceland's subsoil where it reacts with the magnesium, calcium and iron in the rock to form crystals -- solid reservoirs of CO_2.
- **Challenges** - The role of direct air capture with carbon storage (DACCS) remains minor in the various climate models due to its *high price* and its deployment at a large scale *depends on the availability of renewable energy*.



3.2 Aircraft Turbulence

Passenger were injured after a Singapore Airlines flight from London to Singapore hit severe turbulence.

- **Turbulence** – A sudden and violent *shift in airflow*, can felt as *jolts or vibrations* making aircraft movement less stable and comfortable.
- **Causes** – The most obvious is *unstable weather patterns* that trigger *storms*, which can be detected by weather radar.
    - **Atmospheric factors** – wind shear or convective currents.
    - **Physical factors** – Like mountains and buildings



- **Clean air turbulence (CAT)**- A *sudden and severe swirl* that causes violent buffeting of a plane even where there are no clouds.
- Such invisible pockets of air can appear without warning, and are *hard to predict*.
- **Frequency**- Turbulence-related incidents are common.
- **Impact**- From 2009 through 2018, turbulence resulted in *one or more serious injuries*, but no aircraft damage.
- Yet fatal turbulence in air travel remains extremely rare.
- **Impact on planes**- Long planes can feel most turbulent at the back and the *ideal spot is around the centre of gravity*, which is typically just ahead of the wings.
- The feeling experienced by passengers varies from plane to plane and seat to seat.
- **Preparedness**- Loading extra fuel when needed and monitoring weather radar during flight.

*Boeing's high-tech 787-9, with a "**Gust Alleviation System**" from Honeywell, ranks 1st for handling turbulence followed by the Airbus A340-500/600.*

- **Measures**- NASA is developing an early-warning system that relies on ground-mounted infrasonic microphones to detect clear-air turbulence hundreds of kilometers away.
- **Links with climate change**- A report from the University of Reading suggested turbulence could worsen with climate change.
- While there seems to be a strong correlation, more research is needed.

3.3 Teal Carbon

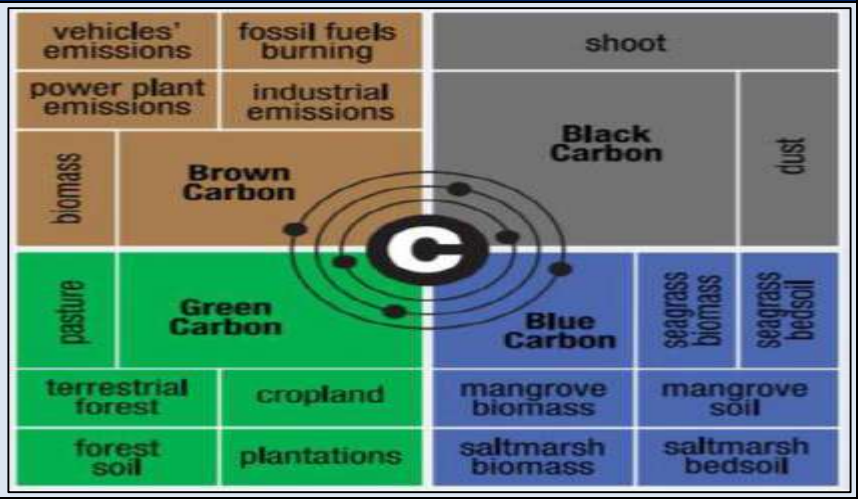
Recently, India's 1st study on 'teal carbon' was undertaken at Keoladeo National Park (KNP) in Rajasthan.

- **Teal Carbon** – It is the organic carbon stored in ***non-tidal freshwater wetlands***.
- It is color-based terminology that reflects the classification of the organic carbon based on its ***functions and location*** rather than its physical properties.
- **Components** - It encompasses carbon sequestered in *vegetation, microbial biomass, and dissolved and particulate organic matter*.
- **Sources** - Peatlands, freshwater swamps, and natural freshwater marshes.
- **Global level storage** - Across the ecosystems, 500.21 petagrams of teal carbon (PgC) is strored.
- **Uses** - It can be used as a tool to *mitigate climate change* caused by anthropogenic pollution in the wetlands.
- It increases the ground water level, *flood mitigation and heat island reduction*, supporting a sustainable urban adaptation.
- Equivalent to coastal wetlands, they have the capacity to *regulate greenhouse* gases.

Petagrams of carbon (PgC) *is a unit to measure carbon and it is equivalent to* 10^{15} *grams.*

Other Carbon Forms

- **Black and Brown carbons** - They are primarily produced by *incomplete combustion of organic matter* from sources such as wild fires, fossil fuel combustion, and industrial activities.
- **Blue carbon** - It is the *carbon* stored in *coastal and marine ecosystems.*
- Coastal wetlands, including seagrass meadows, mangroves and tidal marshes, are major blue carbon ecosystems and are often termed "*blue forests*".



3.4 Melting of Glaciers in Central Asian Countries

Tian Shan mountain range, home to thousands of glaciers that are melting at an alarming rate in Central Asia pose a significant risk for towns and cities in Kyrgyzstan.

- **Tian Shan mountain range** – It extends into *China, Kazakhstan, and Uzbekistan*.
- It is regarded as the ***"Water tower of Central Asia,"*** being a solid reservoir of freshwater resources.
- **Decline of glaciers** – Until the end of the 1960s, the glaciers of the entire Central Asian region remained in a more or less stable state.

According to a report by the Eurasian Development Bank between 14% and 30% of glaciers in the ***Tian-Shan and Pamir****, 2 main mountain ranges in Central Asia have melted over the last 60 years.*

- In the early *1970s, there was a sharp acceleration* in the rate of degradation.
- Conventionally, from 1973 to 1978, the winter glacier mass balance decreased by more than three times.
- **Cause** - *Climate change* is notably pronounced in Central Asia, which has been increasingly plagued by extreme weather events.

Adygene glacier *has retreated by around 16 centimetres (6 inches) every year.*

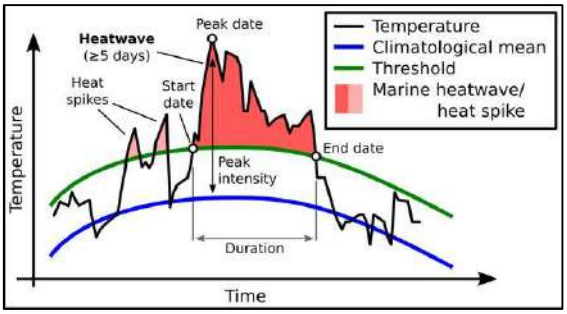
- **Key Findings -** Melted glacial waters comprise up to 50% of the glacial runoff, the annual runoff during the vegetative season.

- Meltwater forms new lakes that can overflow and create dangerous torrents, as this water carries rocks.
- Increasing demand for substantial natural resources in the area, particularly *gold extraction*, may accelerates ice melting through chemical processes.
- Forecasts show Central Asia's glaciers will *halve by 2050 and disappear completely by 2100*.
- **Measures**- Natives of this region have installed a sensor about 50 centimeters above the water level that will transmit radio alerts in case of flooding.
- United Nations, responded to the initiative of the government of Tajikistan, declared ***2025 as the Year of Glacier Conservation.***

3.5 Marine Heat Waves (MHWs)

Researchers found that MHWs deep in oceans may be significantly under-reported and caused by ocean currents and also being impacted by global warming.

- **Conditions** – When the surface temperature of sea rises to ***3 or 4 degree Celsius*** above the average temperature for ***at least 5 days***.
- **Occurrence** – It can manifest in any place in the ocean and at scales of up to thousands of kilometres and can occur in *any season*, can last for weeks or even years.
- **Causes**
  - Surface heat flux - When a high-pressure system sits over a body of water for a long time, the atmosphere heats the water's surface.
  - Advection - Ocean currents move warmer water into a region.
  - Winds - Winds can increase or decrease the warming that occurs during an MHW.
  - Climate modes - Climate modes like El Niño can change the likelihood of MHWs occurring in certain regions.
  - Human-caused climate change - Human-caused climate change leads to 87% of MHWs.



- **Impacts**
  - Extreme weather events
  - Increased ocean stressors
  - Fisheries collapse
  - Coral deaths
  - Socioeconomic challenges for local communities
- **Trends -** The area and depth of all types of MHWs have been increasing significantly over the past 2 decades.
- **Predictions -** By the end of the 21st century, the annual MHW days are expected to increase to approximately 224.2 ± 26.9 days.
- The fraction of the global ocean experiencing MHWs is also expected to reach approximately 53.1 ± 6.3%.

Recent Findings

- Researchers found that MHWs in deep oceans may be significantly under-reported.
- They found that in the deep ocean, atmospheric factors are not responsible for temperature changes (unlike MHWs). Instead, eddy currents play a major role.
- Eddies carry warm or cold water across long distances.

3.6 Phytoplankton Bloom

The researchers found drought in southern Africa's drylands had caused the strongest phytoplankton bloom in about 27 years in the South East of Madagascar.

- **Phytoplankton –** It is a ***microalgae similar to terrestrial plants*** which contain chlorophyll and require sunlight in order to live and grow.
- **Phytoplankton Bloom** – Its takes place when a species of ***phytoplankton reproduces at a rapid rate,*** multiplying quickly in a short amount of time.
- It may cover hundreds of square kilometers in the ocean and are easily visible in satellite images.
- It also forms Harmful Algal Blooms (HABs).
- High concentrations of bloom in the water column can cause the water to *appear blue-green, green, brown or even red,* depending upon the pigments found in the species experiencing the bloom.
- **Bloom in South Africa** – It was caused by *nutrient rich dust* like iron, nitrogen, and phosphorus that *blew from drought drylands* in the western parts of southern Africa like
    - *Etosha and Makgadikgadi salt pans* in Namibia and Botswana
    - Pans and ephemeral rivers in the coastal Namibian desert
    - South-western Kalahari pan belt

> ***Harmful Algal Blooms*** *can produce extremely toxic compounds that have harmful effects on fish, shellfish, mammals, birds, and even people.*

- Dusts were *carried over by wind* and deposited into the nutrient limited surface waters through *intense rainfall* events while rising air temperatures, increasing dryness, and higher dust emissions cause such massive blooms.
- It could have potentially *boosted populations of zooplankton* and fish species *in the Madagascar* region.
- The region acted as a significant carbon sink because of the high rates of photosynthesis occurred and thus making them essential for climate regulation

Phytoplanktons

- **Presence** – It floats in the *upper part of the ocean*, where sunlight penetrates the water.
- **Growing conditions** – Its growth depends on the *availability of carbon dioxide, sunlight, and nutrients*.
- It requires inorganic nutrients such as nitrates, phosphates, and sulphur which they convert into proteins, fats, and carbohydrates.
- Water temperature, salinity, water depth, wind, and kinds of predators are grazing on them are the factors influencing growth rates.
- **Main classifications** – Dinoflagellates and Diatoms
- **Dinoflagellates** – It use a whip-like tail, or flagella, to move through the water and their bodies are covered with complex shells.
- **Diatoms** – It have shells and their structure is rigid, made of interlocking parts, rely on ocean currents to travel through the water.
- It provides food for a wide range of sea creatures like zooplankton, shrimp, snails, and small fish to whales.

3.7 Algal Bloom

A new study finds that elephants died 4 years ago in Botswana from drinking water poisoned by an explosion of toxic algae populations in the water pans due to the effects of climate change.

- **Algae** – Algae are *microscopic organisms* that live in aquatic environments and use photosynthesis to produce energy from sunlight, just like plants.
- **Presence** – It can be found in *all types of natural waters*, including salt water, fresh water, and brackish water (a mix of salt and fresh water).
- **Algal bloom –** It is a *rapid increase in the density of algae* in a body of water, such as a lake, river, or bay.
- They are caused by diverse organisms, including toxic and noxious phytoplankton, cyanobacteria, benthic algae, and macro-algae.
- **Growth influencing factors**

- Bright sunlight
- High nutrient levels
- Calm waters (low wind and circulation)
- Limited number of grazers or predators

- Temperatures and salinity also plays an important role.
- **Types**

Red tides	Green tides	Brown Tides
• Red color due to reddish pigment called peridinin. • It is found in most dinoflagellates, such as Alexandrium catenella. • A bloom of this dinoflagellate can make the ocean red. • It is common on both the east and west coasts of the U.S. as well as Florida and the Gulf of Mexico.	• Caused by ***Phaeocystis***, which is a unicellular, photosynthetic algae. • It can also be caused by macroalgae such as Enteromorpha spp. and Codium isthmocladum. • When in bloom, macroalgae often *outcompete seagrass and coral reefs*.	• Caused by the ***pelagophytes*** (another type of microalgae) such as Aureococcus anophagefferens. • Aureococcusis a spherical, non-motile species causes noticeable damage to the coastal ecosystems. • They are commonly seen in the northeast and mid-Atlantic U.S. estuaries.

- **Issues** - A few types of algae produce toxins that can be stimulated by environmental factors such as light, temperature, salinity, pH, and nutrient levels.

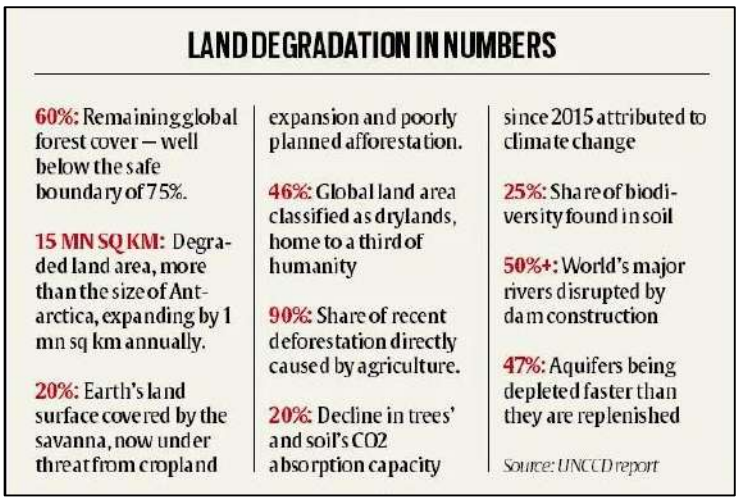
3.8 Land Degradation

Recently, the United Nations Convention to Combat Desertification (UNCCD) published a report that Land degradation is undermining Earth's capacity in the COP16 summit, Riyadh, Saudi Arabia.

- **Land Degradation –** It is the *reduction in the capability of the land* to produce benefits from a particular land use under a specified form of land management.
- It is expressed as a long-term reduction or loss of biological productivity, ecological integrity or value to humans.

***Land Degradation hotspots** in dry regions such as South Asia, northern China, the High Plains and California in the United States, and the Mediterranean.*

- **Causes –** It caused by *direct or indirect human-induced* processes including anthropogenic climate change.
  - Unsustainable land management practices
  - Deforestation, Overgrazing
  - Urbanization & Pollution
  - Inappropriate irrigation, Excessive use of agrochemicals
  - Mining and quarrying
- **Impacts** – It raises the risk of malnutrition by reducing the quality and quantity of food production.



- It can cause respiratory diseases due to soil erosion and water- & food-borne diseases that result from poor hygiene and scarcity of clean water.
- Marine and freshwater systems also suffer due to land degradation.

- When land is degraded, soil carbon can be released into the atmosphere, along with nitrous oxide that can further exacerbate global warming.

*The **global area impacted** by land degradation approximately 15 million km², more than the entire continent of Antarctica or nearly the size of Russia, is expanding each year by about a million square km.*

United Nations Convention to Combat Desertification (UNCCD)

- It is the *only legally binding framework* set up to address desertification and the effects of drought.
- **Established in** – 1994.
- **Member Countries** – 197 Parties to the Convention, including 196 country Parties and the European Union.
- **Principles -** Participation, Partnership and Decentralization.
- **Aim** – To attain land degradation neutrality (LDN), which aims to halt and reverse land degradation.
- LDN is based on the concept of reducing, avoiding, and reversing degradation from a baseline year of 2015.

3.9 Coral Spawning

The Great Barrier Reef busted to life during this mass coral spawning event that happened after the November full moon in Australia.

- **Coral Spawning** – It is the ***annual process by which coral reefs reproduce simultaneously.***
- It brings an underwater blizzard with billions of colourful flakes cascading in white, yellow, red, and orange.
- **Process** – The Coral reefs scatter millions of tiny egg and sperm bundles into the water, called *Gametes*.
- The gametes are full of fatty substances called lipids that rise slowly to the ocean surface, where the process of fertilization begins.
- Each bundle must find another bundle from the same species to fertilise.

***Coral Spawning** event was first witnessed on Magnetic Island in 1982.*

- **Coral Babies** – The coral egg and sperm join together as an embryo and develop into a *coral larva, called a Planula.*
- Planulae float in the ocean, before dropping to the ocean floor.
- Depending on seafloor conditions, the planulae may attach to the substrate and grow into a new coral colony at the slow rate of about 4 inches a year.
- **Spawning conditions** – It depends on a number of factors including their *location, the water temperature and tides*.
- *Full moon and water temperatures of 27-28 degrees Celsius* triggers the maturation of the coral's egg & sperm bundles.
- The timing of spawning is also impacted by the length of the day, the tide and salinity levels in the water.
- It occurs ***only at night*** & lasts from a few days up to a week.
- **Coral spawning at Great Barrier Reef** – It is the *world's largest coral spawning event*.
- On the Great Barrier Reef, inshore reefs typically spawn in October, while outer reefs spawn in November or December.

***Coral IVF** is a world-leading technique to grow baby corals and use them to restore damaged coral reefs.*

3.10 Impact of Warming Waters on Marine Life

According to a recent analysis by Down To Earth (DTE), nearly 20% of species residing in UNESCO's World Heritage marine sites have lived in unsuitable warm waters.

- **Global sea surface temperature (SST)** – At present, it is *roughly 1 degrees Celsius higher than 140 years ago,* according to National Oceanic and Atmospheric Administration.
- The warmest future climate scenario or SSP 8.5 (estimated projected warming of 4.4°C by the end of the century).
- **Impact** – Ocean heat content has *impacted all the 6 major oceans* since 1998 but the most significant warming has been in the southern oceans.
- **Induce migration** – Ocean warming is *shifting marine species into cooler and deeper waters* from their natural habitats.
    - Warming waters have compelled *white-beaked dolphins* found in cooler North Atlantic waters to move north-west from the southern areas during 1991-2017.
- **Impacts reproduction of mammals** – *Female sperm whales are unable to conceive* at their known rates due to warm waters.

Environmental DNA (eDNA) *is an on-invasive sampling method developed by UNESCO, maps ocean life and create an inventory of marine biodiversity in 21 of its 51 World Heritage marine sites.*

- **Affect survival rates of mammals** – As species migrate for new suitable waters, they become more vulnerable to new pathogens.
- **Affect water movement** – It impacts oxygen levels between the surface waters and deeper waters that naturally circulates, providing nutrients to marine species.
- **Alter species behaviour** – For instance, bacteria which use oxygen as fuel has now *switched to nitrate*, eventually releasing nitrogen gas and impacting water and atmosphere characteristics.
- **Thermal limit breaching** – 881 of 4,406 species studied have breached their thermal limits includes.
- UNESCO's eDNA Expeditions inventoried 21 of 51 marine sites have exceeded their living thermal limits.

Location	Species living beyond their thermal limits
Coiba National Park, Panama	26.6%
Everglades National Park, US	24.4%
Banc d'Arguin National Park, Mauritania	23.9%
Sundarbans, Bay of Bengal	19.8%

3.11 India's Forests Fires

Recently, the data showed that in the past 5 fire seasons, over 11 lakh fires incidents reported in India.

- **Ministry of Environment, Forest and Climate Change** – Mentioned that *4 states* have reported over *1 lakh forest fire incidents* each in the *last five forest fire seasons*.
- **4 States** – Odisha, Madhya Pradesh, Chhattisgarh and Maharashtra.
- They accounted for 4,73,834 forest fires, which constitutes approximately 43% of the total forest fire incidents in India.
- **India State of Forest Report (ISFR) 2021** – Over 36% of the country's forest cover is estimated to be vulnerable to frequent forest fires.
    - **2.81%** - Extremely fire-prone.
    - **7.85%** - Very highly fire-prone category.
- **ISFR 2023** – Around 275 million rural people in India depend on forests for their livelihood security.

India has reported a staggering 11, 09,588 forest fires. Each year from November to June, forests across the country ignites, threatening ecosystems, wildlife and livelihoods.

- Communities residing near forested areas rely heavily on forests for Non-Timber Forest Products (NTFPs).
- **Major Factors** – Collection of *tendu leaves and mahua flowers* contributing to forest fires.

- *Shifting cultivation practices* adopted by local farmers, where an estimated 4.35 million hectares (mha) of forest area is affected by fires.
- **Reasons for fires** – Unsustainable exploitation of forest resources and coupled with increasing human activities threat to the balance of forest ecosystems.
- **Impacts** – It leads to loss of:
    - Human lives
    - Depletion of biodiversity
    - Habitat destruction
    - Reduced agricultural productivity
    - Landscape degradation
    - Disruptions to local livelihoods

3.12 Climate Risk Index

According to a climate risk index report, India was the 6th most affected by extreme weather events over the last 3 decades from 1993 to 2023.

- **Published since** – *2006*.
- **Published by** – *German watch*, a non-profit organization.
- **Climate Risk Index** – It is one of the longest running ***annual climate impact-related indices***.
- **It uses the data from**:
    - Emergency Events Database (EM-DAT) international disaster database.
    - World Bank.
    - International Monetary Fund (IMF).

More than 400 extreme weather events in the 3 decades, causing losses of nearly USD 180 billion (inflation-adjusted) and at least 80,000 fatalities.

- **Methodology –** It analyses climate-related extreme weather events' impacts via *3 hazard categories*:
    - Hydrological
    - Meteorological
    - Climatological
- It visualizes such events' degree of effect at 2 years before the index's publication and over the preceding 30 years.
- **6 key indicators** – Economic loss, fatalities, and affected people with *each in absolute and relative terms*.
- **Ranking** – It is based on the countries economic and human impacts (fatalities as well as affected, injured, and homeless).
- **Countries most affected in last 3 decades (1993-2022)** – The top 10 countries that are most affected are *Dominica, China, and Honduras* were the most affected countries followed by Myanmar, Italy and India (6th most affected).

- **India** – It ranks ***6th*** among the top 10 countries which shows high absolute fatalities and economic losses.
- India has faced a variety of increasingly frequent extreme weather events, including floods, heat waves, cyclones, and drought.
- *Floods and landslides* resulting from heavy monsoons displaced millions and damaged agriculture.
- Cyclones devastated coastal areas, underscoring India's diverse cli- mate risks.

Notable catastrophic events in India

1998	Gujarat Cyclones
1999	Odisha Cyclones
2014 & 2020	Cyclones Hudhud and Amphan
1993	Floods in northern India
2013 & 2019	Uttarakhand severe floods
1998, 2002, 2003 and 2015	Recurring and unusually intense heat waves, all with temperatures around 50°C, claimed many lives.

4. ENVIRONMENTAL ORGANISATIONS, CONVENTIONS & TREATIES

4.1 India in UNFF-19

India had informed its significant advancements in forest conservation and management over the past 15 years during the 19th session of United Nations Forum on Forests (UNFF).

- **UNFF-19** – It was held in New York, United States in 2024.
- **India in UNFF 19** – It had organised an event on *'Principles and Strategies for Landscape Integrated Fire Management* through Collaborative Governance', in UNFF 19.
- **India's recommendations** – To adopt an integrated approach to *forest fire prevention and management*, along with post-fire landscape restoration.
- It proposed operationalisation of the *Global Fire Management Hub*.
- India shared its experience with technology adoption
  - Use of remote sensing for near-real-time fire monitoring.
  - Online geoportals for forest fire reporting
  - Ecosystem-based approaches for post-fire restoration.
- **UNFF19 declaration**
  - To take urgent and accelerated actions to *halt deforestation and forest degradation*.
  - To *prevent land degradation*
  - To promote implementing the United Nations Strategic Plan for Forests and the achievement of the *Global Forest Goals*.

***United Nations Forum on Forests (UNFF)**, a UN body that aims to promote the management, conservation and sustainable development of all types of forests.*

***Global Fire Management Hub**, an initiative of the UNEP and FAO, which aims to create a platform for sharing knowledge and experience in mitigating forest fires.*

India's commitment to conservation

- **Species conservation & habitat protection** – India has completed the 50 years of 'Project Tiger' and 30 years of 'Project Elephant'.
- **International Big Cat Alliance** – A global initiative by India aimed at protecting and conserving the 7 big cat species worldwide through collaborative efforts.
- **Green Credit Program** – A market-based mechanism rewarding voluntary environmental actions by individuals, communities, and the private sector was introduced.
- **Forest fire management & forest certification** – In 2023, India hosted the Country Led Initiative under UNFF in Dehradun, focusing on these topics, whose recommendations were presented during UNFF 19.
- Globally, India ranks *3rd in the net gain in average annual forest area* between 2010 and 2020.

4.2 World Animal Day

World Animal Day is celebrated worldwide recently.

- World Animal Day is observed ***annually on October 4th.***
- **Theme, 2024 -** "The world is their home too".
- It was first *celebrated on 24th March 1925* by Heinrich Zimmermann, a German writer and animal welfare activist.
- The day is later celebrated yearly on October 4th to align with the feast day of Saint Francis of Assisi, the patron saint of ecology and animals.
- It is a global celebration that shines a light on animal rights, welfare, and conservation.
- This special day, dedicated to raising awareness about the protection and care of animals, encourages people to take action in safeguarding the creatures we share this planet with.
- It is a reminder of the vital role animals play in our world and our responsibility to ensure their safety and well-being.
- **Significance- Raising Awareness -** World Animal Day draws attention to the plight of animals across the world, especially those affected by habitat destruction, poaching, and climate change.
- It encourages people to learn about the challenges animals face and take steps to protect them.

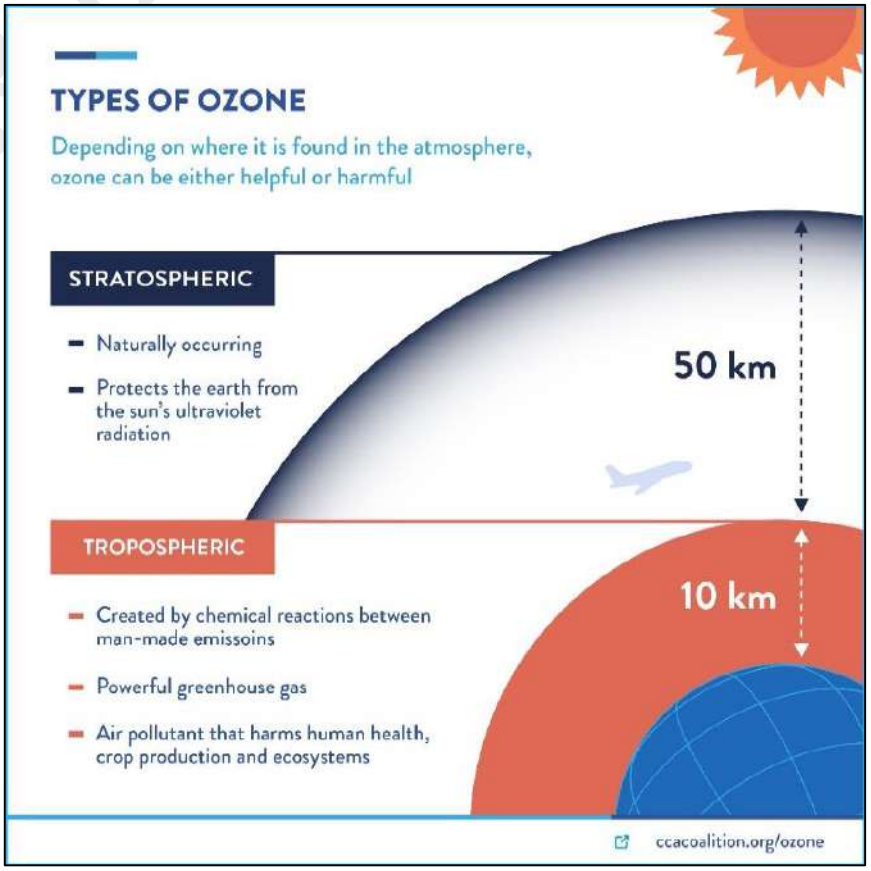
4.3 World Ozone Day, 2024

Recently, the Ministry of environment, forest and climate change celebrated the 30th world ozone day in New Delhi.

- **International Day for the Preservation of Ozone Layer** – It is celebrated ***annually*** on ***September 16.***
- **Designed by** – United Nations General Assembly.
- India has been celebrating this day since 1995.
- **Theme -** "Montreal Protocol: Advancing Climate Actions".

Montreal Protocol *was signed on 1987 to eliminate production of the Ozone Depleting Substances.It has been ratified by all the UN member states.*

- **Ozone (O3) –** It is a reactive gas, consisting of three oxygen atoms which can be *natural or man-made* and found in the Earth's high atmosphere (*stratosphere*).
- It is continuously created in the high atmosphere by the interaction of solar UV radiation with atmospheric oxygen.
    - **Dobson Unit (DU)** – It is the unit of measurement for *measuring the amount of ozone* in a column of air above the Earth's surface.
- The average total ozone concentration is usually around 300 DU (low at poles and higher at the equator).
- **Stratospheric Ozone** – It is present at a height of *around 15 to 30 km* is produced naturally by the interaction of solar ultraviolet light with molecular oxygen (O2).
- It protects the planet Earth from the harmful ultraviolet radiations from the Sun.



- **Ozone hole** – It refers to areas or regions harmed by damaging UV radiations.
- The ozone hole reached its biggest historical extent of 28.4 million square kilometers in September 2000.
- **Tropospheric Ozone** – Also known as ground-level ozone is principally produced by photochemical processes that involve volatile organic compounds (VOC) and nitrogen oxides.
- It is an explosive, pale blue gas with a distinct odour.

Recent condition of O3

- **Ozone depletion** – It is observed in *in both hemispheres* of the Earth, specifically Antarctica in the Southern Hemisphere and the Arctic in the Northern Hemisphere.
- However, the phenomenon is ***more recognized in Antarctica than in the Arctic***.
- **Relation with temperature** - If the temperature goes *below -78 degrees Celsius, stratospheric clouds form*, worsening the status of the ozone hole.
- **Action plan of India -** To phase out CFC, the Indian government has brought the *Indian Cooling Action Plan (ICAP)* document to phase out demand for refrigerants by 2037-38.
- It is a major gas which is contributing to rapid depletion of the Ozone layer and warming climate.

> ***CFCs** are nearly 2,000 times more potent than carbon dioxide (Co2) in terms of their global warming potential.*

- Because of this, the world has come together to phase out the CFC by 2040 at their 28th Meeting of the Parties on 15 October 2016 in Kigali, Rwanda under the Montreal Protocol.

4.4 World Wetlands Day

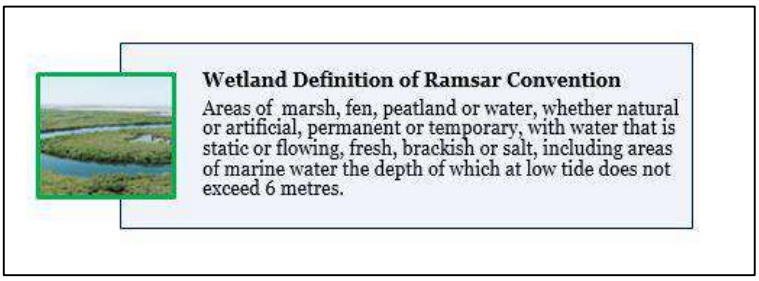
India announced new Ramsar Sites on the World Wetlands Day recently.

World Wetlands Day, 2025

- *February 2* is annually marked as World Wetlands Day.
- **Aim -** To spread awareness about conserving one of the most critical ecosystems on the planet.
- **Theme, 2025 -** "Protecting Wetlands for Our Common Future".
- **Wetlands -** Wetlands are regions covered by water either perennially or seasonally, such as marshes and lakes.
- They are vital reservoirs of biodiversity, aid water conservation and provide habitat for numerous migratory birds, aquatic species, and plant life.
- They also help recharge groundwater, control floods and support fisheries and local communities.
- From the point of view of climate change mitigation, wetlands are ***important carbon sinks***, absorb more carbon from the atmosphere than they release.

Ramsar Convention

- Ramsar Convention is an ***international treaty*** that aims to conserve wetlands and their resources.
- It was the ***first modern treaty*** between nations to conserve natural resources
- It was signed in 1971 in the Iranian city of Ramsar and came into force in **1975.**
- These sites receive international support for conservation and management.
- **Pillars -** Provides a framework for national action and international cooperation.



- Protects sites of global importance.
- Ensures the sustainable use and conservation of wetlands.
- **Main bodies of the Ramsar Convention -** The Conference of the Parties (COP) and Standing Committee.
- There are currently over 2,400 Ramsar Sites around the world.

- **Ramsar sites in India -** India has ***89*** Ramsar sites. Tamil Nadu has the most Ramsar sites at ***20***.
- India recently announced ***4 new Ramsar sites*** under the global agreement Ramsar Convention on Wetlands.

Newly Added Ramsar Sites, 2025	
Udhwa Lake	Jharkhand
Theerthangal	Tamil Nadu
Sakkarakottai	Tamil Nadu
Khecheopalri	Sikkim

5. GOVERNMENT INTERVENTIONS

5.1 Soil Nailing

The Tamil Nadu State highways department is undertaking the stabilisation of slopes around the Nilgiris' major roads by growing grasses to prevent soil erosion.

- **Soil nailing** – A geotechnical engineering technique that involves the *insertion of reinforcing elements into the soil* in a specified area to strengthen it.
- **Types** - Drilled and grouted soil nailing, driven soil nailing, drilling soil nailing, jet grouted soil nailing and launched soil nailing.
- **Technique** – Many holes are drilled in walls or slope face and then, nails are inserted in the pre-drilled holes.
- After that, the hole is filled with grouting materials such as concrete, shotcrete etc.
- **Application** – It is used for slopes, excavations, retaining walls etc. to make the soil more stable.

> ***Slope stabilisation project*** *uses soil nailing and Hydroseeding method,' is being undertaken in and around Nilgiris'.* ***Hydroseeding*** *is a process of applying a mixture of seeds, fertilizer, organic materials and water onto the soil to facilitate the growth of grass and plant-life.*

5.2 Strategic Interventions for Green Hydrogen Transition (SIGHT) Programme

The Union government has increased the Fertilizer Sector's allocation under the SIGHT Programme.

- **Aim -** To support the domestic manufacturing of electrolysers and the production of Green Hydrogen.
- **Umbrella Mission -** ***National Green Hydrogen Mission***.
- It caters the need of the fertilizer sector.
- **Nodal Ministry-** Ministry of New & Renewable Energy (MNRE).
- **Implementing agency-** The Solar Energy Corporation of India (SECI)

- **Financial incentive-** It consists of 2 distinct financial incentive mechanisms.
    - Incentive for manufacturing of electrolysers
    - Incentive for production of green hydrogen.

National Green Hydrogen Mission
• **Aim** – To accelerate the deployment of Green Hydrogen as a clean energy source, will support the development of supply chains that can efficiently transport and distribute hydrogen. • **Launched in -** January 2023. • **Target-** To achieve production capacity of ***5 million tonnes per annum of Green Hydrogen*** in the country by the year 2030. • **Significance-** It will drive major decarbonization of the economy, decrease reliance on fossil fuel imports, and position India as a leader in Green Hydrogen technology and markets.

5.3 Rhisotope Project

South African scientists injected radioactive material into live rhinoceros horns to curb poaching.

- **Aim –** To insert measured quantities of *radioisotopes into the horns* of live rhinos.
- To reduce the demand and save rhinos from the very real threat of extinction in South Africa.
- Concept – It is founded in 2021 by *Prof. James Larkin and Suzanne Boswell*.
- **Application** – Radioactively treated horns are more likely to be detected at international borders, making it more likely that smuggling syndicates are exposed, prosecuted and convicted.

South Africa is home to the largest population of rhinos in the world, including the world's largest population of white rhinos and about half of the African continent's black rhinos.

African Rhinos

Species	White Rhino	Black Rhino
Scientific Name	Ceratotherium simum	Diceros bicornis
Habitat	Long and short grass savanna areas in grasslands	Semi-Desert Savannah, Woodlands, Forests, Wetlands
Size	2nd-largest land mammal	It is smaller compared to white ones.
IUCN Status	Near Threatened	Critically Endangered
Distribution	South Africa, Zimbabwe, Namibia and Kenya	South Africa, Zimbabwe, Namibia and Kenya

5.4 Green Haryana manifesto, 2024

In a first-of-its-kind initiative, People for Aravallis group initiated the process of creating 'Haryana Green Manifesto 2024' to address urgent environmental concerns.

- **Aim-** To include their *environmental demands in the manifestoes of various political parties* ahead of the upcoming Haryana Assembly election.

Environmental concerns in Haryana
• **Degradation of land -** Desertification and Land Degradation Atlas of India, 2021, shows that 8.24% of the total geographical area of Haryana has degraded. • **Air pollution-** Haryana is home to ***8 of the 50 most polluted places in the world.*** • **Waste management-** Unsegregated waste is dumped across the state, leading to toxic landfills, affecting natural ecosystems and water bodies.

- **Groundwater depletion-** Groundwater levels have dropped significantly, especially in South Haryana, reaching depths of 1,500-2,000 feet.
- **Industrial pollution-** Chemical waste from industries is polluting water sources, affecting both humans and animals with ailments like skin diseases and breathing problems.

- **Main demand** – *To legally designate the Aravallis* including the Bhood areas and the Shivaliks as *'Critical Ecological Zones'.*
- It asks for legal protection be given to all the state's forests by including un-notified forests as *'deemed forests'* under the Punjab Land Preservation Act (PLPA).
- A demand for a strict *'Tree Act' for Haryana*, similar to the Delhi Preservation of Trees Act 1994.
- It asks to declare all *open natural ecosystems* (ONEs), such as the blackbuck natural habitat in Fatehabad district, as conservation or community reserves.
- A call for an action plan to reach a target of 10% native forest and tree cover within 4 years.
- **Crop-Diversification** – It is to ensure
    - Guaranteed purchase of every crop grown by the farmers on the MSP announced by the Centre,
    - Creating an action plan to restore soil and its microbial diversity
    - Incentivising natural farming practices that improve soil health.

5.5 Star Rating for Vehicles

The National Green Tribunal (NGT) has sought responses from some ministries of the Union government on a plea seeking implementation of a star-rating system.

- **2016 notification** – Ministry of Road Transport and Highways notified the amendment of the *Central Motor Vehicle Rules 1989* in order to introduce the star-rating system for all vehicles.
- It had specified the design of the *star-rating stickers* that were to be *placed on the windows of vehicles*
- The onus of putting them lying on the manufacturers.
- **Star rating systems –** It is rating based on fuel efficiency & carbon dioxide emissions across all vehicles.
- **Need** - India's *vehicular pollution accounts for 40% of the total air pollution* as per the Ministry of Earth Sciences.
- **Aim** – To *raise the consciousness* of customers on the importance of fuel efficiency, with the assumption that properly informed people will always buy fuel-efficient vehicles.
- The key information that are common in many countries are
    - *Fuel consumption per litre* for a stipulated number of kms (it could be separate for urban and rural)
    - *CO2 emissions in grams/km*
    - Annual fuel cost based on certain parameters
    - Fuel economy
    - *Greenhouse gas emission ratings*

India had unveiled the Bharat New Car Assessment Programme (Bharat NCAP) in 2023 to increase the road safety.

- **Global practices** – Also called as ***vehicle fuel efficiency labelling (VFEL),*** issued elsewhere since 1978.
    - For instance, in the Asia Pacific Economic Cooperation (APEC) region, *more than 13 countries* have already implemented VFEL.
- APEC countries include Australia, Canada, China, Japan, Korea, US, Vietnam and Thailand.
- Also implemented in non-APEC countries like Brazil, the UK and Germany.
- **Learnings from global practices** – Data signifies that a voluntary implementation of the system for vehicles has seen low coverage, with very few auto firms implementing it
- But a mandatory rule has been more effective.

5.6 Operation Bhediya

Recently, 5th wolf were trapped in Bahraich after deadly attacks.

- **Aim** – To ***capture wild wolves*** in the Bahraich region.
- **Launched by** – Forest Department of Bahraich District, ***Uttar Pradesh***.
- **Operation** – It includes increased monitoring of known wolf habitats and areas with frequent attacks to track their movements and prevent further incidents.
    - Creation of barriers to prevent wolves from entering human settlements.
    - Thermal drones are being deployed to track the wolf's movements.
    - Camera Traps were installed to automatically trigger by motion by the presence of the animal.
    - Identifying pugmarks and gathering intelligence from residents.
    - Permission to tranquilise the animals has also been granted by the Chief Wildlife Warden.
- **Wildlife Disaster area** - Uttar Pradesh government has declared the Bahraich district as a 'Wildlife Disaster' affected area.
- It will expedite the ongoing 'Operation Bhediya' to catch the animals involved in the attack on humans and help the affected families to get an ex-gratia amount without much trouble.

To know more about the wolves, click here

5.7 Elephant culling in Zimbabwe

Zimbabwe to Cull 200 Elephants to Alleviate Food Shortages amid Drought.

- **Elephant rich countries -** Estimated about 200,000 elephants inhabit a conservation zone that spans across 5 southern African nations - *Zimbabwe, Zambia, Botswana, Angola, and Namibia*.
- Zimbabwe is home to over 84,000 ***African savanna elephant (Loxodonta africana)***, also known as the *African bush elephant*, second highest worldwide.
- It holds approximately $600 million in ivory stockpiles that remain unsellable.
- **Culling –** It is the process of killing a number of animals in a group to prevent the group from becoming too large.
- **Reason for Culling**- Overpopulation of Elephants highlights that it leads to resource depletion and escalating human-wildlife conflicts.
- The nation has been advocating to the U.N.'s Convention on International Trade in Endangered Species (CITES) to allow the resumption of ivory and live elephant trading.
- African elephants in Botswana, Namibia, South Africa and Zimbabwe are included in ***CITES Appendix II.***
- This means that CITES Parties have agreed that
    - Although the species is "not necessarily now threatened with extinction" in these States,
    - It may become so unless international trade in specimens from these States is strictly regulated in order to "avoid utilization incompatible with their survival".
- **Center for Natural Resource Governance** - In Zimbabwe, denounced the culling that elephants have an inherent right to exist, and future generations should experience them in the wild.
- **MIKE Program** - Under CITES aims to
    - Help range States improve their ability to monitor elephant populations
    - Detect changes in levels of illegal killing
    - Use this information to provide more effective law enforcement and
    - Strengthen any regulatory measures required to support such enforcement

5.8 Integrated Development of Wildlife Habitats scheme (IDWH)

Cabinet gives nod to Rs. 2,602 crore Wildlife Habitats Development scheme recently.

- **IDWH** – It is a *centrally sponsored scheme* to develop wildlife habitats in India.
- **Launched by -** Ministry of Environment.
- **Components of the scheme**
  - *Support to Protected Areas* (National Parks, Wildlife Sanctuaries, Conservation Reserves and Community Reserves)
  - Protection of Wildlife Outside Protected Areas
  - *Recovery program* for saving critically endangered species and habitats
- **Role** – It has helped improve the habitats of critically endangered species like the Asiatic lion, snow leopard, and great Indian bustard.
- It also *helps reduce human-wildlife conflict*, generate employment opportunities, and improve the livelihoods of people living near protected areas.
- **Sub-schemes** – It includes Project Tiger, Project Elephant, Project Dolphin, and Project Lion.
- Project Tiger – It currently uses technology such as the ***M-STrIPES*** (Monitoring System for Tigers, Intensive Protection and Ecological Status) mobile application for day-to-day management practices.
- **The Project Dolphin** – It is to be supported by provisioning equipment such as Remotely Operated Vehicles (ROVs) and passive acoustic monitoring devices for enumeration of dolphins as well as their habitat.
- **Project Lion** – It is under the Development of Wildlife Habitat, will be strengthened as per activities envisaged.
- **Project Elephant** – It is envisaged to leverage information and communication technology interventions.

5.9 Ideas4LiFE portal

The union government recently launched the Ideas4LiFE portal.

- **Aim –** To invite ideas related to products and services for inducing behavioral changes related to environment-friendly lifestyles.
- **Developed by-** Ministry of Environment, Forest and Climate Change in partnership with UNICEF YuWaah.
- The winning ideas under each of the 7 themes of Mission LiFE will be recognized and awarded with attractive prizes for individuals as well as for institutions.
- **7 Themes**
  - Water Conservation
  - Energy Efficiency
  - Waste Reduction
  - E-Waste Management
  - Minimizing Single-Use Plastics
  - Embracing Sustainable Food Practices
  - Fostering Healthy Lifestyles

Mission LiFE

- LiFEStyle for Environment is a campaign that aims to encourage people to adopt environmentally conscious lifestyles.
- It was announced at the UN Climate Change Conference (UNFCCC COP26) in 2021.
- **Goals**
  - Mobilizing at least one billion people to take action to protect the environment
  - Making at least 80% of villages and urban local bodies environment-friendly by 2028
  - Encouraging people to engage in small, everyday actions that can halt climate change
- It emboldens the spirit of the ***P3 model*** i.e. Pro Planet People.

- It unites the people of the earth as pro planet people, uniting them all in their thoughts.
- It functions on the basic principles of 'Lifestyle of the planet, for the planet and by the planet'.

5.10 CO2-to-methanol plant

India's 1st CO2-to-methanol pilot plant with a capacity of 1.4 tons per day (TPD) to come up at Thermax Limited in Pune, Maharashtra.

- The plant marks a pioneering effort in *carbon reduction and conversion technology*.
- **Implemented by -** The Public-Private Partnership (PPP) model between the Indian Institute of Technology (IIT), Delhi, and Thermax Limited.
- **Supported by –** *Department of Science and Technology* under the Ministry of Science and Technology.
- **Fund** – Estimated cost of Rs. 31 crore.
- **Features -** It will act as a living lab for CCU research, focusing on developing new catalysts and processes for converting captured CO2 into chemicals.
- It includes both *pre-combustion and post-combustion carbon capture* techniques, which aim to reduce CO2 emissions significantly.
- **Carbon capture and utilization (CCU)** – It involves the process of converting carbon dioxide (CO2) to methanol involves capturing carbon emissions before they enter the atmosphere.
- **Carbon capture -** CO2 is captured from sources like power plants or directly from the air using direct air capture (DAC) technologies.
- **Hydrogenation -** The captured CO2 is then *reacted with hydrogen to produce methanol*.
- **Significance** – It can help reduce greenhouse gas emissions and create a sustainable fuel source.
- It can also help reduce the demand for fossil-based methanol production, which contributes to global CO2 emissions.

5.11 Swachh Vayu Survekshan Award 2024

Recently Union Environment Ministry presented Swachh Vayu Survekshan Awards for the year 2024.

- **Swachh Vayu Diwas** – It is the *International Day of Clean Air for Blue Skies* is celebrated on 7 Sept, 2024.
- **Current year host** - *Rajasthan* State Pollution Control Board.
- **Swachh Vayu Survekshan Awards** – They were presented to the best performing 9 National Clean Air Program (NCAP) cities.

Category	No. of Cities	Population	List of cities
Category 1	47 cities	above 10 Lakh plus population *(5 nos. of NCAP funded cities are also Million plus cities (MPCs) apart from 42 MPCs under XV-FC)*	List of 47 cities are attached at **Annexure-I.**
Category 2	44 cities	above 3 to 10Lakh population	List of 44 cities are attached at **Annexure-II.**
Category 3	40 cities	under 3 Lakh population	List of 40 cities are attached at **Annexure-III.**

*Population 2011 census

Award Category	Winners
Category-1 (Population over 10 Lakhs)	Surat, Jabalpur, and Agra
Category-2 (Population between 3 and 10 Lakhs)	Firozabad, Amravati, and Jhansi
Category-3 (Population under 3 Lakhs)	Raebareli, Nalgonda, and Nalagarh

- The Municipal Commissioners of winner cities were awarded with cash prizes, trophy, and certificate.
- **Evaluation Criteria** - The Criteria for Ranking of cities for ambient air quality will be on population basis.
- 131 NCAP cities are divided into 3 categories mentioned below:

National Clean Air Program

- It is a pollution control initiative, the government committed funds as well as set targets for 131 (non-attainment cities) of India's most polluted cities.
- **Year-** 2019
- **Ministry**- Ministry of Environment, Forest and Climate Change.
- **Non-attainment cities**- Cities that did *not meet the national ambient air quality standards (NAAQS)* for the period of 2011-15 under the National Air Quality Monitoring Program (NAMP).
- **Goal-** To meet prescribed annual average ambient air quality standards at all locations in the country in a stipulated timeframe (long-term).
- **Objectives-**
  - Mitigation measures for prevention, control and abatement of air pollution.
  - Augment public awareness and capacity building measures.
  - Augment and strengthen air quality monitoring network across the country
- **Tenure**-
  - **Mid-term**- *5 years action plan* to begin with keeping 2019 as base year.
  - **Long term**- The program is further extendable to *20-25 years* after mid-term review of the outcomes
- **Phase-I** - It proposes a tentative national target of 20%-30% reduction in PM2.5 and PM10 concentrations by 2024, with 2017 as the base year for comparison.
- **Phase-II**-The government set a new target of a 40% reduction in particulate matter concentration, by 2026.
- **Fund**- The program is backed by *15th Finance Commission*.
- **Cities responsibilities**- Cities are required to take measures to improve air quality inter-alia include solid waste management, control of pollution from biomass burning and air pollution from construction & demolition activities.
- **Non-binding**- There are no specified penal actions against cities that fail to meet the targets.
- **PRANA**– Portal for Regulation of Air-pollution in non-attainment cities, is a portal for monitoring of implementation of National Clean Air Programme (NCAP).
- **Status of air quality**- Out of 131 identified cities, decrease in PM10 Concentration has been observed in 88 cities during 2022-23 as compared to levels during FY 2017-18.

5.12 Umbrella Conservation project

The wildlife wing of the Pune Forest department has recently proposed an umbrella conservation project.

- It is a ***species-specific conservation*** approach.
- **Coverage** – It *covers 5 wild animal species* namely wolf, jackal, fox, civet and hyena, together, these species are called '*Mizo-Carnivorous*'.
- **Wolves** - The most endangered population of wolves in Pune.
- **Leopards** - The leopard population is expanding to new areas, causing significant crop and cattle damage.
- **Other animals** - Other wild animals in Pune are threatened by habitat destruction, conflict with stray dogs, and diseases.
- **Implementation** – It will be implemented in *3 phases*.
- The 1st phase will begin with data collection regarding the animal population and identifying the area they are living in and also includes areas outside the protected forest.

- The later stage will include threat analysis and mitigation measures.
- The conservation plan has been submitted to the forest head office, and it is under consideration by the chief wildlife warden.
- **Threats -** Habitat destruction due to expansion of agriculture in grasslands, infrastructure projects.

5.13 Uttarakhand Bird Census

Recently, the 2-day bird census has been organized in Uttarakhand.

- It is the ***1st ever bird count in Uttarakhand***.
- **Organized By -** The *E-Bird Organization* in collaboration with the forest department and other groups.
- **Goal -** To establish a dedicated annual bird count for Uttarakhand, bringing communities together to celebrate the state's rich birdlife.
- **Time** - *Mid-November* is an interesting time for birds count in this region as the *altitudinal migrants descend to lower elevations* and long-distance migrants arrive from far-off lands, joining resident species who are adapting to the presence of this region.

Key findings of the Survey

- **Avian diversity** – It had concluded with ***729 bird species*** across 13 districts.
- **Leading District** – They are in the order as follows
  - **Nainital** - 251 species
  - **Dehradun** - 230 species
  - **Pauri Garhwal**
- **Highest birds count** – It includes the species *Ruddy Shelducks, Indian Spot-billed Ducks, and Eurasian Coots*.
- **Endangered species** - The *17 species classified as endangered* which includes the Pied Avocet, Red-wattled Lapwing, Spotted Dove, Rose-ringed Parakeet, Greater Coucal, and White-throated Kingfisher.

E-Bird Organization India

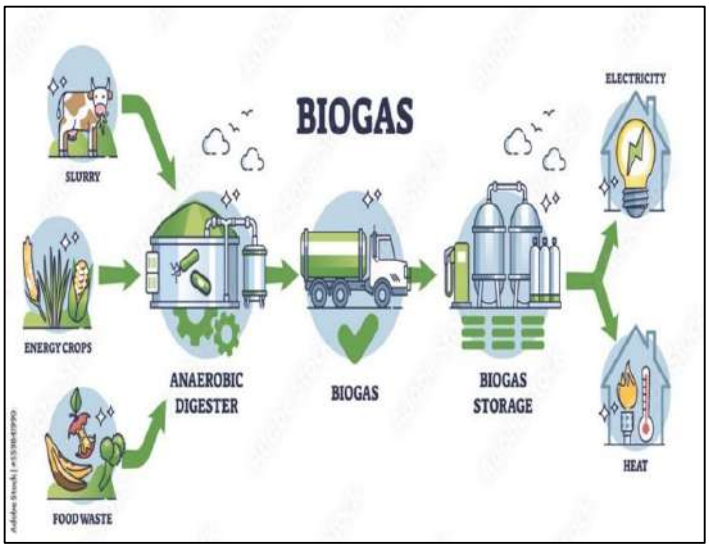
- It is a *collaborative project managed by Bird Count India*.
- It is designed for the use of birders.

Bird Count India *is a partnership of a large number of organizations and groups working to increase our collective understanding of the distribution, abundance, and population trends of Indian birds.*

5.14 Compressed Biogas (CBG) Plant

Recently, the Prime Minister inaugurated new 100 tons per day cattle dung based Compressed Bio-Gas (CBG) plant in Gwalior.

- **Compressed Biogas (CBG) -** It is produced by ***anaerobic digestion of biomass and waste sources*** like agricultural residue, cattle dung, sugarcane press mud, municipal solid waste, sewage treatment plant waste, etc.
- It consists of more than 90% of methane and other gasses like carbon dioxide less than 4%.
- **Compressed Biogas (CBG) Plant -** It is *India's 1st modern, self-sufficient gaushala* that houses a state-of-the-art Compressed Biogas (CBG) plant.
- It is the ***first CBG plant in Madhya Pradesh***.
- **Vision -** Waste to Wealth initiative.
- **Ministry -** Ministry of Housing & Urban Affairs
- It is the *Gwalior's largest cowshed over 10,000 cattle live here*.
- **Operated by -** Gwalior Municipal Corporation.



- **Operation –** Biogas will be prepared from cattle dung & garbage such as vegetable and fruit waste materials collected from mandis and homes.
- It transforms cow dung, an often-underutilized resource, into Bio CNG and organic manure.
- It will generate 2 tons of compressed Biogas daily from 100 tons of cattle dung.
- It produces 10-15 tons of dry bio-manure daily, a valuable by-product for organic farming and also produces 2-3 tons of Bio-CNG daily.

5.15 Green Steel Taxonomy

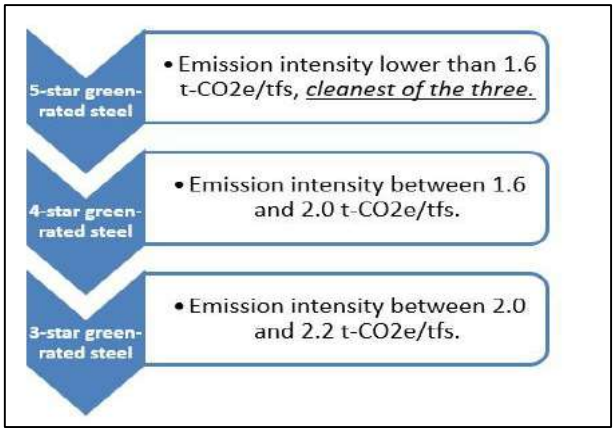
Recently, the Union Minister of Steel & Heavy Industries announced the taxonomy for Green Steel based on emissions.

- **Aim** – To redefine the *production of steel by focusing on reducing carbon emissions* and fostering innovation in sustainable practices.
- To decarbonise the steel sector in alignment with net-zero emission intensity target by 2070.
- **Launched by** – Ministry of Steel & Heavy Industries.
- **Green Steel** – It is defined in terms of ***percentage greenness of steel.***
- It is produced with Carbon dioxide (CO_2) emission intensity less than 2.2 tonnes of Carbon dioxide equivalent (CO_2e) per Tonne of Finished Steel (tfs).
    - **Carbon dioxide equivalent (CO_2e)** means the number of metric tons of CO_2 emissions with the same global warming potential as 1 metric ton of another greenhouse gas.

*India is the **world's first** nation to release the Taxonomy of Green Steel.*

*India is the **world's biggest** steel producer after China.*

- The greenness is expressed as a percentage, based on the steel plant's emission intensity, which is lower compared to the 2.2 t-CO_2e/tfs threshold.
- **Steel rating** – Based on the quantity of carbon emissions per metric tonne, the steel is rated.
- Steel with emission intensities ***exceeding 2.2 tCO_2/tfs will not qualify for a green rating.***
- The star rating is *reviewed every 3 years*.
- **Emission Scope** – It includes Scope 1, Scope 2, and limited Scope 3, up to finished steel production.
- It is from beneficiation, agglomeration processes, and embodied emissions in raw materials.
- **Monitoring** – The *National Institute of Secondary Steel Technology (NISST)*, as the nodal agency to oversee the Measurement, Reporting and Verification (MRV).
- NISST also issue the greenness certificates and star ratings for the steel.
- The certificate is issued on *yearly basis* (financial year).



5.16 Green Bank

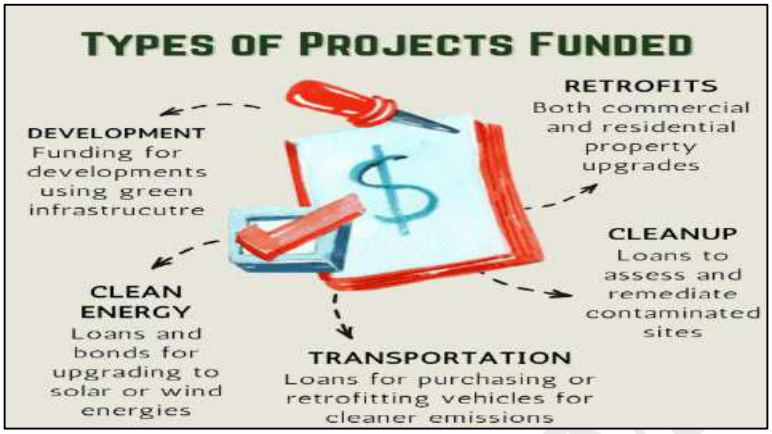
Recent study by the Council on Energy, Environment and Water (CEEW) and Natural Resources Defense Council India (NRDC) highlighted the need for a green bank in India.

- **Green banking** – It is a new financing trend where banks shift their investment strategies to *focus on sustainable technologies and environmentally-friendly initiatives.*
- **Primary objectives**
    - To protect the environment for future generations
    - To minimize paperwork and concentrate on electronic transactions

*The 29th Conference of Parties to the UN Framework Convention on Climate Change (COP29) ended with the assurance of **$300 billion** annually as climate finance. The demand of $1.3 trillion by the Global South for establishment of a 'Green Bank'.*

- It became widely popular among banks following the Paris Climate Agreement in 2015 at Cop21 of UNFCCC.

- **Green banks** – It is a ***mission-driven institutions*** that use innovative financing to accelerate the transition to clean energy.
- Banks can also become green at a more local level by instituting ***eco-friendly lending policies.***
  - **For example**, it could be like loans for electric vehicles and home solar electric systems or company-wide policies banning investments in harmful industries such as fossil fuels.



*The State Bank of India has adopted green banking as a policy and is the **1st green bank in India**, by going green and encouraging green energy projects.*

- **In India** - The World Bank has recently announced a $1.5 billion funding for India in its efforts to develop energy from low carbon sources.

5.17 Multi-taxon Global Freshwater Fauna Assessment

The recently published study of multi-taxon global freshwater fauna assessment has identified Western Ghats as a hotspot of threatened freshwater species.

- **Study by** – *IUCN* (International Union for Conservation of Nature).
- **Global assessment** – It evaluates the extinction risk and conservation status for diverse freshwater fauna groups.
- It is the *1st ever multi-taxon global freshwater fauna assessment* for the IUCN Red List of Threatened Species.
- It is a comprehensive assessment involving contributions from *more than 1,000 species experts over 20 years.*
- It underscores the historical underappreciation of freshwater ecosystems in global environmental governance
- **Coverage** – 23,496 *Decapod crustaceans, Fishes and Odonates*.

Threats	Impact on Freshwater Species
Pollution	54%
Dams and water extraction	39%
Land-use	37%
Invasive species and disease	28%
Habitat loss and degradation	84%
Agricultural practices	74%
Logging	49%

- **Findings** – It revealed that a *staggering 1/4th of the freshwater fauna are threatened* with extinction, and a record of 89 confirmed and 187 suspected extinctions since 1500 AD.
- **Hotspots of Threatened Freshwater Species**
  - **Lake Victoria** - Kenya, Tanzania & Uganda.
  - **Lake Titicaca** - Bolivia & Peru.
  - **Wet Zone** - Sri Lanka.
  - **Western Ghats** - India.

*Climate change and severe weather events pose a substantial risk, impacting nearly **1/5th of threatened freshwater species.***

- **Threat in Western Ghats** – It harbours over 300 freshwater fish species of which *more than 1/3rd face extinction*.
- **Western Ghats** is the only region in Asia with 2 endemic families of freshwater fishes which are exclusively found in groundwater and subterranean systems.

*The iconic **Humpbacked mahseer**, a critically endangered megafish that can grow up to weigh 60 kg, was found in Western ghats.*

- Among Indian States, *Kerala has the highest number of threatened freshwater fishes*, with 74 of its 188 fish species for which Red List assessments are available categorized as threatened.
- **Periyar River** stands out as a critical conservation priority due to its high concentration of endemic and threatened freshwater fish species.

5.18 Pongal Bird Count (PBC)

Recently, the Pongal Bird Count completed its 10 years.

- **PBC** – It is an initiative of the Tamil Birders Network.
- It is an *annual bird monitoring programme* for the state of Tamil Nadu.
- **1st PBC** – It was conducted in *2015*.
- **Time period** – It happens *every year during the Pongal Festival* which falls in January.
- **Purpose** – To know the snapshot of distribution and abundance of the birds of Tamil Nadu.

Pongal Bird Count (PBC), 2025

- **Organized by** – Tamil Birders Network.
  - Bird Count India.
- **Total bird species** – *332*, were spotted across the state.
- **Decline in bird count** – The number of birds is lower during this year, where last year a total of *345 bird species spotted*.
- **Reasons** – It attributed to many reasons including,
  - Rains and unscientific de-silting of water bodies that wiped off natural vegetation from the bunds.
  - Dumping waste in lakes unaware of the presence of domestic and migratory birds.
  - Copious water in the lakes.
  - Brimming lakes.

5.19 National Plan for Conservation of Aquatic Ecosystems

The central government is implementing the National Plan for Conservation of Aquatic Ecosystems (NPCA) to conserve and manage wetlands nationwide.

- **NPCA** – It is a conservation program for ***wetlands and lakes.***
- It is formed by merging the National Lake Conservation Plan and the National Wetlands Conservation Programme.
- **Objectives –** To holistically *conserve and restore the wetlands* for achieving the desired water quality enhancement, besides improvement in *biodiversity and ecosystems*.
- To promote *mainstreaming of wetlands* in developmental programming with States by *supporting formulation and implementation* of integrated management plans, capacity development and research.
- **Mode –** It is a ***centrally sponsored scheme***.
- Central assistance is provided *based on state government proposals*, aligned with guidelines and *budget availability*.
- **Regulated by-** The *Wetlands (Conservation and Management) Rules, 2017*, established under the Environment (Protection) Act, 1986.
- **Implemented by-** Ministry of Environment, Forest and Climate Change.
- **NPCA Guidelines** – To facilitate implementation of NPCA by outlining the different steps to be undertaken for preparing and submitting plans before implementation.
- **Activities covered** - Wastewater treatment, shoreline protection, lakefront development, desilting, stormwater management, bioremediation, catchment area treatment, lake beautification, survey and

demarcation, bio-fencing, fisheries development, weed control, biodiversity conservation, education, and community participation.

'Wetlands Rejuvenation' programme

- It aims on *Restoration & Rejuvenation of at least 100 major wetlands* across the country.
- It is structured based on 4 pronged approach.
- **Wetland Brief Document** - Developing baseline information
- **Wetland Health Card** - Rapid assessment of wetlands condition
- **Wetlands Mitras** - Stakeholder platforms to enable collaborative and participatory management
- **Wetland Integrated Management Plan** - Management planning addressing wetlands' biodiversity and ecosystem services, values and threats.
- In continuation to the first cycle, it is now being scaled up to 1,000 wetlands, reaching out to all districts of the country.

5.20 Bharat Zero Emission Trucking (ZET)

The Principal Scientific Adviser (PSA) recently launched the "Bharat Zero Emission Trucking (ZET) Policy Advisory".

- **Zero-emission trucks-** These are vehicles that produce no tailpipe emissions, contributing significantly to reducing greenhouse gas emissions and improving air quality.
- These trucks are primarily powered by either ***electric batteries or hydrogen fuel cells***, making them an essential part of the transition to sustainable transportation.
- ZETs are crucial for ***decarbonization and energy security***.
- **Bharat Zero Emission Trucking policy-** It is a dynamic document designed to guide India's transition to ***zero-emission trucking.***
- **Aim-** It is initiatives and strategies to promote zero-emission trucking as part of the broader goal to reduce carbon emissions in the transportation sector.

Tailpipe emissions *are the release of pollutants into the atmosphere from the end pipe of a car's exhaust system. These emissions are caused by the combustion of fuel, such as gasoline, diesel, or biofuel.*

- **Target-** The goal is to reach ***100% ZET sales*** penetration by 2050 to achieve ***India's Net Zero 2070 target.***
- **Focus area-** The document is dynamic, with 30 policy interventions across five key areas i.e. ***incentives, regulations, infrastructure, business and financing, and stakeholder-centric*** initiatives.
- **Nodal Agency Responsibility-** It links each policy intervention to a nodal agency responsible for its implementation.
- **Key Stakeholder**- Central Ministries, central and state agencies, Financiers, Private companies, Research Organisation and Labour Union.
- **Development and Oversight-** The development of the advisory was led by a Policy Advisory Panel (PAP) constituted by the Office of the Principal Scientific Adviser (PSA).
- The drafting was done by a Project Management Unit at the Centre of Excellence for Zero Emission Trucking (CoEZET), IIT Madras, under the guidance of the PAP.
- **Strategic Importance-** The advisory is expected to play a crucial role in shaping India's strategy for transitioning to zero-emission trucking, aligning with the country's broader environmental and energy goals.

5.21 TrailGuard AI

Recently, the Similipal Tiger Reserve in Odisha was fitted with 100-150 cameras loaded with TrailGuard an Artificial Intelligence (AI) model.

- **TrailGuard AI** – It is an end-to-end, ***camera-based alert system*** and an effective anti-poaching tool.
- **Developed by** – Nightjar Technologies, a social impact enterprise in Gurgaon, Haryana.

- It is designed for enhancing wildlife conservation and promoting human-wildlife coexistence in remote areas.
- **Deployment along** – *Trails or access points* in areas of interest.
- **Unique Features** – Its ***battery life***, lasts for 6 months to 1 year based on the number of images it sends.
- It transmits human and wildlife activities in remote areas in under *30 seconds.*
- **AI hardware –** It combines durable outdoor hardware, on-the-edge AI algorithms, and real-time transmission capabilities.
- **Real-time Alert system –** It autonomously detects target objects, and transmits real-time alerts that can trigger,
    - Rapid-response to entry by poachers or illegal loggers.
    - Wildlife entering agricultural or pastoral lands.
    - Status of endangered or exotic invasive species.
- **Usage in multiple cases:**
    - Human-wildlife conflict
    - Park intrusion monitoring
    - Wildlife monitoring
    - Illegal logging
    - Mine security
    - Border security.

*Similipal is the **1st reserve** where TrailGuard has shown success as an '**anti-poaching tool**' but it has takers outside Odisha as well. It has also been implemented in the Kanha Tiger Reserve in Madhya Pradesh and Dudhwa National Park in Uttar Pradesh with 20 and 10 cameras respectively.*

6. PROTECTED AREAS IN NEWS

Protected Areas of India
• Protected areas - Human occupation or at least the exploitation of resources is limited and it includes 1. National Parks 2. Wildlife Sanctuaries 3. Conservation Reserves 4. Community Reserves 5. Marine Protected Areas
1. National Park • An area, whether within a sanctuary or not, can be notified by the state government. • No human activity is permitted inside the national park except for the ones permitted by the Chief Wildlife Warden of the state.
2. Wildlife Sanctuaries • Any area other than area comprised with any reserve forest or the territorial waters can be notified by the State Government to constitute as a sanctuary. • Some restricted human activities are allowed inside the Sanctuary area.

3. Conservation reserves and Community reserves

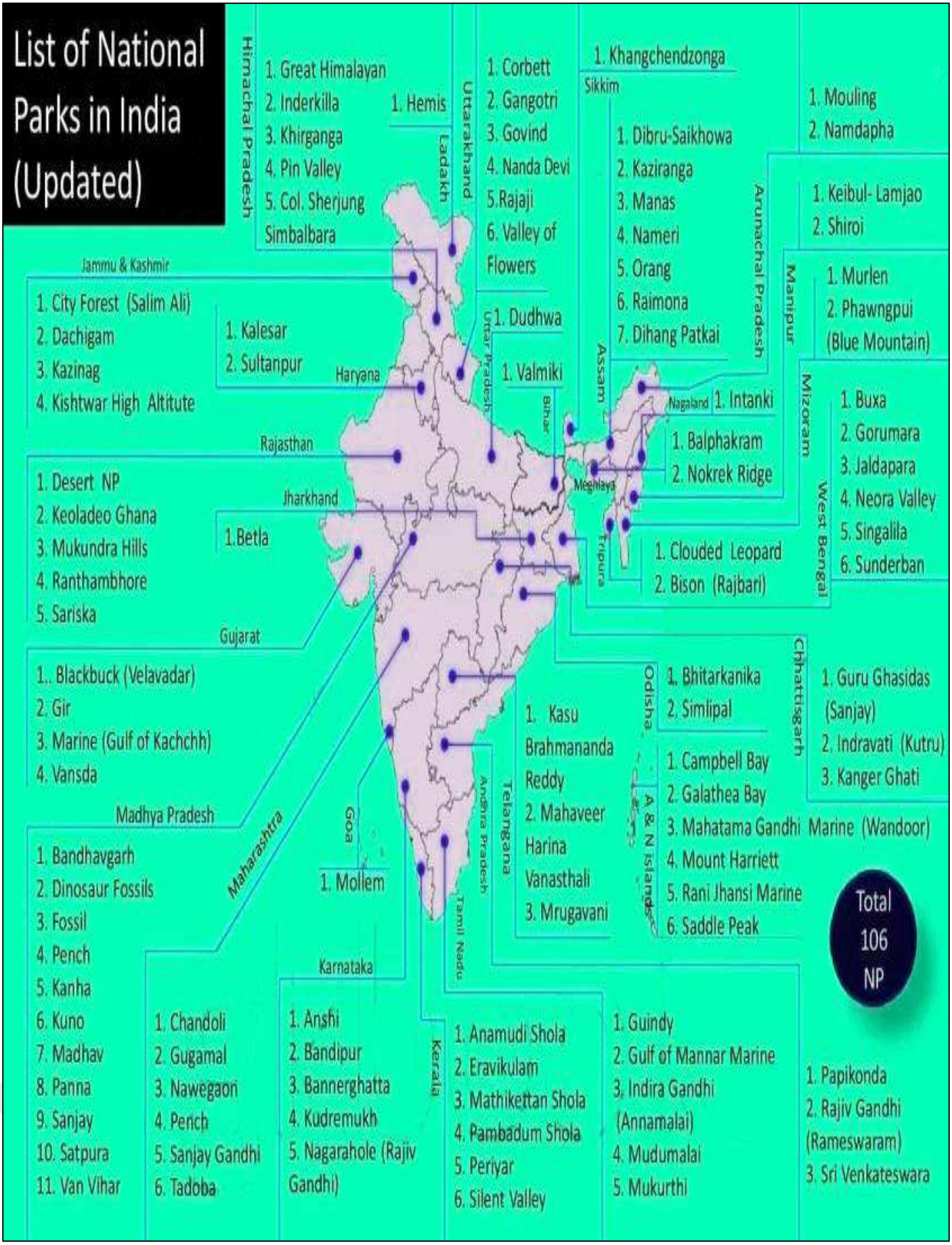
- It was first introduced in the Wildlife (Protection) Amendment Act of 2002.
- They act as buffer zones to or connectors and migration corridors between established national parks, wildlife sanctuaries and protected areas.
- **Conservation Reserves** – Such migration corridors if uninhabited and completely owned by the Government of India but used for subsistence by communities are called Conservation reserves.
- **Community Reserves** – Such migration corridors if privately owned are called community reserves.

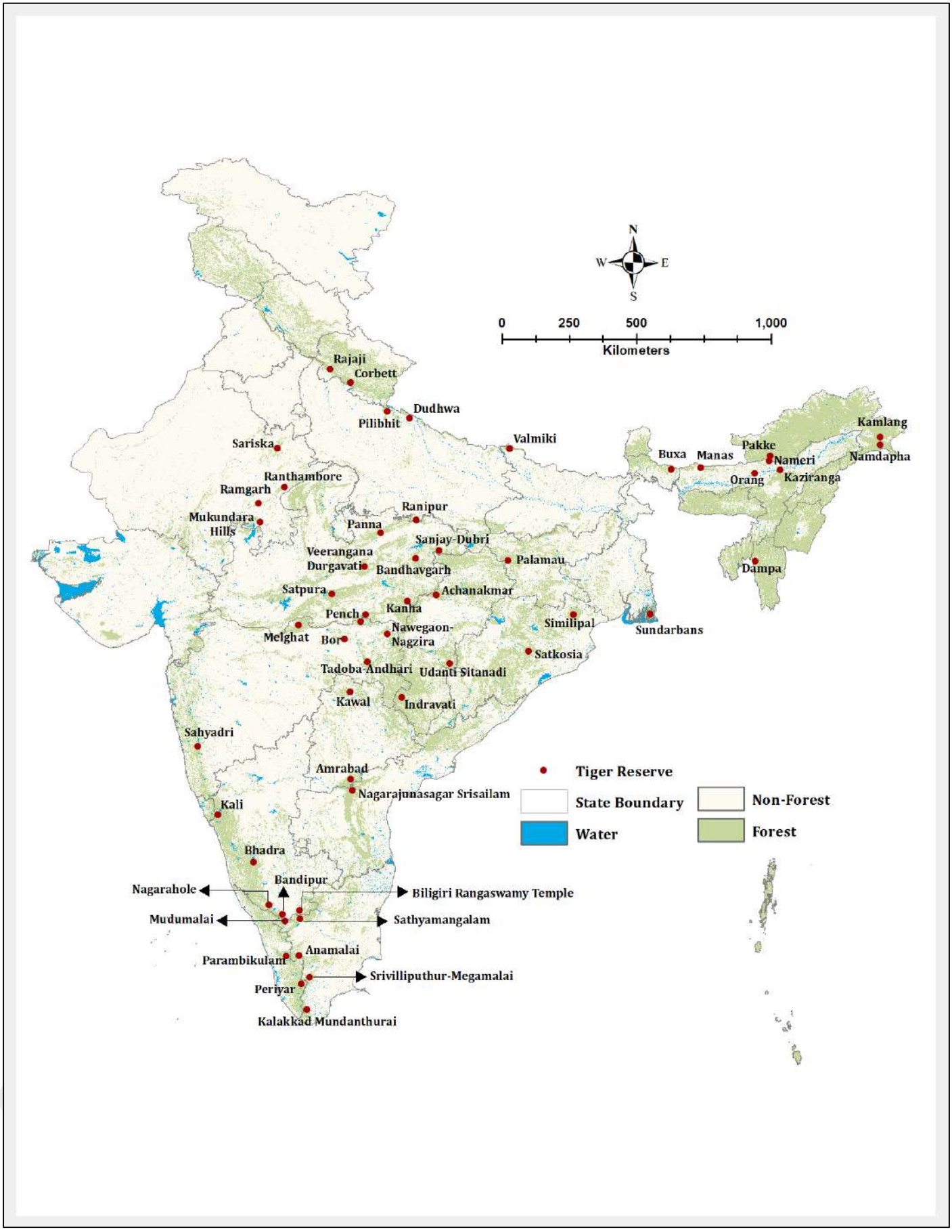
4. Marine Protected Areas

- A space in the ocean where human activities are more strictly regulated than the surrounding waters.
- These places are given special protections for natural or historic marine resources.

- Tiger Reserves - 58
- Elephant Reserves - 33
- Biosphere Reserves - 18
- World Network of Biosphere Reserves - 12
- RAMSAR Wetland Sites - 89
- World Heritage Sites - 43
  - Natural World Heritage Sites - 7
  - Cultural World Heritage Sites - 35
  - Mixed World Heritage Sites - 1

Protected Areas of India	Numbers
National Parks	106
Wildlife Sanctuaries	573
Conservation Reserves	115
Community Reserves	120
Marine Protected Areas	129


List of National Parks in India (Updated)
Himachal Pradesh
1. Great Himalayan
2. Inderkilla
3. Khirganga
4. Pin Valley
5. Col. Sherjung
Simbalbara
1. Hemis
Ladakh
Uttarakhand
1. Corbett
2. Gangotri
3. Govind
4. Nanda Devi
5.Rajaji
6. Valley of Flowers
1. Khangchendzonga
Sikkim
1. Mouling
2. Namdapha
Jammu & Kashmir
1. City Forest (Salim Ali)
2. Dachigam
3. Kazinag
4. Kishtwar High Altitute
1. Kalesar
2. Sultanpur
Haryana
Uttar Pradesh
1. Dudhwa
1. Valmiki
Bihar
Assam
1. Dibru-Saikhowa
2. Kaziranga
3. Manas
4. Nameri
5. Orang
6. Raimona
7. Dihang Patkai
Arunachal Pradesh
1. Keibul- Lamjao
2. Shiroi
Manipur
1. Murlen
2. Phawngpui (Blue Mountain)
Nagaland
1. Intanki
Mizoram
1. Buxa
2. Gorumara
3. Jaldapara
4. Neora Valley
5. Singalila
6. Sunderban
Rajasthan
1. Desert NP
2. Keoladeo Ghana
3. Mukundra Hills
4. Ranthambhore
5. Sariska
Jharkhand
1.Betla
Meghlaya
1. Balphakram
2. Nokrek Ridge
Tripura
1. Clouded Leopard
2. Bison (Rajbari)
West Bengal
Gujarat
1.. Blackbuck (Velavadar)
2. Gir
3. Marine (Gulf of Kachchh)
4. Vansda
Odisha
1. Bhitarkanika
2. Simlipal
Chhattisgarh
1. Guru Ghasidas (Sanjay)
2. Indravati (Kutru)
3. Kanger Ghati
Madhya Pradesh
1. Bandhavgarh
2. Dinosaur Fossils
3. Fossil
4. Pench
5. Kanha
6. Kuno
7. Madhav
8. Panna
9. Sanjay
10. Satpura
11. Van Vihar
Maharashtra
Goa
1. Mollem
Andhra Pradesh
Telangana
1. Kasu Brahmananda Reddy
2. Mahaveer Harina Vanasthali
3. Mrugavani
A & N Islands
1. Campbell Bay
2. Galathea Bay
3. Mahatama Gandhi Marine (Wandoor)
4. Mount Harriett
5. Rani Jhansi Marine
6. Saddle Peak
Total 106 NP
Karnataka
1. Anshi
2. Bandipur
3. Bannerghatta
4. Kudremukh
5. Nagarahole (Rajiv Gandhi)
Kerala
1. Anamudi Shola
2. Eravikulam
3. Mathikettan Shola
4. Pambadum Shola
5. Periyar
6. Silent Valley
Tamil Nadu
1. Guindy
2. Gulf of Mannar Marine
3. Indira Gandhi (Annamalai)
4. Mudumalai
5. Mukurthi
1. Papikonda
2. Rajiv Gandhi (Rameswaram)
3. Sri Venkateswara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Bandhavgarh
Palamau
Satpura
Achanakmar
Kanha
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Tadoba-Andhari
Udanti Sitanadi
Satkosia
Similipal
Sundarbans
Kawal
Indravati
Sahyadri
Amrabad
Nagarjunasagar Srisailam
Kali
Bhadra
Bandipur
Nagarahole
Biligiri Rangaswamy Temple
Mudumalai
Sathyamangalam
Anamalai
Parambikulam
Srivilliputhur-Megamalai
Periyar
Kalakkad Mundanthurai
Kamlang
Pakke
Namdapha
Buxa
Manas
Nameri
Orang
Kaziranga
Dampa
Tiger Reserve
State Boundary
Water
Non-Forest
Forest

6.1 Protected Areas in news

S.No	Protected Areas in news	State	Features
1	**Chinnar Wildlife Sanctuary**	**Kerala**	*The tribal settlements in Chinnar Wildlife Sanctuary are reviving cultivation of millets and endemic crops through Punarjeevanam scheme.* • Chinnar WLS is home to the Great Grizzled Squirrel of India. • Punarjeevanam (revival or resurrection) scheme was launched in 2016 by Kerala Forest and Wildlife Department to revive farming of millets and endemic crops in the tribal settlements.

2	**Sariska Tiger Reserve**	**Rajasthan**	*The Supreme Court has ordered to shutter 68 mines operating within a 1-km periphery of the critical tiger habitat (CTH) of the Sariska reserve.*
			• **Located at** – Rajasthan, nestled in the lap of Aravalli hills.
			• **Ecosystem** – It contains mountains, grasslands, dry deciduous forests and cliffs which span over 800 square kilometres.
			• **Biodiversity** – Nearly 90% of the area in the sanctuary is covered with dhok trees and is home to India's largest population of peafowl.
			• The Siliserh Lake on of the park has a large number of crocodiles.
			• **Historical significance** – It houses the ruins of medieval temples of Garh-Rajor that date back to the 10th and 11th centuries.
			• Also, a 17th century castle on a hilltop at Kankwari provides a panoramic view of flying vultures and eagles.
			• **Recognition of Sariska**
			  ○ 1955 - Wildlife sanctuary
			  ○ 1978 - Tiger reserve
			  ○ 1979 - National Park

3	**Ramgarh Vishdhari Tiger Reserve (RVTR)**	**Rajasthan**	*A Tigress RVT-2 from the Ramgarh Vishdhari Tiger Reserve (RVTR) died recently, a massive setback for tiger conservation in Rajasthan.* • Ramgarh Vishdhari Tiger Reserve (RVTR) is located in Bundi district, ***Rajasthan.*** • **Established in –** 2022. • It is the ***4th tiger reserve*** in Rajasthan and the 52nd overall in India. • The reserve includes the Ramgarh Wildlife Sanctuary as its core area. • **Topography** - It represents a mix of ***Vindhyan and Aravalli*** geographical features. • It is in continuation with the buffer area of ***Ranthambore Tiger Reserve*** on the north-eastern side and Mukundara Hills Tiger Reserve on the southern side.

			• **Rivers** - Mez, a tributary of the Chambal River, passes through the tiger reserve. • **Vegetation** - Dry Deciduous Forest. • **Flora** – It comprises of fairly dense forest with ***dhok*** being the predominant species. • The major tree species are Dhok (Anoggesius pendula) Khair (Acacia catechu), Amaltas (Cassia fistula), Tendu, Salar, Jamun, Kadamb, Ronjh, Ber, Arjun, etc. • **Fauna** - Tigers, Panthers, Sloth Bears, Jungle Cats, Palm Civets, Ratels, Mongoose, Chital, Sambar, Wild Boar, Nilgai, Langur, and more than 150 species of birds.
4	**Nagarhole Tiger Reserve**	**Karnataka**	*Recently, Ashwatthama, a Dasara elephant, died due to alleged electrocution in Karnataka.* • **Location -** Nagarahole *is an important Tiger Reserve in Karnataka, supporting the highest number of wild tigers in India and single largest Asiatic elephant population in the world.* • *It is* previously *known as Rajiv Gandhi National Park.* • Nagarahole *is contiguous with Wayanad wildlife sanctuary (Kerala) to the south and Bandipur Tiger Reserve to its south eastern parts.* • **Established in –** *It is* established *as a wildlife sanctuary in 1955 and was upgraded into a national park in 1988.* • **Reservoirs -** *The* Kabini *and Taraka reservoirs are large waterbodies in the park.* • *River Kabini* separates *the Nagarahole & Bandipur tiger reserve.* • **Tiger population-** *Nagarahole* is acclaimed as one of the high-density tiger populations in the country after Corbett & Kaziranga tiger reserves respectively. • *It is part of Nilgiri Biosphere Reserve*, one of the oldest and largest conservation areas in the world. • It was declared as the 37th Tiger reserve under Project Tiger in 1999. • **Flora -** The forests are interspersed with Marshy Swamps called 'Hadlu', characetrised by open grassy lands with scattered presence of stunted specimens. • **Fauna –**Leopard, Asiatic Wild Dog, Sloth Bear, Asiatic Elephant Gaur, Sambar, Chital, Muntjac, Four Horned Antelope, Wild Pig Mouse Deer and South-western langur.
5	**Amangarh Tiger Reserve**	**Uttar Pradesh**	*The body of an eight-year-old tiger was found on the border of Amangarh Tiger reserve of Bijnor and Jim Corbett National Park recently.* • It is a protected area in Bijnor district, Uttar Pradesh. • The reserve encompasses a combination of grasslands, wetlands and dense forest. • **Established in –** 2012. • It is also known as New Jim Corbett Park.

			• It has been declared as buffer area of Corbett Tiger Reserve to be known as the Amangarh Tiger Reserve, is now a corridor to Asiatic Elephant, Tiger and much other wild life. • It is a part of **Project Tiger** and is recognized for its rich biodiversity and wilderness. • The Reserve was said to have 13 tigers which jumped to a total of 20 in All India Tiger Estimation 2018. • **Animals -** Tiger, Elephant, Swamp deer, Sambar, Cheetal, Hog deer, Kakar, Langur, Sloth bear, Porcupine, Otter, Monitor lizard, Turtles, Python, Gangetic Dolphin, Mugger, Gharial etc. • **Birds -** Hornbill, Red Jungle Fowl, Pea fowl, Bengal Florican, Fishing eagle, Serpent eagle, Osprey, Woodpeckers, Shama, Indian Pitta, Paradise flycatcher, Orioles, Emerald dove etc.
6	**56th Tiger Reserve of India**	**Chhattisgarh**	*Recently, Union Minister for Environment, Forest and Climate Change notified the 56th Tiger Reserve in Chhattisgarh.* • **Guru Ghasidas-Tamor Pingla Tiger Reserve** – It *is* the 56th Tiger Reserve of India located in Chhattisgarh. • The *National* Tiger Conservation Authority (NTCA) had accorded final approval for notifying it in 2021. • **Geographical features** – *It* is *nestled in the Chota Nagpur plateau and partly in Baghelkhand plateau* thus comprises varied terrains, dense forests, streams and rivers. • These *conditions* are favourable for harbouring a rich faunal diversity and contains critical habitats for the tiger. *Guru Ghasidas-Tamor Pingla Tiger Reserve becomes the **3rd largest tiger reserve** in the country after Nagarjunasagar-Srisailam Tiger Reserve in Andhra Pradesh and Manas Tiger Reserve in Assam.* • **Area** – It is *spread* over 2,829 square km. • *Core/critical tiger habitat spans* about 2049.2 square kms comprising the o *Guru Ghasidas National Park* o *Tamor Pingla Wildlife Sanctuary* • Buffer *zone* spans around 780.15 square kms. **4 Tiger Reserves in Chhattisgarh** • Indravati Tiger Reserve • Udanti-Sitanadi Tiger Reserve • Achanakmar Tiger Reserve • Guru Ghasidas-Tamor Pingla Tiger Reserve • **Landscape complex** – *This* reserve is *in line with landscape approach* as envisaged in India's National Wildlife Plan. • It is *contiguous with the Sanjay Dubri Tiger Reserve* in *Madhya* Pradesh forming a landscape complex. o **Connection in west** - *Bandhavgarh* Tiger Reserve, Madhya Pradesh

			○ **Connection in east** – *Palamau* Tiger Reserve, Jharkhand • **Biodiversity** - A *total* of 753 species, including 365 invertebrates and 388 vertebrates, have been documented here by the Zoological Survey of India. • The invertebrate *fauna* is represented mostly by the class insecta. • The *vertebrate* fauna includes 230 species of birds and 55 species of mammals.
7	**Ranthambore National Park**	**Rajasthan**	*In a recent report, officials say that 25 out of 75 tigers were missing last year in Ranthambore National Park.* • It is named after the Ranthambore fort, is situated in Karauli and Swai Madhovpur districts of Rajasthan. • It is one of the largest tiger habitats in India. • Located at the junction of Aravallis & Vindhyan ranges. • **History** - It was established initially as Sawai Madhopur Game Sanctuary in 1950s and in 1973 as one of the Project Tiger reserves in India. • In 1980, it was declared a national park, while the forests located beside it were named Sawai Man Singh Sanctuary & Keladevi Sanctuary. • It is bounded to the north by the Banas River and to the south by the Chambal River. • **Topography** - It is dry deciduous forests and open grassy meadow. • **Flora** - There are about 539 species of flowering plants where the Dhok tree is the most common type of tree. • It is also famous for housing one of the largest banyan trees in India at Jogi Mahal. • **Fauna** – A natural habitat for Royal Bengal Tiger. • It also has a rich population of leopards, sloth bears, several deer species like chital (spotted deer), marsh crocodile, palm civet, jackal, desert fox, serpent eagle, and waterfowl. • 40 species of mammals, 35 species of reptiles and 320 species of birds found inside the park. • Most of the birds inhabit the areas around the 3 large lakes Padam Talao, Malik Talao and Rajbagh Talao. • **Significance** - Tiger populations in Ranthambore are smaller, isolated populations. • This makes them less genetically diverse due to lesser intermixing of different populations. • **Threats** - Poaching, habitat loss and fragmentation.
8	**Madhav National Park**	**Madhya Pradesh**	*National Tiger Conservation Authority (NTCA) has granted in-principal approval for the designation of Madhav National Park in Shivpuri district as a Tiger Reserve.* • It will be the 9th tiger reserve in Madhya Pradesh. • It is one of the oldest national parks of Madhya Pradesh notified in 1956.

			• It is a part of the upper Vindhyan hills. • **Lakes** - Sakhya Sagar and Madhav Sagar are the 2 lakes in the southern part of the park. • Marsh Crocodiles are in abundance in Sakhya Sagar Lake. • **Highest point** - George Castle, built by Jivaji Rao Scindia of the Gwalior Royal family. • **Forest type** - Northern tropical dry deciduous mixed forests as well as Dry Thorn Forests typical of North – Western Madhya Pradesh. • Champion and Seth system of classification, they are classified under the category 5B/C2. • **Trees** - Important species in the park are Kardhai, Salai, Dhaora and Khair. • The understory comprises almost entirely of Ber, Makor and Karonda. The jamun and mahua are found along the nullahs. • **Animals** - The forest is home to antelopes like Nilgai, Chinkara and Chowsinga and Deer including Chital, Sambar and Barking Deer. • Animals like the Leopard, Wolf, Jackal, Fox, Wild Dog, Wild Pig, Porcupine, Python etc are also sighted in the park. • After a successful breeding program, the park welcomed tiger cubs in September 2024, marking a historic moment in its restoration efforts. • Other tiger reserves in Madhya Pradesh - Kanha, Satpura, Bandhavgarh, Pench, Sanjay Dubri, Panna, Veerangana Durgavati and ratapani.. • **Tiger population in states** - According to National Tiger Conservation Authority and Wildlife Institute of India, Madhya Pradesh has 785 tigers, the highest in the country. • The state is followed by Karnataka (563) and Uttarakhand.
9	**Hoollongapar Gibbon Sanctuary**	**Assam**	*Railways to build canopy bridges across track in Assam gibbon habitat.* • It is an isolated protected area of evergreen forest. • **Hoolock gibbon** - It is one of the 20 species of apes on earth. • It is known for its vocalisation, spends much of its time on the upper canopy of tall trees called as Hoolongapar. • **Hoollongapar** – Its scientific name is Dipterocarpus macrocarpus • It rises about 12 to 30 m and having straight trunks. • Other species found in the top canopy include Sam, Amari, Sopas, Bhelu, Udal and Hingori. • **Located in** – Jorhat district of Assam, India. • **Development** – Officially established & renamed in 1997. • It was renamed in 2004, formerly known as the Gibbon Wildlife Sanctuary or Hollongapar Reserve Forest. • In the early 1900s, artificial regeneration was used to a develop well-stocked forest, resulting in the site's rich biodiversity. • **Upper canopy** – It is dominated by the Hollong tree

			• **Middle canopy** – Nahar or Indian Rose Chestnut (State Tree of Mizoram)
			• **Lower canopy** – It consists of evergreen shrubs and herbs.
			• Important species
			  ○ The hoolock gibbons – It is India's only gibbons.
			  ○ The Bengal slow loris – It is Northeastern India's only nocturnal primate.
			• Threat – A 1.65-km-long Mariani-Dibrugarh railway track divides sanctuary into 2 halves which has disturbed the arboreal nature of the ape.
			• **Conservation measures** – The Northeast Frontier Railway (NFR) has plans to construct canopy bridges for gibbons to move across a railway track.
			• **Canopy bridges** – They are designed by the WII in consultation with NFR, to facilitate easy movement of the arboreal species.
			• Safety nets will be installed below the main twin-rope bridge to save the species accidentally falling off the bridges.

10	**Gandhi Sagar Wildlife Sanctuary**	**Madhya Pradesh**	*The Gandhi Sagar Wildlife Sanctuary is set to become the 2nd home for cheetahs in India, after the Kuno National Park.* • It spread over the Gandhi Sagar dam backwater. • It was notified in 1974 and added to the list of sanctuary in 1984. • **Location** - Western Madhya Pradesh. • This region is known a Nimar region which touches its border with Rajasthan. • **Physiography**- It sits atop a flat rocky plateau, with the Chambal River cutting the sanctuary into two almost equal halves. • **Forest type**- It has Savanna ecosystem (dry deciduous trees and shrubs) due to shallow topsoil. • **Flora**- It has trees like Salai, Kardhai, Dhawda, Tendu, Palash etc. • **Fauna**- It is knowns for some rare wildlife species like Wild Dogs (Dholes), Chinkara, Leopard, Otter, Mugger crocodile. • **Project Cheetah** - To establish a viable cheetah (flagship species) metapopulation in India and provides space for the expansion of the cheetah within its historical range.
11	**Talacauvery Wildlife Sanctuary**	**Karnataka**	*The National Green Tribunal (NGT) principal bench has taken suo moto cognizance of alleged tree felling and burning near Talacauvery Wildlife Sanctuary.* • **Location** - It is a wildlife sanctuary in Karnataka. • It is also known as the Greater Talacauvery National Park and was declared a sanctuary in 1987. • It is located in the Brahmagiri hills, which is part of the Western Ghats, a UNESCO World Heritage site. Tree felling and burning indicate a violation of the provisions of the Environment Protection Act, of 1986, and the Forest (Conservation) Act, of 1980.

			• **Border** - It borders Ranipuram Hills and Kottencheri Hills in the Kasaragod district of Kerala. • **Geography** – It is characterized by dense evergreen forests that have largely remained untouched. • **Flora** - Key plant species include rosewood, teak, and laurels. • **Fauna** - Elephants, tigers, leopards, Indian bison (gaur), wild boar, Malabar giant squirrels, and sambar deer, Great Indian hornbill, Malabar trogon, and various species of woodpeckers, flycatchers, and thrushes. **• River Kaveri** • **Origin** - The Kaveri River originates at Talakaveri in the Western Ghats in Kodagu district, Karnataka. • **Flow** - It flows southeast for about 800 kilometers through the states of Karnataka and Tamil Nadu before emptying into the Bay of Bengal. • **Tributaries** • **Left Bank** - Harangi, Hemavati, Shimsha, Arkavati. • **Right Bank** - Lakshmana Tirtha, Kabini, Bhavani, Noyyal, Amaravati. • **Dams and Reservoirs** - Krishna Raja Sagara (KRS) Dam and Mettur Dam. • **Interstate Water Dispute** - The Kaveri water dispute between Karnataka and Tamil Nadu has been one of India's most contentious interstate water disputes.
12	**Barak Bhuban Wildlife sanctuary**	**Assam**	*The National Green Tribunal's (NGT) eastern bench in Kolkata has ordered a stay on road construction work inside the Barak Bhuban wildlife sanctuary in Assam's Cachar district.* • It is situated in Barak valley of Assam. • It is named after the 2nd largest river in the northeast, the Barak. • It spreads between the Barak and Sonai rivers. • **Faunas** - The area has 8 recording species of primates like slow loris, rhesus macaque, pig-tailed macaque, stump-tailed macaque, Assamese macaque, capped langur, hoolock gibbon and phayre's leaf monkey. • **Endemic** – King Cobra, Gorals, Himalayan Serow. **Barak valley** • **Location** – It is a region in the southern part of Assam. • **Bordered by** - Mizoram, Tripura, Bangladesh, Meghalaya, and Manipur. • It is known for its tea cultivation and is nicknamed the "Valley of Peace". • It is considered part of the Indo-Myanmar biodiversity hotspot. • **Features** – It is a horseshoe-shaped plain. • **Main city** - Silchar, which is also the administrative divisional office for the region.

			• It is made up of 3 administrative districts - Cachar, Karimganj, and Hailakandi. • **Official languages** – Bengali and Meitei (Manipuri). • Assam's 1st sanctuary 'Borel Wildlife Sanctuary' is in Barak Valley itself.
13	**Kaimur Wildlife Sanctuary (KWLS)**	**Bihar**	*The central government has given its in-principle approval to develop the Kaimur Wildlife Sanctuary (KWLS) into Bihar's 2nd tiger reserve.* • It is the largest wildlife sanctuary in Bihar. • It is located in the Kaimur hills range. • **Established in** – 1982. • The KWLS is bounded in the north and west by Uttar Pradesh, in the south by Jharkhand and in east by Bihar. • **Waterfalls** - Karkat and Telhar. • It is a plateau situated between the Son River, bordering Jharkhand to the south, and the Karmanasa River, bordering Uttar Pradesh to the west. • The Oraon tribe is believed to have originated from this plateau. • Kaimur Hills plateau is connected to the Bandhavgarh-Sanjay-Guru Ghasidas-Palamau tiger meta-population landscape • **Species** - The sanctuary supports sizable populations of leopard, sloth bear, chital, sambar, wild pig, nilgai, and chowsingha, besides about 70 species of birds.
14	**Amangarh Tiger Reserve**	**Uttar Pradesh**	*The body of an eight-year-old tiger was found on the border of Amangarh Tiger reserve of Bijnor and Jim Corbett National Park recently.* • It is a protected area in Bijnor district, Uttar Pradesh. • It encompasses a combination of grasslands, wetlands and dense forest. • **Established in** – 2012. • It is also known as New Jim Corbett Park. • It has been declared as buffer area of Corbett Tiger Reserve to be known as the Amangarh Tiger Reserve, is now a corridor to Asiatic Elephant, Tiger and much other wild life. • It is a part of Project Tiger and is recognized for its rich biodiversity and wilderness. • **Animals** - Tiger, Elephant, Swamp deer, Sambar, Cheetal, Hog deer, Kakar, Langur, Sloth bear, Porcupine, Otter, Monitor lizard, Turtles, Python, Gangetic Dolphin, Mugger, Gharial etc. • **Birds** - Hornbill, Red Jungle Fowl, Pea fowl, Bengal Florican, Fishing eagle, Serpent eagle, Osprey, Woodpeckers, Shama, Indian Pitta, Paradise flycatcher, Orioles, Emerald dove etc.
15	**Sukhna Wildlife Sanctuary**	**Chandigarh**	*The Union ministry of environment, forest and climate change recently issued a notification demarcating an area of 1 km up to 2.035 km around the Sukhna Wildlife Sanctuary on the Haryana side as an ESZ.* • It is spread over 25.98 square km in the North-East of Sukhna Lake.

			• It is under the administrative control of the union territory of Chandigarh. • It shares its *boundaries with Haryana and Punjab.* • The sanctuary is located *in the Shivalik foothills*, which are considered ecologically sensitive and geologically unstable. • The soil in the Shivaliks is sandy, embedded with pockets of clay which is highly susceptible to erosion by surface run off. • Prohibited activities include commercial mining, stone quarrying, crushing units, sawmills, industries causing water, air, noise, and soil pollution, commercial use of natural water resources including groundwater, wood-based industry, etc. • Among the regulated activities, no new commercial hotels and resorts shall be permitted within zone 1 and 2 except for accommodation for temporary occupation of tourists related to eco-tourism activities. • However, the local residents shall be permitted to undertake construction on the land for their bona fide residential use. • **Sukhna Lake** - It is a man-made, rainfed lake, constructed in 1958 by damming the Sukhna Choe, a seasonal stream. • The lake was designed by the creator of the city, Le Corbusier, and the plan was executed by the then Chief Engineer, P L Verma. • The Lake is declared as a *National Wetland in 1988.* • In sixties & early seventies, the rate of siltation of the lake was very high due to high rate of soil erosion from its catchment area. • Upto 1988, 66% of the original water holding capacity of the lake was lost due to siltation. • The lake is home to several species of migratory birds.
16	**Girnar Wildlife Sanctuary**	**Gujarat**	*As per the Centre for Environmental Planning and Technology (CEPT) data the vegetation of Girnar Wildlife Sanctuary had declined from 2000 to 2020.* • Girnar National Park and wildlife sanctuary is located in Junagadh, Gujarat. • It is also known as Sasan Gir. • **Established in** –1965. • The sanctuary was established to conserve the endangered Asiatic lion, which was once wiped out from other parts of Asia due to indiscriminate hunting. • The Gujarat government declared 180 square km of the sacred Girnar forests as a Wildlife Sanctuary in 2008. • It spans the rugged terrain of the Girnar hills, which are a part of the Saurashtra region and also a part of the Khathiar-Gir dry deciduous forests ecoregion. • It is home to Asiatic Lions and the only place in the world after Africa where these species live in the hilly and forested area of the park. • **Vegetation** - Mostly consists of • **Deciduous** – It sheds their leaves seasonally, usually in the dry season.

			• **Thorny scrubland** – It is found in areas with low water availability and these plants have fewer leaves. • This vegetation are classified under open forest. • **Flora** – Includes variety of plant species, avian species, insect species, animal species and reptile species. • It also filled with several trees, climbers, twiners, creepers, parasite and many other varieties of flower plants. • **Fauna** – Includes Asiatic lions, spotted deer, Sambar, Chousinghas, Chinkaras, leopards, and Indian golden jackals. • 179 Birds Species, 33 Reptiles species, 30 Mammals species are available. • **Recent Findings** - The study revealed that 94% vegetation of the total area in 2000, has dipped to 83% in 2020 over 2 decades. • It revealed that settlements were increased from 2000 to 2020 near the dense forest which was converted to open forest during the same period of time. **Asiatic Lions** • **Scientific name** - Panthera leo persica. • **Habitat -** Gir National Park and Wildlife Sanctuary is the only abode of the Asiatic lion.  • **Distribution** - State of West Bengal in east and Rewa in Madhya Pradesh, in central India. • **Conservation status** o Wildlife (Protection) Act 1972 - Schedule I. o CITES - Appendix I. o IUCN – Endangered. • ***World Wide Fund for Nature India (WWF)*** strengthen the efforts of Gir towards managing the conflict and poaching.
17	**Kavango-Zambezi Trans-Frontier Conservation Area (KAZA-TFCA)**	**5 African countries**	*Delegates to the ongoing KAZA 2024 Heads of State Summit in Livingstone, Zambia renew calls to leave Convention on International Trade in Endangered Species of Wild Fauna and Flora (or CITES).* • **KAZA-TFCA** – It is a 520,000-square kilometre wildlife sanctuary straddling 5 southern African nations that share common borders along the Okavango and Zambezi River basins. • **5 Countries** – Angola, Botswana, Namibia, Zambia and Zimbabwe. • **Inaugurated in** – 2012.

- **Aim** – To facilitate cooperation between countries and remove physical impediments to wildlife that traverses their boundaries.
- **Conservation areas** – It includes 36 proclaimed protected areas such as national parks, game reserves, forest reserves, community conservancies and game/wildlife management areas.

*Transfrontier conservation areas (TFCAs) are called as **peace parks**.*

- **Ecological diversity** – Salt pans and arid grassland, woodland and scrubland, seasonal wetlands and permanent marshes, among other biomes, are all found within its borders.
- **Biodiversity** – Those areas support some 3,000 species of plants and are home to more than two-thirds of the African elephant population of about 450,000.

Important sites

- Victoria Falls, a World Heritage site.
- The Okavango delta, the largest site covered by the 1971 Ramsar Convention on Wetlands.
- Issue with CITES – CITES has repeatedly denied them permission to sell off their abundant ivory and other wildlife products.

***CITES**, an international agreement between government's aims to ensure that international trade in specimens of wild animals and plants does not threaten the survival of the species. In 2022, the European Parliament called for a total ban on the import of trophies derived from species listed as endangered under CITES.*

18	**Hasdeo Arand Forest**	**Chhattisgarh**

The Hasdeo forest in Chhattisgarh saw villagers clash with the police recently, after tree-felling for mining of coal resumed in the green belt.

- The Hasdeo Arand is referred to as the "lungs of Chhattisgarh", with a wealth of biodiversity.
- According to the Indian Council of Forestry Research and Education (ICFRE), Hasdeo Arand is the largest un-fragmented forests in Central India.
- It consists of pristine Sal (Shorea robusta) and teak forests.
- The forest is the catchment of the Hasdeo River, the Mahanadi's largest tributary.
- It is also the watershed for the Hasdeo Bango reservoir, which irrigates 300,000 hectares of land in Chhattisgarh.

			• It is a noted migratory corridor and has a significant presence of elephants. • **Hasdeo-Arand Coalfield (HAC)** – It covers an area of 1,879.6 sqkm, spanning 3 districts of Sarguja, Korba and Surajpur, in the northern tribal belt of Chhattisgarh. • As per a 2021 report by the Wildlife Institute of India (WII), 9 species in HAC have special protection under schedule I of the Wildlife Protection Act, 1972.  • These include Elephant, Leopard, Sloth Bear, Indian Grey Wolf, Honey Badger, Four-Horned Antelope, Indian Pangolin, Giant squirrel, and Rusty spotted cat. • There are 92 species of birds in Hasdeo and 25 different mammals, 16 types of snakes. • According to the ICFRE in 2021, there are 640 floral species, 128 medicinal plants and 40 timber-yielding species of plants. • It is also a habitat as well as a corridor for elephants and a corridor for tigers. • The forest is home to Adivasi communities such as the Gonds, who have been stewards of the environment for eons.
19	**Namdapha National Park**	**Arunachal Pradesh**	*An elephant has been camera-trapped after 12 years, as the encroachment since 1996 blocked the jumbo migration route between Arunachal Pradesh and Myanmar through Namdapha National Park.* • It is India's easternmost tiger reserve and National park situated in the Changlang district of ***Arunachal Pradesh.*** • It is originally declared as a Wildlife Sanctuary in 1972 and a National Park and Tiger Reserve (15th Tiger Project) in 1983. • The Namdapha protected area is wedged between Dapha Bum ridge of Mishmi Hills, of North Eastern Himalayas and Patkai Ranges. • The reserve has a common boundary with Kamlang Wildlife Sanctuary (Lohit District). • **Vegetation** - It consists of Northern Tropical Evergreen Forest, North Indian Tropical Moist Deciduous Forests, East Himalayan Moist Temperate Forests, Moist Alpine Scrub Forests. • **River** - It lies along the ***Noa-Dihing river*** lies in the tropical rain forest. • **Flora -** The *Pinus merkusi and Abies delavavi* are not found elsewhere in India. • One of the rarest and endangered orchids, the ***Blue Vanda*** found here.

			• The most famous local medicinal plant ***Mishimi Teeta (Copti teeta)***, is available here but its export has been banned.
			• It is ***only park in the World*** to have the 4 Feline species of big cat namely
			  ○ The Tiger (Panthera Tigris),
			  ○ Leopard (Panthera Pardus),
			  ○ Snow Leopard (Panthera Uncia) and
			  ○ Clouded Leopard (Neofelis Nebulosa) and numbers of Lesser cats.
			• **Primate species -** Assamese macaque, pig-tailed macaque, stump-tailed macaque and Hoolock Gibbons (Hylobates Hoolock), highly endangered and only 'ape' species found in India dwells here.
			• **Birds** - White winged Wood Ducks, a rare and endangered species, the great Indian hornbills, jungle fowls and pheasants.

20	**Dibru Saikhowa National Park**	**Assam**	*Recently the Environment Ministry's forest advisory committee recommended the R&D proposal on Extended Reach Drilling technology subject to the condition that it will be used purely for research purposes* • Dibru Saikhowa National Park is a national park and biosphere reserve located in *Assam.* • It is the ***largest salix swamp forest*** in northeast India. • It is an identified Important Bird Area (IBA). • The area was declared as Dibru Reserved Forest in 1890. In 1929, Saikhowa Reserve Forest was declared. • It was declared as wildlife sanctuary in 1995. In 1997, Dibru-Saikhowa Biosphere Reserve was declared. • Originally created to help conserve the habitat of the ***rare white-winged wood duck.*** • **Rivers -** The park is bounded by the Brahmaputra and Lohit Rivers in the north and Dibru River in the south. • **Forest type -** Dibru-Saikhowa comprises of semi-evergreen forests, deciduous forests, littoral and swamp forests and patches of wet evergreen forests. • The Park is renowned for natural regeneration of ***Salix trees.*** It is famed for ***Ferral horses.*** • **Fauna -** 36 species of mammals have so far been recorded.

Tiger	Squirrels	Hoolock Gibbon
Elephant	Gangetic Dolphin	Wild Pigs
Leopard	Slow Loris	Sambar
Jungle Cat	Assamese Macague	Barking Deer
Bears	Rhesus Macaque	Water Buffalo
Small Indian Civet	Capped Langur	

<table>
<tr><td></td><td></td><td></td><td>
Birds – It have more than 382 species of Birds.
<table>
<tr><td>Greater Adjutant Stork</td><td>Large Whistling Teal</td><td>Spot Billed Pelican</td></tr>
<tr><td>Lesser Adjutant Stork</td><td>Grey leg Goose</td><td>White Winged Wood Duck</td></tr>
<tr><td>Greater Crested Grebe</td><td>Grey-headed Fishing Eagle</td><td>Baer’s Pochard</td></tr>
<tr><td>Large Cormorant</td><td>Griffon Vulture</td><td>Greater Spotted Eagle</td></tr>
<tr><td>Open bill Stork</td><td>Osprey</td><td>Pale Capped Pigeon</td></tr>
<tr><td>Black necked Stork</td><td>Crested Serpent Eagle</td><td>Great Pied Hornbill</td></tr>
<tr><td>Marsh Babbler</td><td>Jerdon’s Babbler</td><td>Black Breasted Parrot bill</td></tr>
</table>
</td></tr>
<tr><td>21</td><td>Katarniaghat Wildlife Sanctuary (KWS)</td><td></td><td>
The carcass of a male elephant aged around 45-50 years was found recently in the dense forests of the Katarniaghat Wildlife Sanctuary (KWS).

KWS is a protected area in the Upper Gangetic plain of <u>Uttar Pradesh.</u>
Established under the 'Project Tiger' initiative in 1987.
Together with the Kishanpur Wildlife Sanctuary and the Dudhwa National Park it forms the <u>Dudhwa Tiger Reserve.</u> It was established in 1975.
The Katerniaghat Forest provides strategic connectivity between tiger habitats of Dudhwa and Kishanpur in India and the Bardia National Park in Nepal.
River – Girwa.
Forest - Mixed deciduous forests.
Vegetation - Its fragile <u>Terai ecosystem</u> comprises a mosaic of sal and teak forests, lush grasslands, numerous swamps and wetlands.
Faunas - It is home to a number of endangered species including gharial, tiger, rhino, Gangetic dolphin, swamp deer, hispid hare, Bengal florican, and the white-backed and long-billed vultures.
The sanctuary also features species such as chital, hog deer, wild boar, tigers, elephants, and leopards.
Recently spotted Herpetofaunas - Banded krait, the Burmese rock python, the yellow speckled wolf-snake and the paradise flying snake, a rare red coral kukri snake.

The only place where gharial seen in its natural habitat in the world is the Girwa River.
</td></tr>
<tr><td>22</td><td>Sariska Tiger Reserve (STR)</td><td>Rajasthan</td><td>
Sariska Tiger Reserve (STR) will be notified by as an eco-sensitive zone by the end of June, 2025.

Sariska Tiger Reserve or Sariska National Park is <u>one of the biggest Tiger reserve</u> located in Rajasthan.
The tiger reserve is spread over an area of <u>Aravalli hills.</u>

</td></tr>
</table>

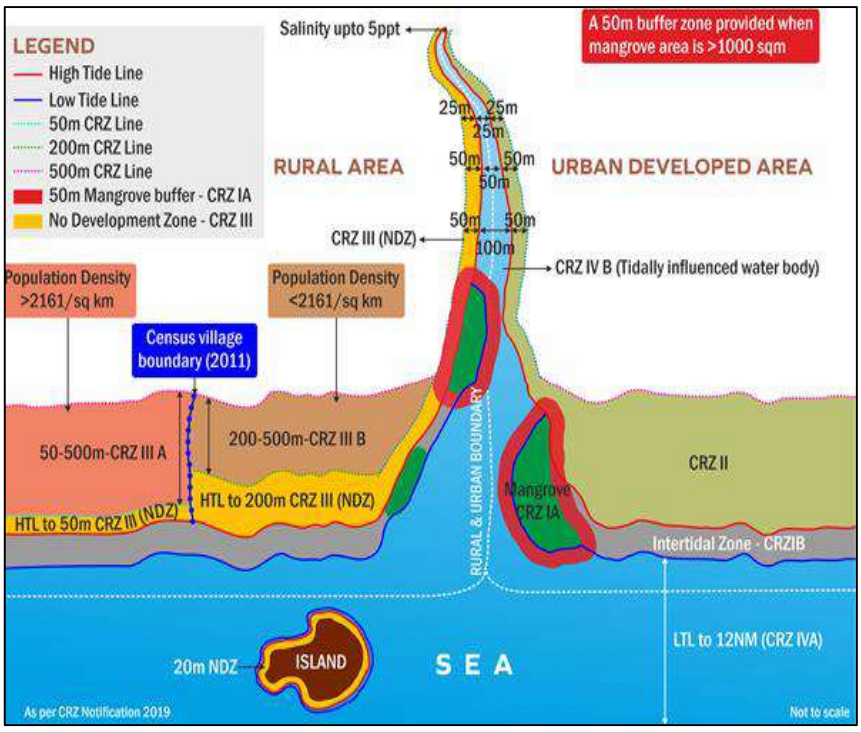
- The Sariska area was first notified as a Wildlife Reserve in 1955, Wildlife Sanctuary in 1958, it came under Project Tiger as Sariska Tiger Reserve in 1979.
- It is the ***1st reserve*** which successfully relocated tigers.
- **Vegetation** - Tropical dry deciduous and tropical thorn forest.
- Dhok (Anogeissus pendula) is the ***dominant tree species*** covering over 90% area of the forest.
- Boswellia serreta and Lannea coromandelica grow in rocky patches. Kathaa (Acacia catechu) and Bamboo are common in the valleys.
- Some valleys support Palas (Butea monosperma) and Ber (Zizyphus species).
- Besides these, some other tree species are Arjun (Terminalia arjuna), Gugal (Commiphora wightii), Kadaya (sterculia urens), Amla (Emblica officinalis), Bahera (Terminalia bellerica).
- **Fauna -** Nilgai (Boselephous tragocamelus), Sambar deer (Cervus unicolor), Spotted deer (Axis axis), Four-horned antelope (Tetraceros quadricorns) and Wild pig (Sus scrofa).
- **Famous places -** Pandu Pol, Bhangarh Fort, Ajaibgarh, Pratapgarh, Siliserh Lake and Jai Samand Lake.

6.2 Coastal Regulation Zone (CRZ)

The National Green Tribunal (NGT) said that the Tamil Nadu State Coastal Zone Management Authority (TNSCZMA) nod is needed to set up facilities on Chennai city's beaches.

- **CRZ** – A *zone near the coastline* that includes the coastal area *up to 500m from the High Tide Line* & a stage of 100m along the banks of streams, estuaries, backwaters vulnerable to tidal variations.
- **Notified by** – Union Ministry of Environment, Forests and Climate Change in *1991, later in 2011 and in 2019*.
- **Statutory backing** – *Environment Protection Act 1986*.
- **Objectives** – To *conserve and protect* the unique environment of coastal stretches and marine areas and to ensure *livelihood security* to the fisher communities.
- To promote *sustainable development* based on scientific principles.
- **4 Zones** – CRZ I, II, III and CRZ IV.
- **CRZ-IA** – Ecologically Sensitive Areas.
- **CRZ-IB** – Intertidal Zone
- **CRZ-II** – Developed Land Areas (Municipal Limits / Urban Areas).

High Tide Line (HTL) *is the line on the land up to which the highest water line reaches during the Spring Tides.* ***Low Tide Line (LTL)*** *is the line on the land up to which the lowest water line reaches during the Spring Tides.*



- **CRZ-IIIA** – *Undeveloped rural areas*, with population density *more than 2161* per square kilometre.
    - **No Development Zone (NDZ)** – An area *up to 50m* from the HTL on the landward side.
- **CRZ-IIIB** - Undeveloped rural areas where the population density of *less than 2161* per square kilometre
    - **No Development Zone (NDZ)** – An area *up to 200m* from the HTL on the landward side.
- **CRZ-IVA** – It is the water area and the sea bed area between the *LTL up to 12 nautical miles* on the seaward side.
- **CRZ-IVB** – It include the water area and the bed area between LTL at the bank of the tidal influenced water body to the LTL on the opposite side of the bank.
- **Clearance authority**
    - **States** – For urban (CRZ-II) and rural (CRZ-III) areas.
    - **MOEFCC** – For CRZ-I & areas falling between the LTL and 12 nautical miles seaward.
- **Significance** – It strikes a balance between economic growth and environmental conservation.

6.3 Biosphere Reserves

It is important to reflect on the progress made in conserving and sustainably using the biosphere reserves.

- It is an international designation for representative parts of *natural and cultural landscapes* extending over large area of terrestrial or coastal/marine ecosystems or a combination thereof.
- BRs are living examples of how human beings and nature can co-exist while respecting each other's needs.
- **Designated by-** United Nations Educational, Scientific and Cultural Organization (UNESCO)
- **Function**
    - *Conservation* of biodiversity and cultural diversity
    - *Economic development* that is socio culturally and environmentally sustainable
    - *Logistic support* underpinning development through research, monitoring education and training
- **Supported by** - Other UN agencies and International Union for Conservation of Nature (IUCN)

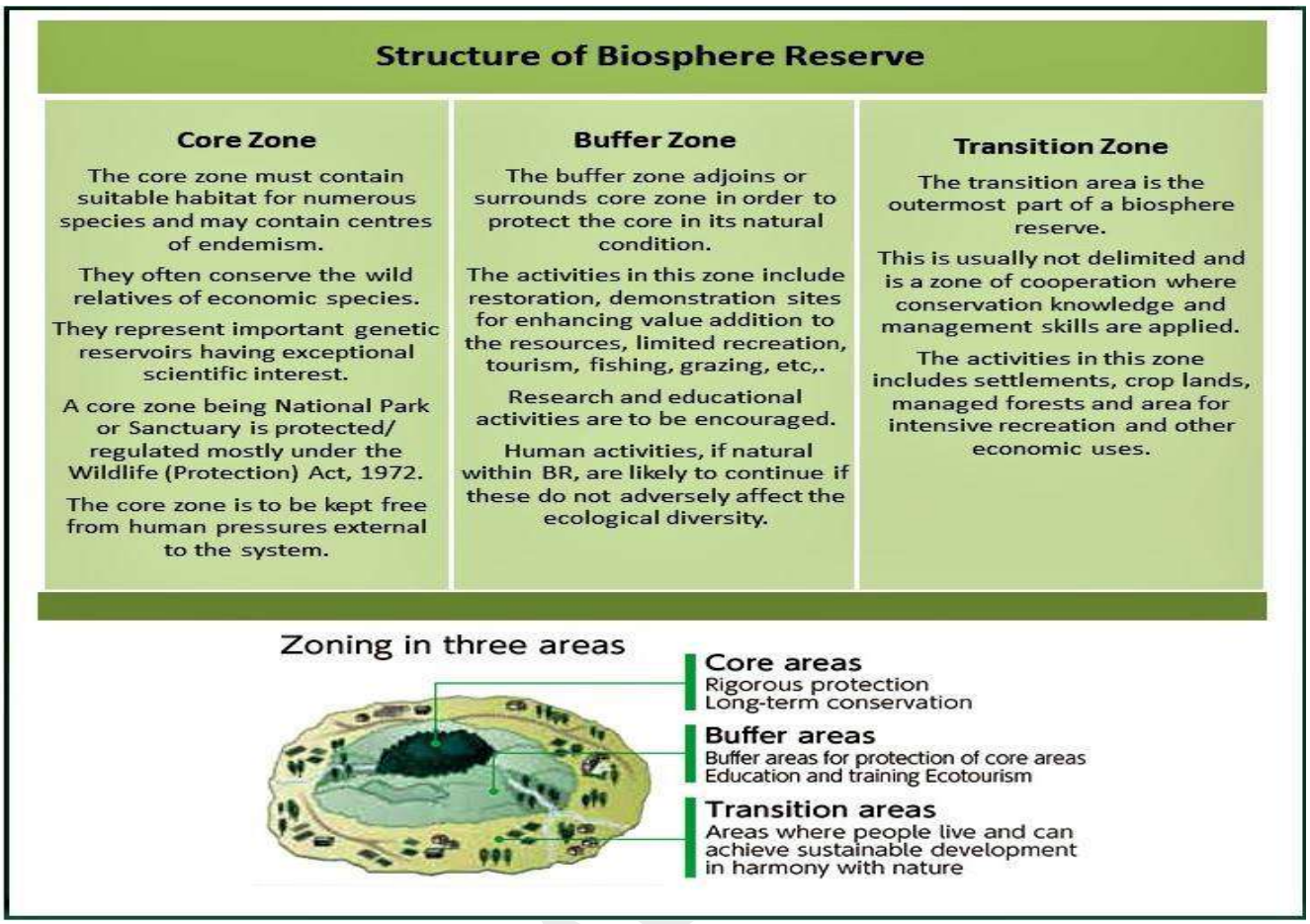
World Biosphere Reserve Day is celebrated on November 3 to raise awareness on the importance of biosphere reserves & to promote its conservation & sustainable use.

- **Criteria for designating biosphere reserves** - The site must contain an *effectively protected and minimally disturbed core area* of value of nature conservation.
- The core area should be typical of a *bio-geographical unit* and large enough to *sustain viable populations* representing all trophic levels in the ecosystem.
- The management authority to ensure the *cooperation of local communities* while managing and containing the conflicts.
- Areas potential for *preservation of traditional tribal or rural modes of living* for harmonious use of environment.

World Network of Biosphere Reserves (WNBR)

- The WNBR of the MAB Programme consists of a dynamic and interactive network of sites of excellence.
- **Launch year-**1971
- **Aim**- To establish a scientific basis for the improvement of relationships between people and their environments.
- **Role** - It proposes interdisciplinary research, demonstration and training in natural resources management.
- It helps national governments with the planning and implementation of research and training programmes with technical assistance and scientific advice.

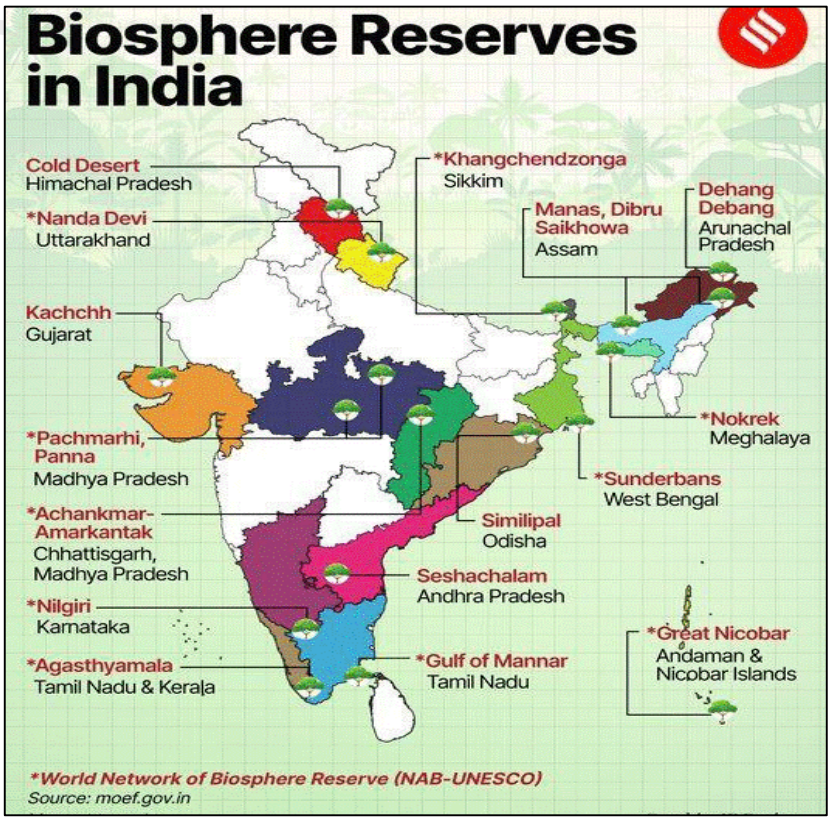
- **Picture of WNBR**



  - **Leading WNBR country** - Spain, with 53 properties
  - **1st biosphere reserve in South Asia** - Hurulu Biosphere Reserve, Sri Lanka.
  - **No Biosphere Reserves** - Bangladesh, Bhutan, and Nepal
  - **India-** Signatory to the landscape approach supported by UNESCO's MAB programme

Status of biosphere reserves in India

- **Status-** There are 18 biosphere reserves in India, out of which 12 are recognized internationally under the MAB programme.
- **1st biosphere reserve** - Nilgiri Biosphere Reserve, Tamilnadu, Kerala, Karnataka
- **Largest Biosphere reserve** - Great Rann of Kutch, Gujarat
- **Smallest biosphere reserve** - Dibru- Saikhowa, Assam



UNESCO's Man and the Biosphere Programme

- UNESCO's Man and the Biosphere Programme (MAB) is an

intergovernmental scientific programme that was launched in *1971*.

- It aims to establish a scientific basis for the improvement of relationships between people and their environments.
- It proposes interdisciplinary research, demonstration and training in natural resources management.
- MAB helps national governments with the planning and implementation of research and training programmes with technical assistance and scientific advice.

South and Central Asian Biosphere Reserve Network Meeting (SACAM)

- In partnership with the Ministry of Environment, Forests and Climate Change and the National Centre for Sustainable Coastal Management, 10th SACAM was concluded in Chennai.
- **Theme**- "Ridge to Reef"
- **Role-** A platform for exchanging knowledge and fostering collaborations in the realm of sustainable environmental practices.

- ***India is a signatory*** to the landscape approach supported by UNESCO's MAB programme.

6.4 Ramsar convention on Wetlands

CONVENTION

- It is an *intergovernmental treaty* that provides the framework for national action and international cooperation for the conservation and wise use of wetlands and their resources.
- Adopted in *1971 (Ramsar, Iran)* and enforced in 1975. It is the only global environmental treaty that deals with a particular ecosystem.
- The convention defines wetlands as areas of marsh, fen, peat land or water, whether natural or artificial, permanent or temporary, with water that is static or flowing, fresh, brackish or salt, including areas of marine water the depth of which at low tide does not exceed 6 meters.
- The Indian government's definition as per the Wetlands (Conservation and Management) Rules, 2017 excludes river channels, paddy fields and other areas where commercial activity takes place.
- Ramsar Convention is *not affiliated with the United Nations system of Multilateral Environmental Agreements*.
- Every year, *2nd February was celebrated as World Wetlands Day*.

INDIA & RAMSAR SITES

- Ramsar list is a list of wetlands of International Importance mentioned under the Ramsar convention.
- It confers upon the prestige of international recognition and commitment to ensure the maintenance of the ecological character of the site. India became a contracting party in 1981.
- ***Chilika Lake (Odisha) and Keoladeo National Park (Rajasthan)*** - 1st two Ramsar sites in India.
- India presently has ***89 sites*** designated as Wetlands of International Importance.
- India has the highest number of Ramsar sites among Asian countries.

MONTREUX RECORD

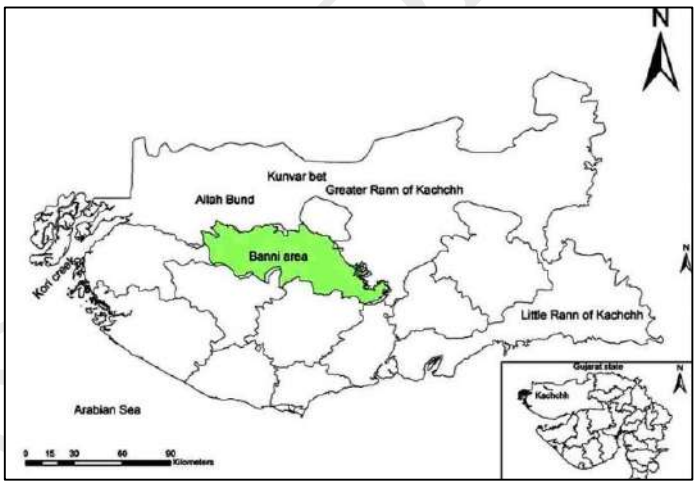
- Maintained as a part of Ramsar list, it listed wetlands where changes in ecological character have occurred, are occurring, or are likely to occur as a result of technological developments, pollution or other human interference.
- The Record was adopted by the Conference of the Contracting Parties in Brisbane, 1996.
- Montreux sites in India
  - ***Keoladeo National Park, Rajasthan (1990)***
  - ***Loktak Lake, Manipur (1993)***
  - *Chilika Lake, Odisha was included in 1993 and was* ***removed in 2002***

OTHERS

6.5 Banni grasslands

In a new study, researchers have assessed the suitability of different areas of Banni for sustainable grassland restoration, considering ecological value to be the primary criterion.

- **Banni Grasslands** – It is a largest tracts of ***arid grasslands*** **in** ***Kachchh district in Gujarat*****.**
- It is a unique ecosystem ***combining wetlands, grasslands, and salt pans*****.**
- Bannis fall under ***Dichahnthium-Cenchrus-Lasiurus*** type of grass cover.
- Traditionally, Banni grasslands were managed following a system of rotational grazing.
- **Area** - It once covered an area of approximately 3,800 sq. km but it has now ***decreased*** to about 2,600 sq. km.
    - In India, grasslands account for about ***24%*** of the country's total land area.



- **Climate** - Banni is situated in Arid climate, with high temperature up to 48°C -50°C during May and June .
- Winter temperature goes down to 5°C – 8°C during December January.
- **Rainfall** - Average Annual rainfall, occurring through Southwest monsoon between June to September, is very low of 317mm with coefficient of variation of 65%.
- **Wetlands** - There have been numerous natural wetlands in Banni and the larget one is known as ***Chhari – Dhandh***.
    - It is a saucer shaped wetland which is recently declared as Conservation Reserve.
- **Bio Diversity** - Banni grasslands is home to 192 species of plants, 262 species of birds including native and migratory as well as several species of mammals, reptiles, and amphibians.
    - **Flora** - Salvadora persica,Cressa cretica, Cyperus spp, grasses in the genera Sporobolus, Dichanthium, and Aristida.
    - **Fauna** - Nilgai , Chinkara, Blackbuck, Wild boar, Golden jackal, Indian hare, Indian wolf caracal, Asiatic wildcat, Desert fox , Indian wild ass.
    - **Migratory species** - During rainfall season flamingos, migratory cranes visit here.
    - **Cheetah Reintroduction** - Banni Grasslands Reserve and Narayan Sarovar Sanctuary, both in Kutch, have been classified as the last remaining habitats of the cheetah (Acinonyx jubatus) in India.
- **Breeding ground** - Many bird species such as the great Indian bustard and the Bengal florican prefer to breed in grasslands.
- **Tribal Communities -** It is home to Sindhi speaking Maldhari (cattle breeders), Halaypotra, Hingora, Hingorja, Jat and Mutwa tribes .
- **Threat** - Degradation due to deforestation, overgrazing, agriculture, urbanisation, tree-based plantation projects, invasive species, and mega-development projects.
    - As much as 49% of grassland areas worldwide are estimated to be experiencing degradation.
- **Findings of the recent study**
    - The recent study has suggested measures for restoring the grassland.
    - Providing them with adequate water sources, either through irrigation or rainwater harvesting.

- Providing supplementary inputs like fertilizers.
- Terracing to protect from high water run-off , erosion and soil intrusion.

7. SPECIES IN NEWS

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

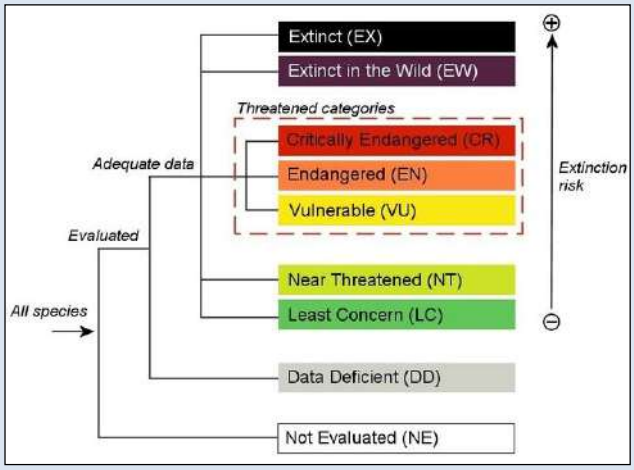
- CITES, also known as ***Washington Convention***, is an international agreement between governments and is ***legally binding*** on the Parties.
- India is a Party to the CITES since 1976.
- **Aim** - To ensure that international trade in specimens of wild animals and plants does not threaten the survival of the species.
- It has 3 appendices to protect threatened and vulnerable species.
  - **Appendix I** - For species currently threatened with extinction.
  - **Appendix II** - For species not necessarily threatened with extinction but demands intervention to keep a check on trade and avoid its utilisation that may threaten their survival.
  - **Appendix III** – For a given species, when a specific country wants to regulate trade.

International Union for Conservation of Nature and Natural Resources (IUCN)

- **Founded** in October 1948 as the International Union for the Protection of Nature (IUPN) following an international conference in Fontainebleau, France.
- It was later known as the *World Conservation Union*.
- The organization changed its name to the International Union for Conservation of Nature and Natural Resources in 1956
- **Headquarters** - Gland, Switzerland
- **Vision** - Just world that values and conserves nature
- **Functions** - It provides public, private, and non-governmental organizations with the knowledge and tools to achieve sustainable development.

IUCN Red List of Threatened Species

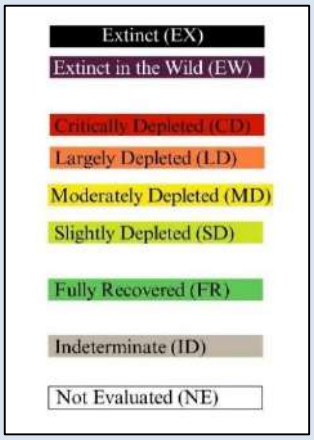
- World's most comprehensive information source on the global extinction risk status of animal, fungus and plant species.
- Provides information about species' range, population size, habitats and ecology, use and trade, threats, and conservation actions.
- The IUCN unveiled this assessment system in 1964.
- Species are classified into one of ***nine Red List Categories***
- Criteria to assess the extinction risk of a given species includes
  - The rate of population decline
  - The geographic range
  - Whether the species already possesses a small population size
  - Whether the species is very small or lives in a restricted area
  - Whether the results of a quantitative analysis indicate a high probability of extinction in the wild



IUCN Green Status of Species

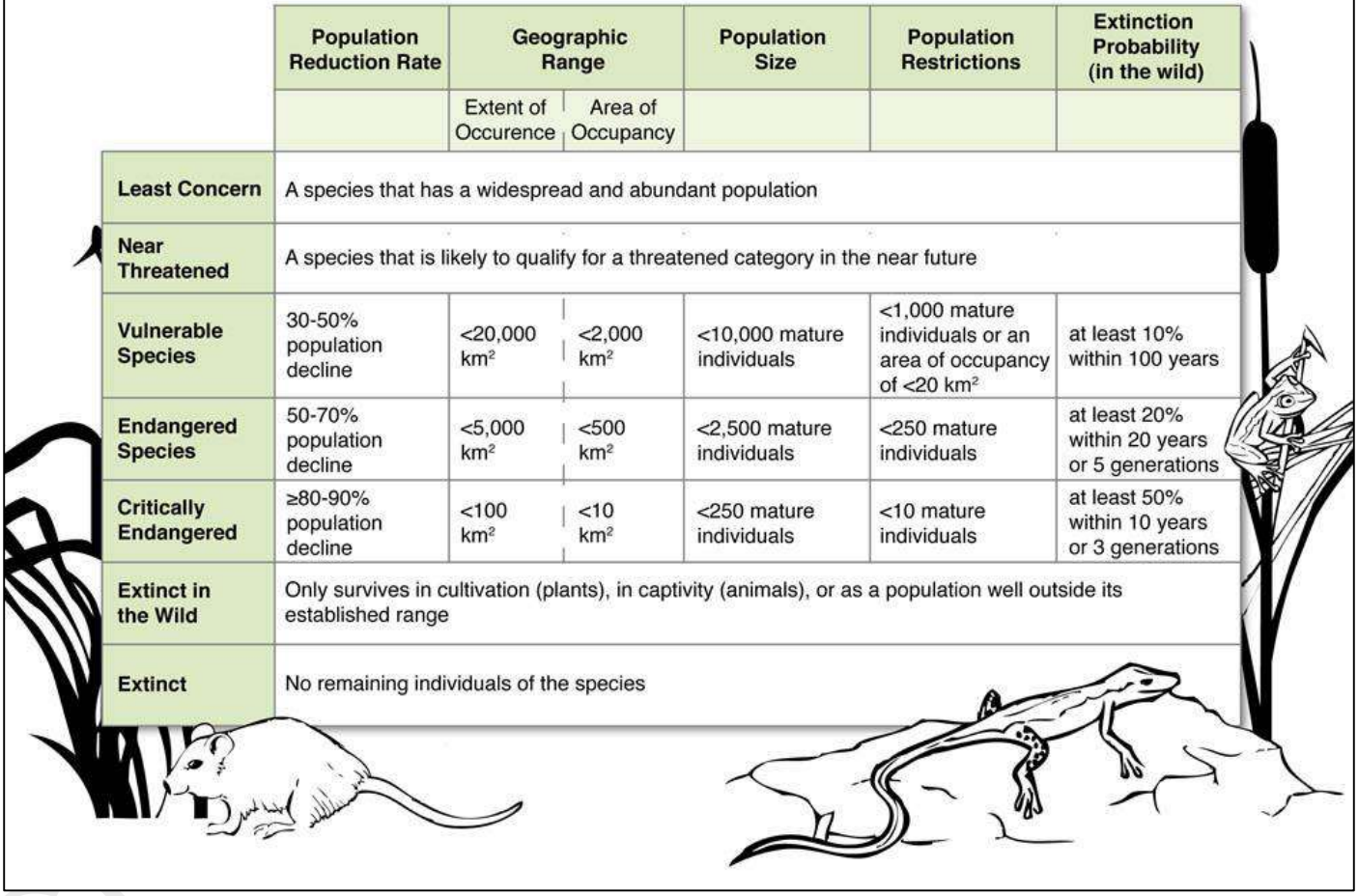
- Introduced by the IUCN in the World Conservation Congress, 2012, held in Jeju, South Korea.
- It called for the development of 'Green Lists' of *Species, Ecosystems and Protected Areas* to measure conservation success in these three areas.
- The IUCN *Red List assess the risk of extinction of a species* whereas the IUCN *Green status tracks the recovery of species' populations* and measure its conservation success.
- The Green status comprises of a *Green Score* ranging from 0–100%.
- A species that is Extinct in the Wild would have a Green Score of 0%, and a species that is not threatened with extinction would have a Green Score of 100%.

The GSS became an *optional part* of Red List assessments in 2020.



Endangered Species: Categories and Criteria

	Population Reduction Rate	Geographic Range		Population Size	Population Restrictions	Extinction Probability (in the wild)
		Extent of Occurence	Area of Occupancy			
Least Concern	A species that has a widespread and abundant population					
Near Threatened	A species that is likely to qualify for a threatened category in the near future					
Vulnerable Species	30-50% population decline	<20,000 km^2	<2,000 km^2	<10,000 mature individuals	<1,000 mature individuals or an area of occupancy of <20 km^2	at least 10% within 100 years
Endangered Species	50-70% population decline	<5,000 km^2	<500 km^2	<2,500 mature individuals	<250 mature individuals	at least 20% within 20 years or 5 generations
Critically Endangered	≥80-90% population decline	<100 km^2	<10 km^2	<250 mature individuals	<10 mature individuals	at least 50% within 10 years or 3 generations
Extinct in the Wild	Only survives in cultivation (plants), in captivity (animals), or as a population well outside its established range					
Extinct	No remaining individuals of the species					



7.1 Extinction of Bird Species

In a recent study, researchers have documented the extinction of 610 bird species over a period of 130,000 years.

- **3 main drivers** – ***Habitat loss, hunting*** and introduction of ***non-native species*** leads to extinction of avian species.
- Most of the documented extinctions occurred on islands.
- Capturing birds for the songbird trade is a big issue, particularly in Southeast Asia.

- Avian malaria, introduced by people, has triggered large numbers of extinctions in Hawaii, particularly among the endemic ***Hawaiian honeycreepers.***
- **Anthropogenic causes** – Of the 610 species, *90% of them* went extinct at least partially due to humans.
- It coincides with the *spread of Homo sapiens* across the globe.
- The effect of this spread has only increased in the past few years
    - For instance, the ***Kaua'i 'ō'ō, a Hawaiian songbird***, was declared extinct just last year.
- **Ecological impacts** - It includes *loss of seed dispersal*, pollination, the consumption of insects & the recycling of dead material.
- **Biodiversity impacts** – It can *precipitate secondary extinctions* of fruit bearing plants.
- Once one species goes extinct, there will likely be other extinctions or even an avalanche of them which is known as secondary extinction.
- **Health impacts** – There is *rise in disease outbreaks* due to fewer scavengers consuming carrion.

> ***A frugivore** is an animal that thrives mostly on raw fruits or succulent fruit-like produce of plants such as roots, shoots, nuts and seeds. Approximately 20% of mammalian herbivores eat fruit.*

Case study of Dodo Extinction

- **Dodo** – A *flightless bird* that inhabited the Indian Ocean Island of *Mauritius*.
- It was finely adopted to the isolated ecosystem.
- **Discovery** – It was 1st encountered by Dutch sailors *in 1598*.
- **Threat** – *Hunting, habitat destruction* and the introduction of *non-native species* doomed it in under 80 years.
- **Extinction** – It became *extinct by 1681*.

CRITICALLY ENDANGERED

7.2 Popa Langur

Why in News?

Recently, the scientists have discovered new monkey species Popa Langur, is on the verge of extinction.

- **Popa Langur –** It is a newly-discovered species, occurs in ***central Myanmar*** which is named after the sacred Mount Popa.
- **Discovered in** – *2020*.
- **Taxonomy**
    - **Scientific Name** – Trachypithecus popa.
    - **Genus** – Trachypithecus of Old-World primates.
- It was often referred as ***Leaf-Monkeys***.
- **Habitat** – Found in the evergreen and deciduous forests, bamboo forests and plantations.
- **Distribution** – High evergreen forests of Myanmar.
- **Morphology –** It has soft fluffy gray fur, pointed cap of fur on their head, like most langurs, small heads and large eyes made bigger in appearance by thick white eye rings.
- It has small, elongated nostrils and a wide mouth covered in white fur, chest and belly are pale gray-white in color.
- **Behavior –** It is an *arboreal* (spending most of their time in trees) and *diurnal* (active during the day).

> *The largest populations of Popa Langur live in Popa Mountain Park and Panlaung-Pyadalin Cave Wildlife Sanctuary, Myanmar.*

- It is capable of traveling long distances and has home ranges large as 256 acres.
- It is vocal primates and range calls to communicate with each other.
- **Diet –** It is a *folivores (leaf eaters)*, which feed on leaves, fruits, green shoots and petioles.
- Researchers recently estimated that only 200 to 260 individuals remain now.
- **Threats** – Hunting for meat
    - Illegal pet trade
    - Agricultural encroachment
    - Water and soil pollution
    - Cattle ranching.
- **Conservation Status**
    - **IUCN** – Critically Endangered.
    - **CITES** – Appendix II.

7.3 Indian Gharial

Why in News?

Recently, scientists warned that Indian gharial and other 5 species might go extinct within the next 5 years unless drastic conservation measures are taken.

- **Indian Gharial** – It is the ***only visibly sexually dimorphic crocodilian***, derives its name from Ghara, an Indian word for Pot.
- **Scientific Name** – Gavialis gangeticus.
- It is known as Gharial, Fish Eating Crocodile, Indian Gavial, Gavial and Long Nosed Crocodile.
- **Habitat –** River habitats with deep, clear, fast-flowing waters and steep, sandy banks.
- **Distribution –** Only in the waters of *India and Nepal*.
- **Morphology –** It has a thick skin covered with smooth epidermal scales that do not overlap.

*The surviving population found within the tributaries of the Ganges river system and **less than 250** in the wild.*

- The snout of the gharial is uniquely the thinnest and most elongated among all the crocodilians.
- **Characteristics –** Its long narrow snout has very little resistance to water, allowing swiping motions to snap up fish in their mouth.
- **Diet –** Primarily fish eaters, some individuals known to scavenge dead animals.
- Feed on warm-blooded species, fish, insects, larvae and small frogs.

- **Threats –** Dam construction
    - Barrages and water abstraction
    - River bed cultivation
    - Pollution
    - Loss of river habitats.
- **Conservation Status**
    - **IUCN** – Critically Endangered.
    - **CITES** – Appendix I.
    - **Wildlife (Protection) Act, 1972** – Schedule I.

5 Other Species on the Verge of Extinction

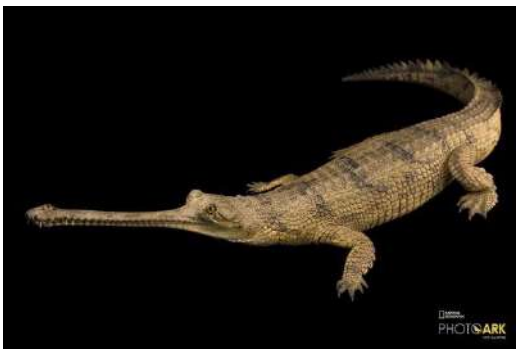
Species	Location	Population
Eastern Lowland Gorilla (Gorilla beringei graueri)	Democratic Republic of Congo.	Declining rapidly.
Hawksbill Turtle (Eretmochelys imbricata)	Tropical oceans worldwide.	Rapid decline due to human activity.
Javan Rhinoceros (Rhinoceros sondaicus)	Ujung Kulon National Park, Indonesia.	Less than 80 in the wild.
Amur Leopard (Panthera pardus orientalis)	Russia and China.	Around 100 in the wild.
Yangtze Finless Porpoise (Neophocaena asiaeorientalis)	Yangtze River, China.	Fewer than 1,000.

7.4 Gharial Crocodiles

Why in News?

Madhya Pradesh Chief Minister recently released 10 gharials into Chambal River at the National Chambal Gharial Sanctuary in Morena.

- It is a type of ***Asian crocodilian*** distinguished by their long, thin snouts.
- **Scientific Name** - Gavialis gangeticus.
- **Place in mythology** - Gharials hold sacred significance, often depicted as the divine mount of the goddess Ganga.
- The name 'gharial' comes from the Hindi word ghara, meaning ***pot or vessel,*** referring to the bulbous snout tip of adult males, resembles an inverted pot.
- **Appearance -** Their slender snouts, lined with numerous sharp, interlocking teeth, are adapted to trap fish, the mainstay of their diet.
- **Size -**Males grow from 3-6 meters, and females 2.6–4.5 meters.
- **Breeding -** Gharials mate during November, December, and January.
- **Habitat -** Sandbanks, sandbars, and islands are critical to their ecology, serving as preferred sites for basking and nesting.



- **Distribution –** India and Nepal.
- **Diet –** Fish eating (carnivores).
- Gharials do not stalk and lunge at prey like other crocodilians, their snouts contain ***sensory cells*** that can detect vibrations in the water.
- **Threats**
  - **Historical** - Overhunting for skins, trophies, eggs, and traditional medicine.
  - **Modern -** Dam construction, irrigation canals, siltation, river course changes, embankments, sand-mining, pollution, and fishing.
  - **Specific threat -** Gill nets kill gharials of all sizes, even in protected areas.
- **Conservation Efforts –** Captive breeding to rear and release hatchlings back into the river, monitoring populations, actively managing threats and engaging local communities in preservation.
- Today, the species survives primarily in **5 refuges**

Sanctuaries	Location	River
National Chambal Sanctuary (NCS)	Uttar Pradesh, Madhya Pradesh, and Rajasthan	Chambal River
Katerniaghat Sanctuary	Uttar Pradesh	Girwa River
Chitwan National Park	Nepal	Rapti River
Son River Sanctuary	Madhya Pradesh	Son River
Satkosia Gorge Sanctuary	Odisha	Mahanadi River

- **Conservation Status**
  - **IUCN** – Critically Endangered.
  - **WPA, 1972** - Schedule I.
  - **CITES -** Appendix I.

7.5 Long-billed Vulture

The population of the long-billed vulture has seen a steady increase between 2015 and 2021, with the species exhibiting a 74% breeding success rate in the Mudumalai Tiger Reserve (MTR).

- It is a medium-sized bird of prey (any bird that pursues other animals for food) native to the Indian subcontinent.
  - **Scientific Name** - Gyps Indicus.
  - **Family –** Accipitridae.
- It is also known as the Indian vulture, Indian Griffon.
- **Appearance -** It features a light brown body with a dark head and neck, and it has a pale bill and collar that is more prominent behind the neck.
- It is similar to Slender-billed Vulture, but Indian Vultures are not as lanky and have a paler bill and very tiny ear holes.
- **Distribution -** Found in India and South East Pakistan.
- **Natural habitat -** Found in cities, towns and villages near cultivated area and open woody areas.
- **Diet -** Long-billed Vulture feeds exclusively on carrion, and mainly remains of cattle.
- **Breeding season -** November to March. Female lays one single whitish egg.
- **Nesting -** Nests in small colonies usually on cliffs. Nests are enormous and constructed with the help of sticks and lined with green leaves and rubbish. Both adults share the nesting duties.
- **Conservation status**
  - **IUCN** - Critically endangered.
  - **CITES -** Appendix II.
  - **WPA, 1972 –** Schedule 1.

- **Threats**
  - Forest fires
  - The use of non-steroidal anti-inflammatory drugs, like diclofenac, in treating cattle, and
  - Farmers indulging in poisoning of tigers and leopards that occasionally prey on domestic cattle.

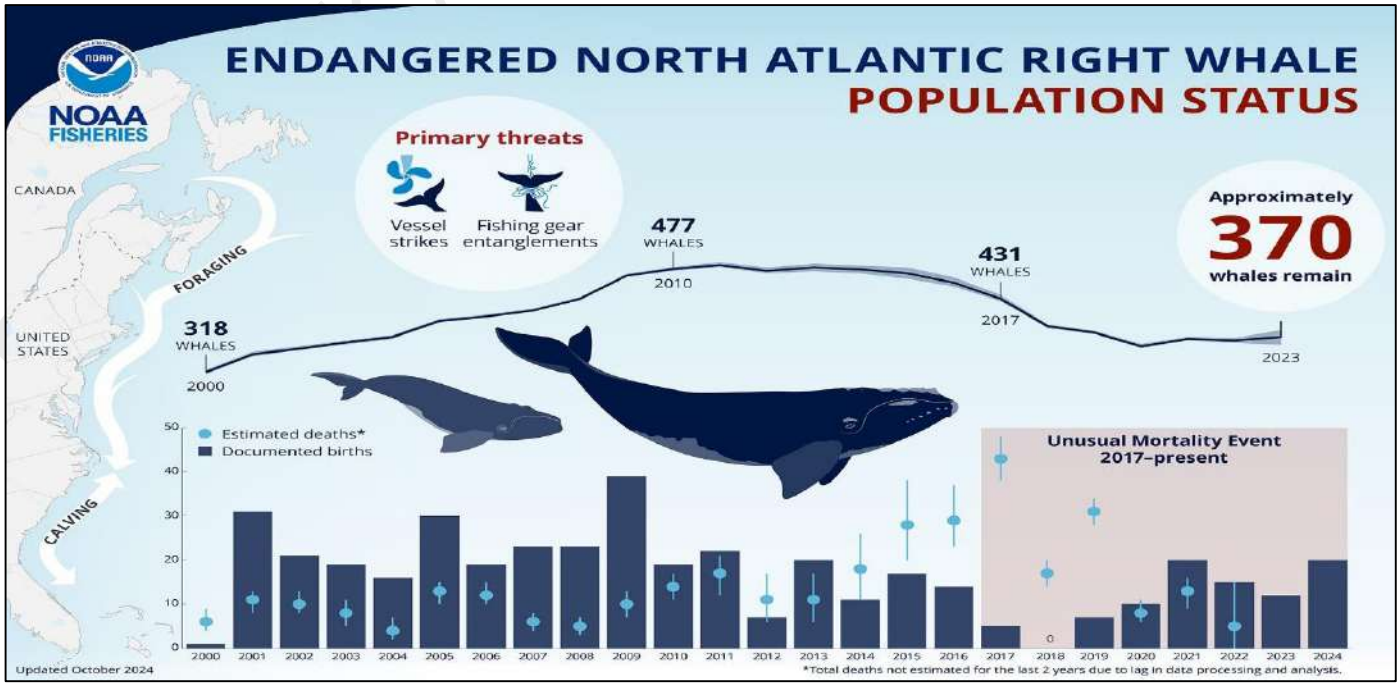
Mudumalai Tiger Reserve

- Mudumalai Tiger Reserve (MTR) is located in the Nilgiri District of Tamil Nadu.
- It is at the tri-junction of Karnataka, Kerala and Tamil Nadu.
- The Tiger Reserve comprises of the wildlife sanctuary and the national park of the same name.
- It forms a part of the Nilgiris Biosphere Reserve.
- It has a common boundary with Wayanad Wildlife Sanctuary (Kerala) on the West, Bandipur Tiger Reserve (Karnataka) on the North.
- The Moyar River flows downstream into the Mudumalai Tiger Reserve and is the natural line of division between Mudumalai and Bandipur Sanctuary.
- Other 2 vulture species observed in the reserve are the white rumped vulture and Asian king vulture.

7.6 North Atlantic Right Whale (NARW)

According to the most recent estimate from the North Atlantic Right Whale Consortium, NARW has continued its slow increase from a low of 358 individuals in 2020.

- Right whales are baleen whales that feeds on copepods (tiny crustaceans) by straining huge volumes of ocean water through their baleen plates, which act like a sieve.
- The population of NARW is one of the ***world's most endangered*** large whale specie that remains significantly smaller than it was a decade ago.
- **Features** – They have stocky black bodies with no dorsal fins, and their blow spouts are shaped like a "V."
- Their heads have knobby white patches of rough skin, called callosities, which appear white because of whale lice (cyamids) covering their otherwise black skin.
- Right whales can probably live for at least 70 years, but data on their average lifespan is limited since scientific monitoring of the species is fairly recent.
- **Range** – North Atlantic right whales primarily occur in ***Atlantic coastal waters on the continental shelf***, although they also are known to travel far offshore, over deep water.
- **Two other species of right whales** – The North Pacific right whale, which is found in the North Pacific Ocean, and the Southern right whale, which is found in the southern hemisphere.
- **Threats –** They have experienced an ongoing Unusual Mortality Event since 2017, which includes sub-lethally injured or ill, seriously injured, and dead right whales.
- Additionally, research demonstrates that only about ***1/3*** of right whale deaths are documented.

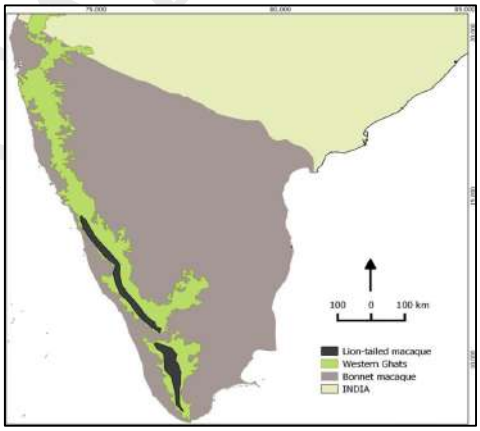


- Other threats include entanglement in fishing gear, vessel strikes, climate change, which may alter their migratory patterns and feeding area.
- The impacts of ocean noise also affect their ability to communicate, find food and navigate.
- **Conservation**
  - **IUCN** - Critically endangered.
  - They have been listed as endangered under the Endangered Species Act since 1970.
- **North Atlantic Right Whale Consortium –** Is a longstanding collaboration between scientists, conservationists, marine industry members and others.

ENDANGERED

8.1 Lion Tailed Macaque

Recently, the researchers from Kerala Forest Research Institute (KFRI) said that human interactions threaten endangered lion-tailed macaque.



- **Lion-Tailed Macaque** – It is one of the smaller macaque species and an *Old-World monkey*.
  - **Scientific name –** Maraca Soleus.
  - **Genus Maraca** – known for its adaptability to human-altered environments.
- **Habitat –** Evergreen, semi-evergreen rainforests & monsoon forests.
- **Distribution –** Found ***only in India*** in the Western Ghats.
- **Distribution in Western Ghats** – Anamalai Hills, Nelliyampathy, Nilambur Ghats, Sholayar, Gavi, Sabarimala, Vallimalai Hills, Valparai and Agumbe.
- **Morphology** – Its body is covered with black fur and tail is long, thin, and naked, with a tuft of black puffy hair at the tip.
- Both males and females have a *grayish lion-like mane of fur* that surrounds the face and the face itself is bare and black.

- **Behavior –** It is *arboreal* (pertaining to trees) and *diurnal*.
- It is a social animal, living in groups of 30-40 animals.
- It is *polygynous*, having more than 1 wife or female mate at a time.
- **Uniqueness** – They are the ***only macaques in which males use loud call*** to let entering troops know their territorial boundaries.
- **Threats –** With only ***about 4,200 individuals*** remaining, they face severe *risks due to food provisioning*, which leads to malnutrition, and disease.
- The long-term consequences of increased human interaction include
  - Increased exposure to *zoonotic diseases* and diet-related illnesses.
  - Behavioural changes like *reduced foraging* in natural habitats and increased reliance on human-provided food.
  - Rise in *injuries, roadkill incidents*, and stress-induced mortality.
- **Conservation status**

Approximately 25% of the macaque population in habitat areas engage in interactions with humans where ***hotspots*** *like Valparai, Nelliyampathy, and Sabarimala have seen rising interactions, especially due heightened tourist and pilgrim footfall.*

- **IUCN Status** – Endangered (2023)
- **CITES** – Appendix I.
- **Wildlife (Protection) Act, 1972** – Schedule I.

8.2 Indian Grey Wolf

Recently, a female Indian grey wolf has given birth to 8 pups at the Bankapura wolf sanctuary, Karnataka.

Bankapur Wolf Sanctuary is the 1st ever wolf sanctuary in Karnataka.

- **Indian Grey Wolf** – It is a ***subspecies of grey wolf species***.
- **Scientific Name** – Canis lupus pallipes.
- **Habitat** – Open forest, open plain areas, scrub forests, grasslands, arid & semiarid areas, dry- deciduous and degraded planes.
- **Distribution** – *India*, Pakistan, Afghanistan, Nepal, Bhutan, Israel, Turkey, Iran, and Syria.
  - **India** – Eastern parts of Peninsular India especially in the regions of southern west Bengal and Jharkhand.
- **Morphology** – Medium in size, shorter fur is greyish intermingled with black on the dorsal crest while the underside is buff.
- Hairs are grizzled with black, a *dark V-shaped patch around the shoulders* and limbs are paler than the body.
- **Characteristics** – It's a *social species* that lives in a pack of 6-8 animals.
- ***Howling*** is a key form of long-distance communication for wolves, especially when territories are vast.
- It has an *excellent sense of smell*, and often sniffs the air to locate prey.
- **Diet** – It is a carnivores animal feed on antelopes, rodents, hares, and raccoons.
- **Threats**
  - Changes in land-use patterns
  - Lesser prey animals
  - Human development
  - Fast encroaching.
- **Conservation Status**
  - **IUCN status** – Endangered.
  - **CITES** – Appendix I.
  - **Wildlife Protection Act, 1972** – Schedule I.

8.3 Khur

Khur have recently overcome a near-extinction event.

- It is an *Indian Wild Ass*, a species of ass that is native to the countries of southern Asia.
- It is one of the 4 remaining subspecies of the Asian Wild Ass.
  - **Scientific name** - Equus hemionus khur
  - **Other local terms** – Ghudkhur or Indian onager
- **Range** – Earlier it extended from Southern India towards southern Pakistan, Afghanistan and south-eastern Iran but now, it can only be found in India.
- **Features** – It is almost the *size of a zebra*, and lives for *21 years*.
- Stable groups consist of *females and their young* while Stallions tend to be loners, especially in the breeding season.
- On the flat terrain of the Rann, they are capable of bursts of up to *70 km per hour*.
- Their gestation periods are long, 11 to 12 months, and concurrent lactation and pregnancy is sometimes seen.

- **Feed** – It predominantly feeds on grasses.

Survival strategies of Khur

- Like donkeys and other members of the Asinus subgenus, possesses a remarkable ability to locate sustenance in desolate environments.
- During summer when grasses are scanty and dried they used to *feed on Prosopis pods and leaves*.
- Their *digestive systems are adept* at processing even the most arid vegetation.
- **Overcome a near-extinction event** – On account of diseases like
  - Viral African Horse sickness
  - Surra
- **Low level of genetic diversity** - It is due of a *genetic bottleneck* caused by disease outbreaks, which left only a small survivor.
- It has outlasted predators such as the cheetah and the lion, which were last spotted in this region in the 1850s.

- **Threat** – *Increased human presence* for salt farming, agriculture coupled with extensive *cattle grazing*, has led to their dispersal.
- *Irrigation canals* that bring water to the southern rim of the Little Rann can also add salinity to the soil.
- **Conservation** – India has declared a ***Wild Ass Sanctuary*** in Little Rann of Kutch, the largest sanctuary in Gujarat.
- It was set up in 1973, only remaining habitat of the Indian wild ass.
- About 6,000 of these sandy and brown creatures live in this area.
- **Conservation status**
  - **IUCN** – Endangered
  - **Wildlife Protection Act 1972** – Schedule I

***Surra** is an infection in Indian Wild Ass caused by the protozoan parasite Trypanosoma evansi and spread by biting insects.*

8.4 Sus salvanius (Pygmy hogs)

Captive breeding and conservation efforts since 1996 in Assam have provided pygmy hogs back to the wildlife.

- **Scientific Name -** Porcula salvania.
- It is the ***smallest wild pig species*** and the only species in the genus Porcula.
- They are tiny, shy and considered extinct in the wild till its rediscovery in the Barnadi Wildlife sanctuary in Assam way back in 1971.
- The pygmy hog is one of the very few mammals that build its own home, or nest, complete with a 'roof'.
- It is an ***indicator species*** (Organism whose presence, absence or abundance reflects a specific environmental condition).
- **Appearance** - Males are slightly bigger than females. Their coats have blackish-brown bristles over gray-brown skin and they have no facial warts.
- Both sexes have a tail and females have 3 pairs of mammae.
- **Habitat-**Pygmy hogs live in tall, dense grasslands that have a mixture of shrubs and trees.
- **Distribution –** It is found only in the reserve forest belts of the Manas Wildlife Sanctuary and the Barnadi Wildlife Sanctuary in northwestern Assam, India.
- It remain hidden in tall dense grass and rarely emerge in the open.
- **Diet -** Pygmy hogs have well developed teeth, with upturned canines and molars with rounded cusps. This allows them to enjoy an omnivorous diet.

- **Threats -** Habitat loss and degradation, and illegal hunting.
- **Conservation status**
  - **IUCN –** Endangered
  - **CITES -** Appendix I
  - **Wildlife (Protection) Act, 1972 -** Schedule I

8.5 Swallowtail butterflies

A new study found that the overexploitation of 25 species of host plants threatens the swallowtail butterflies in the forest habitats of a part of Assam often referred to as the "citrus belt of the world".

- **Family –** Papilionidae.
- Swallowtail butterflies are named for the distinctive "tail-like" projections on their hindwings, even though many species within this group lack these tails.
- **Distribution** - It includes over 550 species found worldwide, except in the Arctic. India is home to 77 of the 573 recorded species.
- **Characteristics** - They are known for their large size and colorful appearance, specifically the characteristic tail-like extensions on their hindwings.
- **Diet -** Swallowtail butterflies primarily feed on nectar from a variety of flowering plants.
- These butterflies often mimic the patterns of distasteful species to avoid predation.
- They serve as valuable indicator species, reflecting the health of their ecosystems.
- There are many species but the most famous ones are Blue-striped mime (Papilio slateri), Bhutan glory (Bhutanitis lidderdalii), and Kaiser-i-Hind (Teinopalpus imperialis).
- Swallowtail is the ***state butterfly of Arunachal Pradesh.***
- **Conservation – IUCN Status: Some species are globally endangered.**
- The International Union for Conservation of Nature designated the northeastern part of the country, where 69 species have been recorded, 'swallowtail-rich zone' under the Swallowtail Conservation Action Plan.
- **Threat -** Habitat destruction due to illegal farming, agriculture, deforestation, and pesticide use.

8.6 Indian Wolf

Indian wolves are sacred beings for Koppal's Kuruba shepherds by removing diseased sheep, prevent spread of infection, saving most of the flock.

- **Scientific Name** - Canis lupus pallipes.
- It is a subspecies of Grey wolf.
- They are also relatively less vocal and have rarely been known to howl.
- Indian wolves are territorial and hunt during the night. One wolf usually is acting as a decoy while the other attacks from behind.
- **Habitat** - lives in semi-arid and arid areas.
- **Size -** The Indian wolf is intermediate in size between the Arabian and Himalayan wolves.
- It lacks the Himalayan wolf's thick winter coat because it lives in warmer conditions.
- **Distribution** – Found in India, Pakistan, Afghanistan, Nepal, Bhutan, Israel, Turkey, Iran, and Syria.
- **Population** – There are approximately 400-1,100 wolves living in the Himalayan Region and 4,000-6,000 wolves in the Peninsular Region.

- **Diet** - Indian wolves are carnivores and prey mainly on antelopes, rodents, hares, and raccoons.
- Indian wolves are monogamous and mate for life.
- **Conservation status**
    - **Wildlife Protection Act of 1972** - Schedule I.
    - **IUCN -** Endangered.
    - **Threats** - Habitat loss, unregulated hunting, and loss of prey.

8.7 African penguin

A new study by an international team of researchers has found that Artificial nests can enhance the breeding success of African penguins by 16.5%.

- It is Endemic to ***Southern Africa.***
- **Scientific Name -** Spheniscus demersus.
- It is also known as Cape penguin.
- It is flightless, with a streamlined body and wings stiffened and flattened into flippers for a marine habitat.
- **Distribution -** The African penguin breeds on the African mainland from Hollams Bird Island, Namibia to Bird Island, Algoa Bay, South Africa.
- **Appearance –** The plumage covering the chin and back is black, and most of the breast plumage is white, possess prominent C-shaped regions of white feathers on both sides of the head.
- **Size –** It can reach up to 60–68 cm in length and weigh up to 3.7–4 kg, the males being slightly larger than the females.
- **Diet -** African penguins primarily feed on pelagic schooling fish, especially sardines and anchovies.
- **Breeding -** The species breeds naturally in burrows dug into guano (a natural substance composed of the excrement of birds, bats, and seals), protects them from the extreme heat of their environment.
- These burrows also protect their broods from harsh winds and rain, which can be fatal to chicks.
- **Breeding season** - Breeding peaks between March and May in South Africa and during November and December in Namibia.
- **Conservation status**
    - **IUCN –** Endangered
- **Threats -** Competition for food, Climate change, Habitat loss, Oil spills.

The penguins prefer the artificial nests over burrows dug in guano.

8.8 Western Hoolock Gibbon

As the world marks International Gibbon Day on October 24, the Western Hoolock gibbon, faces an unprecedented threat to its survival.

- Western Hoolock Gibbon is one of the 20 gibbon species in the world and ***India's only ape*** species.
- **Scientific Name** - Hoolock hoolock.
- **Family** - Hylobatidae.
- It is also known as the white-browed gibbon.
- Currently there are less than 3,000 gibbons in India.
- **Size** - 1.5 feet tall and weighing 6 to 8 kilograms.
- **Habitat –** They are built for an ***arboreal life*** in forests from moist deciduous to evergreen, sub-tropical to lowland.

International Gibbon Day *aims to raise awareness about gibbons and the challenges they face, as well as to promote efforts to protect these*

- **Brachiation** - A special form of arboreal locomotion, enables them to swing up to 6 metres in a single leap, reaching speeds of over 50 km/h as they move effortlessly between trees.
- It can jump between 10 to 12 metres.
- **Distribution** - They are usually seen in the forests of Nagaland, Meghalaya, Manipur, Arunachal Pradesh, Mizoram and Assam.
- **Appearance** – It is ***tailless*** like other apes. Males have jet-black coats, while females are a rich brown.
- **Mating** - Gibbons do not mate within family lines, and once paired, they formed lasting monogamous bonds.
- **Calls** - They are known for their distinct 'hook-o, hook-o, hook-o' calls, which can be heard from up to a kilometre away.

- Males and females often sing in unison, a series of duet calls that helps the pair to mark their territory.
- **Diet** - They are ***omnivorous,*** consuming over 100 species of plants and some invertebrates and birds' eggs.
- **Threats -** Hunting for food and Medicine and Habitat loss, existential risk from a proposed oil exploration project near the Hollangapar Gibbon Sanctuary.
- **Conservation status**
  - It is ***Asia's most endangered primates.***
  - **IUCN** – Endangered.
  - **CITES -** Appendix I.
  - **Wildlife Protection Act of 1972** - Schedule 1.

The western hoolock gibbon's population has declined by almost 90% in the last 30 years.

Hollangapar Gibbon Sanctuary

- It is the ***last remaining home of Hoolock Gibbon*** in Assam.
- It is formerly known as the Gibbon Wildlife Sanctuary or Hollongapar Reserve Forest.
- The sanctuary was officially constituted and renamed in 1997.
- ***Bhogdoi River,*** a tributary of the Brahmaputra, flows along the sanctuary's border.
  - It causes a waterlogged area characterized by plants that can thrive in partially submerged conditions, known as semi-hydrophytic plants.
- **Flora** - The upper canopy of the forest is dominated by the Hollong tree, while the Nahar dominates the middle canopy. The lower canopy consists of evergreen shrubs and herbs.
- **Fauna** - The sanctuary is home to the Bengal slow loris (Northeastern India's only nocturnal primate), 219 bird species, over 200 butterfly species and rare reptiles.
- Indian elephants, tigers, leopards, jungle cats, wild boar, three types of civet, four types of squirrel, and several other types of mammal.
- Other primates include the stump-tailed macaque, northern pig-tailed macaque, eastern Assamese macaque, rhesus macaque, and capped langur.

8.9 Malabar Tree Toad

According to a recent study, Climate change may decrease the distribution range of the Malabar Tree Toad (MTT) by up to 68.7 %t of the current estimated distribution in India's protected areas (PAs).

- It is a small *war***ty Asian Toad amphibian** species ***endemic*** to ***western ghats.***
- **Scientific name** - ***Pedostibes tuberculosus***.
- **Genus** – It is the only species in the monotypic genus ***Pedostibes***.

- **Physical Characteristics**
  - This is a slender frog with a moderate-sized head.
  - The male has a subgular vocal sac.
  - Females are larger than males.
  - Adults of this toad grow to 3.6-3.85 cm in length.

Toad is a common name for certain frogs, especially of the family Bufonidae, that are characterized by dry, leathery skin, short legs, and large bumps.

- **Habitat** –It is the ***only arboreal toad species*** in India, having the unique capability to climb trees.
- It is found in wet tree hollows or leaf bases containing water.
- They are found along Western Ghats at elevations of 250 m to over 1000 m, often beside streams.

Habitats of Malabar Tree Toad	
Tamilnadu	• Kalakad Mundanthurai Tiger Reserve
Kerala	• Silent Valley National Park
Karnataka	• Sharavathi Valley Wildlife Sanctuary • Mookambika Wildlife Sanctuary • Brahmagiri Wildlife Sanctuary • Kudremukha National Park
Goa	• Netravali Wildlife Sanctuary • Mhadei Wildlife Sanctuary • Mollem National Park

- **Discovery** - It was first discovered in 1876.
- It was later rediscovered in 1980 at Silent Valley National Park in Kerala.
- **Conservation Status**
  - **IUCN** – Endangered.
  - **Wild of Protection Act ,1972**– Schedule II
  - **CITES** – Not listed.
- **Threat** – Habitat fragmentation, pollution, disease and orphological deformities with climate change has led to the decline of amphibian populations in the past 40 years.
- Annual precipitation influences species populations and distribution.
- Drought situation experienced by toads and frogs of Karnataka in 2023 impacted their breeding and nesting habitats.

8.10 Halari donkeys

The halari donkeys form close bonds with people, supporting for transport needs with the surviving population of fewer than 500.

- Halari donkey is a beautiful breed of donkey native to *Halar region of Gujarat*.
- They are considered to be intelligent animals which work closely with human beings.
- **Appearance –** They are white in colour, and is larger and more resilient than other donkey breeds.
- **Habitat -** Semi-arid landscape of Jamnagar and Dwarka districts in Gujarat's Saurashtra region.

- **Community Usage -** The Bharwad and Rabari pastoralists are the main communities to use this donkey as a pack animal for carrying luggage during migration.
- The Kumbhar (potter) community also uses this animal for pottery work in the Jamnagar region.
- **Uses -** Halari donkey milk is known for its sweetness.
- Milk powder from it can fetch upto ₹7,000 a kg in the international market, and is used for cosmetic purposes.
- **Conservation status**
  - **IUCN -** Endangered.

VULNERABLE

8.11 Rhododendron Wattii

Researchers have identified the last tree which is standing in a popular trekking destination in Nagaland.

- **Rhododendron Wattii** – It is a ***small tree*** attaining a maximum height of 25 feet.
- It is an *evergreen plant*, and leaf renewal occurs throughout the year.
- **1st identified by** – Sir George Watt from Nagaland's Japfu Hill range during his 1882-85 survey.
- **Habitat** – It grows on ***rocky hill slopes*** with other Rhododendron species, dwarf bamboo, mosses, and ferns.
- **Distribution** – Endemic to Manipur and Nagaland (Dzukou Valley).
- **Seed** – They are fusiform and winged, which retain viability for about one year when stored at normal temperature and humidity.
- No seedlings were observed in its natural habitat.
- It produces numerous seeds after the flowers are pollinated mainly by the fire-tailed sunbird and bumble bees.
- **Fruit** – It is a capsule that is oblong, grooved, and dehisce from the top by longitudinal slits.
- **Factors responsible for disappearance**
  - Poor seedling survivability
  - Anthropogenic activities
  - Wildfires in a Dzukou valley burnt for 2 weeks in 2020-21.
- **Conservation status**
  - **IUCN status** – *Vulnerable*.

> ***Rhododendron*** *has more than 1,000 species of worldwide and the north-eastern region has 129 of the 132 taxa recorded in India.*

8.12 Burmese pythons

Scientists from the University of Florida analysed large amounts of data collected to remove the snakes (Burmese Pythons), revealing critical insights about how to most efficiently remove the reptiles.

- It is an ***invasive and alien species*** in Florida and is one of the largest snakes on Earth.
  - **Scientific Name -** Python bivittatus.
- **Native -** Jungles and grassy marshes of ***Southeast Asia.***
- **Appearance -** It is a dark-colored ***non-venomous snake*** with many brown blotches bordered by black down the back.
- **Growth -** 23 feet or more in length and weighing up to 200 pounds.

- They are also excellent swimmers, and can stay submerged for up to 30 minutes before surfacing for air.
- **Diet** – Carnivores, surviving primarily on small mammals and birds.
- They have poor eyesight, and stalk prey using ***chemical receptors*** in their tongues and heat-sensors along the jaws.
- They kill by *constriction*, grasping a victim with their sharp teeth, coiling their bodies around the animal, and squeezing until it suffocates.
- They are *solitary animals* and are generally only seen together during spring mating.
- In both their native and invasive range they suffer from Raillietiella orientalis (pentastome parasitic disease).
- **Threats -** Habitat depletion, pet trade, and hunting for their skins and flesh.
- **Conservation status**
    - **IUCN** - Vulnerable.

NEAR THREATENED

8.13 Asiatic Golden Cat

Presence of 'Asiatic golden cat' reconfirmed in Assam's Manas National park recently.

- Asiatic golden cat is a ***medium-sized wild*** cat native to Asia.
    - Scientific Name - Catopuma temminckii.
- It is ***polymorphic in color*** and showcases coat colors like golden, red brown, dark brown, and grey.
- **Habitats -** It thrives in dry deciduous forests, subtropical evergreen forests, tropical rainforests, and even temperate and sub-alpine forests.
- It can be found at elevations ranging from sea level to 3,738 meters.
- **Distribution** – It is found across Northeast India, Southeast Asia, and southern China.
- It is also found in protected areas such as
    - Khangchendzonga Biosphere Reserve (Sikkim),
    - Buxa Tiger Reserve (West Bengal),
    - Nongkhyllem Wildlife Sanctuary (Meghalaya),
    - Dampha Tiger Reserve (Mizoram),
    - Namdapha Tiger Reserve, Kamlang Tiger Reserve,
    - Debang valley,
    - Pakke Tiger Reserve,
    - Eaglenest Wildlife Sanctuary,
    - Singchung-BugunVCR and
    - Talle-Valley Wildlife Sanctuary (Arunachal Pradesh), and
    - Intanki National Park (Nagaland).

- **Behavior-** They are *solitary and territorial*.
- Once considered nocturnal, a radio-tracking study showed them to be *diurnal and crepuscular*.
- They are carnivores, often eating small prey like Indochinese ground squirrels, small snakes, and other reptiles, muntjacs, rodents, birds, and young hares.
- They are polygynous (mating with multiple females) with ***no breeding season.***
- **Threats -** Habitat destruction, deforestation, decreasing numbers of ungulate prey, illegal wildlife trade, hunting by tribal people for meat and skin to use in tribal rituals.
- **Conservation status**

- **IUCN** - Near Threatened.
- **Wildlife (Protection) Act, 1972** - Scheduled-I.
- **CITES** - Appendix I.

LEAST CONCERN

8.14 Bharal

Recently, the researchers analyzed the population of 1,000 snow leopards due to large numbers of bharal in the Sanjiangyuan region of China.

- **Bharal –** It is called as the ***Blue Sheep*** and native to the high Himalayas.
- **Taxonomy:**
  - **Scientific name –** Pseudois Nayaur.
  - **Genus** – Pseudois, where it is the only member.
- **Distribution** – Montane regions in the Himalayas and China
  - *India*, Bhutan, Myanmar, Nepal and Pakistan.
- **Habitat** – Open grassy slopes in high mountains and near cliffs.
- **Morphology** – Short, dense coat is slate grey in colour and bluish sheen, underparts and backs of legs are white, chest and fronts of legs are black.
- Ears are small, nose is dark, and horns are found in both sexes and are ridged on the upper surface.
- **Sexual dimorphism:**
  - **Males** – Horns are grown upwards, turn sideways and curve backwards.
  - **Females** – Horns are much shorter and straighter.
- **Behavior** – They are ***active throughout the day,*** alternating between feeding and resting on the grassy mountain slopes.
- They adjust up to the precipitous cliffs, where they once again freeze, melting into the rock face.
- **Threats:**
  - Poaching for meat.
  - Competition with livestock.
- **Conservation Status:**
  - **IUCN Status** – Least Concern (LC).
  - **Wildlife Protection Act 1972** – Schedule 1.

Bharal accounted over 80% of snow leopards food intake. Its density ranks among the world's highest in Sanjiangyuan area of China's Qinghai province, part of the Tibetan Plateau.

8.15 Spotted Hyena

A recent study discovered that the hyena (Crocuta crocuta), one of Africa's most abundant carnivores, appeared in southern Egypt after it became extinct in Egypt 5,000 years ago.

- It is a Non-arboreal, Nocturnal, Highly social hyena species found abundant in ***sub-Saharan Africa.***
- It is also known as the *laughing hyena*.
- **Scientific Name -** Crocutta crocutta.
- **Weight -** 40-86 kg - females often weigh more than males.
- **Habitat** - Semi-desert, savanna and open woodland, dense, dry woodland, and montane regions.
- Its range is Sub-Saharan Africa, though historically across Africa and Eurasia.
- **Distinction** - It is physically distinguished from other species by its vaguely bear-like build, rounded ears, less prominent mane, spotted pelt, more dual-purposed dentition, fewer nipples, and pseudo-penis.

- It is the ***only placental mammalian species*** where females have a pseudo-penis and lack an external vaginal opening.
- **Diet –** Carnivorous.
- **Population in Wild -** 27,000-47,000 individuals.
- Most abundant within the *Serengeti ecosystem and Kruger National Park.*
- **Threats -** Habitat loss and poaching.
- **Conservation status**
  - **IUCN Status** - Least Concern.
  - **CITES Appendix** - Not listed.

8.16 Indian squid

The ICAR-Central Marine Fisheries Research Institute (CMFRI) recently said that it decoded the gene expression pattern of Indian squid having major implications from neuroscience to environmental science.

- It is also known as the ***Indian calamari.***
  - Scientific Name **-** Uroteuthis duvaucelii.
- It is a cephalopod species, any member of the molluscan class Cephalopoda.
  - This group includes highly advanced species such as squids, octopuses, cuttlefish, and nautiluses.
- **Family –** Loliginidae, typically called inshore or neritic squids.
- **Distribution -** It is distributed in the Indo-Pacific region, occurring in depths between 30 and 170 meters.
- Along the coast of India, commonly found in the waters off the *coasts of Tamil Nadu, Kerala, and Goa*.
- **Appearance -** A light pinkish-gray body and 2 large fins on either side.
- They have 8 arms and 2 longer tentacles that they use to capture prey.
- **Behavior -** They are known for their rapid growth rate, limited lifespan, and complex population structures.
- They are fast swimmers and are capable of propelling themselves through the water using a jet propulsion system that allows them to reach speeds of *up to 40 km/h* when escaping from predators or chasing prey.
- Squids tend to prefer areas with high levels of dissolved oxygen, as this is crucial for their respiration.
- **Diet** - This species is an *active carnivore* that feeds mainly on crustaceans and small fishes and often exhibits cannibalistic behavior.
- **Uses -** Utilized as fertilizer supplemental food source for high end and expensive cultured animals.
- **Conservation Status**
  - **IUCN** - Least Concern.

8.17 Black Kite

Recently, it was found that black kites have nesting habitats at a tower structure in Chennai.

- **Black Kite** – It is a bird of prey, and a ***migratory bird*** extends to an extremely large range of habitats.
  - **Scientific Name** – Milvus migrans.
- It is often called ***Fork-Tailed Kites*.**
- **Habitat –** Close access to water bodies such as rivers, ponds, lakes, and wetlands, woodlands, grassland, and open savannas.
- **Distribution –** Tropical portions of Australasia, Eurasia, and Africa.

- **Morphology –** Medium-sized raptors, dorsal, ventral and tail color is brown with darker brown striped feathers within.
- It has small, bead-like dark brown eyes and a large black, hook-shaped beak, long black talons, and pale-yellow legs.
- **Sexual dimorphism**
  - **Female** – It has a slightly *larger body size than males*, though they feature similar coloration.
- **Characteristics –** It typically lives in social groups.
- It migrates from Europe and northern Asia, wintering in sub-Saharan Africa and southern Asia.
- It has well-developed intraspecific communication and very loud vocalizing.
- **Diet –** An extremely *versatile feeder*, it takes carrion, birds, mammals, fish, lizards, amphibians, invertebrates, and forage on vegetable matter such as palm oil fruits.
- **Threats –** Poisoning
  - Shooting
  - Electrocution by power lines
  - Pollution of water by pesticides and other chemicals
  - Vulnerable to the effects of wind energy development.
- **Conservation Status**
  - **IUCN** – Least Concern.
  - **CITES** – Appendix II.
  - **Wild Life Protection Act, 1972** – Schedule-II.

8.18 Baboons

Recently, #JusticeForRaygun widely shared on social media due to encounters between baboons and people in Pretoria.

*A young male baboon named **Raygun** burned to death by the teenagers in Africa.*

- **Scientific name –** Papio.
- **Baboons** – They are ***world's largest monkeys***, and there are 5 different species of baboons.
  - **5 species** – Olive, Yellow, Chacma, Guinea, and Sacred baboon
- **Habitat** – Savanna, woodlands, bushlands, mountains, tropical forests and semi-arid regions.
- **Distribution** – Dry regions of *Africa and Arabia*.
- **Morphology** – Long bodies, not including substantial tails of varying lengths, large head, cheek pouches, dog-like noses and powerful jaws.
- Long snout, sharp canines, red (or black) backside, thick fur and its colour varies depending on the species.
- **Sexual Dimorphism -** Males are largest species, but females are only half this size.
- Males have a thick coat of fur, especially around their chest and head, where they have thick manes.
- **Uniqueness** – It *doesn't have a prehensile (gripping) tail*, meaning their tails are not used as a hand.
- Highly social, intelligent, travel in large noisy troops, and communicating by calls
- **Diet** – They are *omnivorous* feed on fruits, grasses, seeds, eggs, insects, bark, roots, birds, rodents, antelopes and sheep.
- **Threats**
  - Hunted for their skins

- Overgrazing
- Agricultural expansion
- Irrigation projects
- Overall human settlement growth.

- **Conservation status**
  - **IUCN status** – Least concern.
  - **CITES –** Appendix II.

8.19 Blue-Cheeked Bee-eater

The first breeding site of the Blue-Cheeked Bee-eater in peninsular India has been discovered in the saltpans of Aandivilai near the Manakudy Mangroves in Kanniyakumari district.

- It is a near ***passerine bird*** in the bee-eater family, Meropidae.
  - **Scientific Name -** Merops persicus.
- It is a passage *migrant and winter visitor in India*.
- **Appearance** – It is a richly colored, slender bird.
- It is predominantly green, its face has blue sides with a black eye stripe, and a yellow and brown throat, the beak is black.
- **Habitat -** Found in open areas as well as forests from lowlands up into middle elevations.
- **Distribution –** It breeds across Northern Africa and the Middle East, from eastern Turkey to Kazakhstan and India.
- Occasionally, this bird appears as a rare vagrant north of its usual range, particularly in Italy and Greece.
- **Behaviour –** It may choose to nest solitarily or in small, loose colonies of up to ten individuals. It is also known to share colonies with European bee-eaters.
- **Breeding Regions –** Nesting sites are often located in sandy banks, embankments, or low cliffs, and occasionally on the shores of the Caspian Sea.
- Its breeding was primarily recorded in regions such as Nile Delta, Pakistan, and Iran while its wintering grounds include parts of Africa.
- **Diet –** Feed on insects preferably dragonflies.
- **Threats –** Habitat destruction, from developmental activities, and anthropogenic pressures.
- **Conservation status**
  - **IUCN –** Least Concern.

8.20 Caracal

Gujarat government allocates Rs 10 crore for Caracal conservation and breeding recently.

- The caracal is a ***medium-sized wildcat*** primarily nocturnal animal.
  - Scientific Name **-** Caracal caracal.
- The caracal's name comes from the Turkish word karakulak, which means "black ear".
- In India, it is called ***siya gosh***, which is Persian for "black ear".
- **Appearance** – Long legs, a short face, long canine teeth, and have Black markings around eyes and whiskers.
- It is known for its remarkable agility, capable of leaping over 3 meters (9.8 feet) to catch birds in midair.
- Among small cats, caracals are the largest in Africa, recognized for both their speed and weight.
- **Diet** - Caracals are strictly carnivorous and prey primarily on birds, rodents and small antelopes.

- **Habitat** - They live in woodlands, savannahs and in scrub forests, but avoid sandy deserts. In southern Africa, they usually live in upland areas.
- **Distribution** - Most regions of Africa, the Arabian Peninsula through northwest India and in Middle East.
- **In India -** It is now only found in a few areas of India, including:
    - Ranthambhore Tiger Reserve, Rajasthan.
    - Kutch region, Gujarat.
- **Threats -** Hunting, Habitat loss and Competition with other predators.
- **Conservation areas**
    - Kachchh Wildlife Sanctuary (WLS) in Gujarat
    - The tiger reserves of Ranthambhore, Mukundra hills, and Sariska
    - The WLS of Kumbhalgarh, Mount Abu, and Todgarh-Raoli in Rajasthan
    - Gandhi Sagar WLS in Madhya Pradesh
- **Conservation status**
    - **IUCN -** 'least concern'.
    - **Wildlife (Protection) Act, 1972 -** Schedule-I.
    - Conservation Assessment and Management Plan (CAMP) listed as 'near threatened'.

8.21 Rufous-tailed rock thrush

The female Rufous-tailed rock thrush was recently spotted in Kanniyakumari Wildlife Sanctuary could be a passage migrant to Africa.

- It is a distinctive, small, short-tailed thrush-like bird.
    - Scientific Name **-** Monticola saxatilis.
    - Family **-** Muscicapidae.
- It is known as ***Common rock thrush***.
- **Appearance**
    - Males are strikingly beautiful with bright blue-gray head, white back patch, and chestnut underparts.
    - Females are reddish-brown and have a scaly appearance, with a tail pattern similar to males.
- **Distribution** - Europe, northwestern Africa, and parts of Asia
- **Breeding** - Breeds on rocky mountain slopes and alpine meadows, usually above 1,500 m (5,000 ft).
- **Migration -** It migrates to Africa during the non-breeding season.
- **Diet -** It is omnivorous, eating a range of insects, berries and small reptiles.
- **Behavior -** Usually shy but may be obvious when delivering its melodic Eurasian Blackbird-like song in flight. The male common rock thrush has a clear and tuneful song.
- **Threats -** Habitat loss and degradation and indiscriminate shooting.
- **Conservation status**
    - **IUCN** - Least Concern

Kanyakumari Wildlife Sanctuary

- The sanctuary is widely known to be a tiger reserve and is known to be a wildlife corridor
- **Declared in** - 2008.
- **Rivers** - 7 rivers have their origin in this forest including the famous Pahrali and Thamirabarani rivers.

- **Vegetation** - Southern thorn forests, dry deciduous, moist deciduous, semi evergreen forests and ever green hill sholas with grassy downs.
- **Fauna -** Indian Bison, Elephant, Nilgiri Tahr, Sambar Deer, Lion-tailed Macaque and also reptiles such as Indian Rock Python.
- **Other spotted birds -** Persian shearwater (*Puffinus persicus*) and Willow warbler (*Phylloscopus trochilus*).

8.22 Great Eared Nightjar

The Great Eared Nightjar is one of the most mesmerizing creatures, due to its striking resemblance with a mythical dragon, especially when perched.

- The Great Eared Nightjar is a ***dragon-like appearance bird*** *native to Southeast Asia.*
  - **Scientific Name** - Lyncornis macrotis.
  - **Family** - Caprimulgidae.
- The name 'nightjar' comes from the bird's ***nocturnal*** habits and its calls are often called as jarring.
- **Appearance** - They have *large, forward-facing eyes, big head*, and intricate patterning of brown, black, and gray on its feathers.
- It has a white throat band but has no white on its wings or on its tail.
- **Habitat** - These birds prefer to dwell in thick forests, woodlands and mangroves. Instead of making nests really high up on trees, they typically roost on the ground or low branches.
- **Distribution** - It can be found roaming the skies from parts of India and Sri Lanka to the Malay Peninsula, the Philippines, and Indonesia.
- **Diet** – Insectivores include moths, beetles, and other nocturnal insects.

- **Breeding** - They blend into surroundings easily and lay eggs on the ground.
- **Flight** - Nightjars are well known for their ***silent flight,*** which is due to the structure of their feathers.
- Hence they can easily sneak up on their prey and also move away without anyone noticing, if faced with a potential threat.
- **Threat -** Habitat loss.
- **Conservation status**
  - **IUCN -** Least Concern.

NEWLY DISCOVERED SPECIES

8.23 Indo-Burmese Pangolin

Recently, scientists from the Zoological Survey of India (ZSI), Kolkata have identified a new species of Indo-Burmese pangolin.

- **Pangolins** – They are the *only mammals wholly-covered in scales* and they use those scales to protect themselves from predators in the wild.
- **Indo-Burmese pangolin** – It is a distinct phylogenetic species of Asian pangolin, *diverged from the Chinese pangolin* around 3.4 million years ago, during the Pliocene Epoch.
  - **Scientific name** – Manis Indoburmanica.

> ***Phylogenetic species*** *is the smallest set of organisms that share an ancestor and can be distinguished from other such sets.*

- **Distinct species** – It has a genetic distance of 0.038 and a barcode gap of 3.8% which reinforced its status as a distinct species.
- It is influenced by geoclimatic changes in the Indo-Burma region.

- **Distribution** – Nepal, Bhutan and Myanmar.
- **In India** – Arunachal Pradesh and Assam.
- It is home to 2 species,
    - **Indian Pangolin** – Found across the subcontinent.
    - **Chinese Pangolin** – Found across a larger area in south Asia.
- Bihar, West Bengal and Assam have both species in their States.
- **Threats** – Pangolins are among the *most trafficked wild mammals globally* due to poaching and habitat degradation.
- **Conservation Status** –It hasn't yet been concluded.
- **World Pangolin Day** is observed every year on February 18.

Genetic distance *is a measure of the genetic divergence between species or between populations within a species, whether the distance measures time from common ancestor or degree of differentiation.*

Mitochondrial genomes *include mitochondrial DNA are inherited to offspring from their mother.*

8.24 Epicoccum Indicum

A new species of phytopathogenic fungi was recently discovered by researchers at Banaras Hindu University.

- **Taxonomy** - Its scientific name is ***epicoccum indicum,*** where the species name indicum refers to India, where it was discovered.
- It was identified based on morpho-cultural characteristics and multigene molecular phylogenetic analyses.
- It forms a distinct clade, separate from other related species, which justifies its classification as a new species.
- It is associated with an emerging leaf spot disease in Chrysopogon zizanioides (vetiver).

Phytopathogenic fungi

- It can cause diseases in plants, leading to significant economic losses in agriculture and horticulture
- It is contributed to ***70-80%*** of plant diseases and infect parts of the plants such as roots, stems, leaves, fruits and flowers.
- Most of these fungi belongs to Ascomycetes and the Basidiomycetes.
- They possess a wide range of enzymes destroying the carbohydrate polymers (constitute the building materials of the cell walls).
- Some fungi ***kill their hosts*** and feed on dead material (necrotrophs), while others colonize the living tissue (biotrophs).

Leaf spot disease

- It is a plant disease that causes circular or elongated spots on leaves, stems, and sheaths.
- It can be brown, black, tan, or reddish in color, and can vary in size.
- It can be caused by fungi, bacteria, nematodes, or other organisms.

8.25 New Green Cardamom Species

Recently, an international team of researchers have identified 2 new species that are close cousins to green cardamom.

- **Green cardamom** – It is the *most valuable spice plant in the world* and of huge economic importance.
- **Taxonomy**
    - **Scientific name** – Elettaria cardamomum.
    - **Genus** – Elettaria, now ***has 7 species***.
- It is based on the spice's *old Malayalam name, Elletari* which is used by Hendrik van Rheede in the 17th century.

- **Seed capsules** – It provides the commercial green cardamom.
- It is known as ***Queen of Spices***.
- **2 new species** – Elettaria facifera and Elettaria tulipifera.
- **Discovered in** – Western Ghats regions of Kerala.

Elettaria Facifera

- **Found in** – Kerala's ***Periyar Tiger Reserve*** in Idukki district.
- **Morphology** – It is distinguished by sessile leaves, erect flowering shoots that are separate from the leafy shoots, and pure white labellum with purple-red markings.
- **Mannan tribe** – They refer to it as the ***Vai noki elam***, (loosely, Open-mouth cardamom) due to the fruit's resemblance to an open mouth.

Elettaria Tulipifera

- **Found in** – ***Agasthyamalai hills*** in Thiruvananthapuram district.
- **Morphology** – It has strikingly beautiful tulip-shaped inflorescence and large, bright to dark red, whorled bracts.
- **Conservation** – The researchers have underlined the need for conservation efforts as both species face threats.

8.26 Bryospilus Bharaticus

Recently, the researchers have discovered a new species of tiny crustacean in Western Ghats.

- It is a ***new species of water fleas*** (type of small crustacean).
- **Discovered in** – Moss growths of *Korigad fort* and adjacent areas on Deccan Plateau near Pune in the Western Ghats.
- **Taxonomy**
  - **Scientific name** –*Bryospilus (Indobryospilus) Bharaticus*.
  - **Genus** – Bryospilus, is a unique animal with characteristic adaptations suited for *living in semi-terrestrial environments*, such as water film found on mosses.
  - This discovery marks the ***1st time***, in this genus has been recorded in Tropical Asia.

Water fleas *are small aquatic animals belonging to crustacea group and are usually found in rivers, ponds, and pools.*

Research Highlights

- The relatives of this species are found across various continents that were once part of the supercontinent Gondwanaland, which included South America, Australia, New Zealand, and Africa, along with India.
- The ancestors of this species could have been present in the Indian subcontinent before the breakup of Gondwanaland, approximately 200 million years ago.
- Its presence in a pristine environment with minimal human disturbance highlights the health of the habitat.

8.27 Crocodile Catfish

Crocodile catfish, a rare fish species was discovered.

- **Crocodile Catfish** – It is one of the ***largest freshwater catfish species*** in Asia.
- **Discovered in** – Bahini River, Guwahati, Assam.
- **Taxonomy**
  - **Scientific name** – Bagarius suchus.
  - **Family** – Sisoridae.
- It is known as Asian giant river catfish, crocodile goonch catfish or giant devil catfish.
- **Size** – 70 centimeters (28 inches).

Sisoridae *is the largest family of Asian catfishes, found throughout the southern arc of the Asian continent.*

- **Distribution –** South and Southeast Asia, like India, Nepal, Bangladesh, Myanmar, and Thailand.
- **Habitat** – Fast-flowing rivers, turbulent rapids, boulders, large rocks, submerged roots, and debris.
- **Morphology** – It has a long, cylindrical body with a broad head, a wide mouth, typically dark brown or black in colour, and have irregular patches or spots on its body.
- The dorsal fin is long and extends almost the entire length of the back.

- **Sexual Dimorphism**
  - **Males –** Typically slimmer than females and may have slightly more pronounced coloration.
- **Characteristics** – It habitats the rivers characterized by *strong currents, rocky substrates, and cooler water temperatures.*
- It best fed in the evening or at night when they are most active.
- It is a *carnivorous predator* feed on smaller fish, crustaceans, and invertebrates.
- Its overfeeding lead to poor water quality and health issues.
- **Threat to aquatic ecosystem** – It is an ***invasive species***, threatens the local aquatic ecosystem by depleting native fish populations and disturbing the natural balance.
- **Conservation Status**
  - **IUCN List** – Near Threatened (NT).

8.28 Mononoke Tilefish

A Chinese research team has discovered a new fish species, named Mononoke tilefish.

- **Mononoke Tilefish** – It is a new species of ***deep-water tilefish***.
- **Discovered in** – South China Sea in the continental slope area.
- **Taxonomy**
  - **Scientific name** – Branchiostegus sanae.
  - **Genus** – Branchiostegus, are 19 species only 3 species have been discovered.
- It is known as *Ghost Horsehead Fish*.

- **Habitat** – Sandy and muddy bottoms on the edges of continental and oceanic plates.
- **Distribution –** South China Sea, East and Southeast Asia.
- Found from warm temperate to tropical oceans.
- **Morphology** – Large body with an eyes close to its head, nostril oval-like shape, mouth terminal and jaws rows with canine-like teeth.
- Its upper part pale orange mixed with yellow stripes, and lower part dark grey with inconspicuous yellow blotch near base.
- **Uniqueness** – Cheek markers are red and white stripes that run vertically from the eyes to the cheeks.
- Approximately light 16 vertical stripes present along the body.
- It is the ***only one with vertical stripes*** on the body.
- It lives at *great depths*, with some found 600 m below the surface.
- **Threats** – People consume and sell in markets in East and Southeast Asia.
- **Conservation status** – It hasn't yet been concluded.

Mononoke Tilefish's distinctive cheek stripes, earning it the name of a character from the animated movie "Princess Mononoke."

8.29 Haliotis pirimoana

Rare New Paua Species Discovered in Northern New Zealand recently.

- It is a ***new species of paua mollusk*** (also known as abalone).
    - Abalones (family Haliotidae) are herbivorous marine gastropods that occupy hard substrates in shallow non-polar regions worldwide.
    - Presently, almost 70 species and many subspecies and forms are scientifically recognized, all in the genus Haliotis.
- **Habitat -** It lives at 5-47 m depth under rocks and in rock crevices.
- **Distribution** - It has only been found at Manawatawhi 3 Kings Islands, off the northern North Island.
- **Appearance -** It resembles other small paua from the North Island but the shell has finer sculpture across its back & a subtly different shape.
- **Distinction** - It differs further from mainland populations of Haliotis virginea in average shell shape.
- Shell shape generally having a lower profile, especially abapically, a more angular abapical margin, and a flatter, broader, and more sharply delimited umbilical margin.

- **Uses** - Shells are often prized for art, cultural practices, jewellery, and by shell collectors.

8.30 Tenkana Genus & Tenkana Jayamangali

Recently, arachnologists discovered a new genus of jumping spiders, Tenkana, across southern India.

- **Tenakana Genus -** Tenkana comes from the Kannada word for south, reflecting that all the known species are from southern India and northern Sri Lanka.
- This genus encompasses 2 previously known species & also includes a spider called Tenkana jayamangali in Karnataka.
- This new group belongs to the ***Plexippina subtribe of jumping spiders*** and is different from related groups such as Hyllus and Telamonia.
- Two species that were previously in Colopsus - Tenkana manu (found in south India and Sri Lanka) and Tenkana arkavathi (from Karnataka) have now been moved to the new genus.

Tenkana jayamangali

- **Nomenclature** - Jayamangali comes after the ***Jayamangali River*** at Devarayanadurga reserve forest in Karnataka, where it was first seen.
- **Habitat -** Unlike related species that live in forests, Tenkana spiders prefer drier areas and ground habitats.
- **Distribution** - Tamil Nadu, Puducherry, Karnataka, Telangana and Andhra Pradesh.
- Tenkana jayamangali is a sister species to T arkavathi and T manu.
- Its movements are reminiscent of those of the unrelated ground-dwelling Stenaelurillus jumping spiders.
- **Appearance** - The males of T jayamangali, pale hairs occupy most of carapace surface area leaving small bald patch posteriorly.
- Ocular area is covered with white hairs uniformly.
- The colour pattern of the male resembles the face of a panda and has a brownish abdomen.
- The female on the other hand is grey with some pattern.

8.31 Anguiculus dicaprioi

A team of scientists named a new species of snake, Anguiculus dicaprioi recently.

- It is a ***colubrid snake***, refers to any member of the family Colubridae, which is the largest family of snakes.
    - This family account for almost two-thirds of all living snakes in the world.

- It was discovered in ***Western Himalayas***.
- **Nomenclature -** Anguiculus is Latin for small snake.
- It has been *named after Hollywood star Leonardo DiCaprio* for his efforts to create awareness about biodiversity loss.
- Suggested common English name is ***'Himalayan snake'.***
- **Appearance** - The species is small, growing up to 22 inches, with distinct features such as a steeply domed snout and a faint grey collar around its neck.
- The snake resembled ***Liopeltis rappi,*** a species known to be found in the eastern Himalayas.
- **Habitat** - They live at heights of around 6,000 feet above sea level.
- **Distribution** - The snake is found in Chamba, Kullu and Shimla in Himachal Pradesh, Nainital in Uttarakhand and Chitwan National Park in Nepal.

INVASIVE SPECIES

8.32 Culicoides

Recently, researchers from the Zoological Survey of India (ZSI) have identified 23 species of blood-sucking flies in the Andaman & Nicobar Islands.

- **Culicoides** – They are ***tiny insects*** similar in appearance to flies.
- They are *more closely related to mosquitoes* in their feeding habits.
- They are called Midges and are locally called *Bhusi Files in Andaman and Nicobar*.
- **Taxonomy**
    - **Scientific name –** Culicoides.
    - **Order** – Diptera, the *smallest haematophagous member*.
- **Distribution** – Africa, North and South America and Europe.

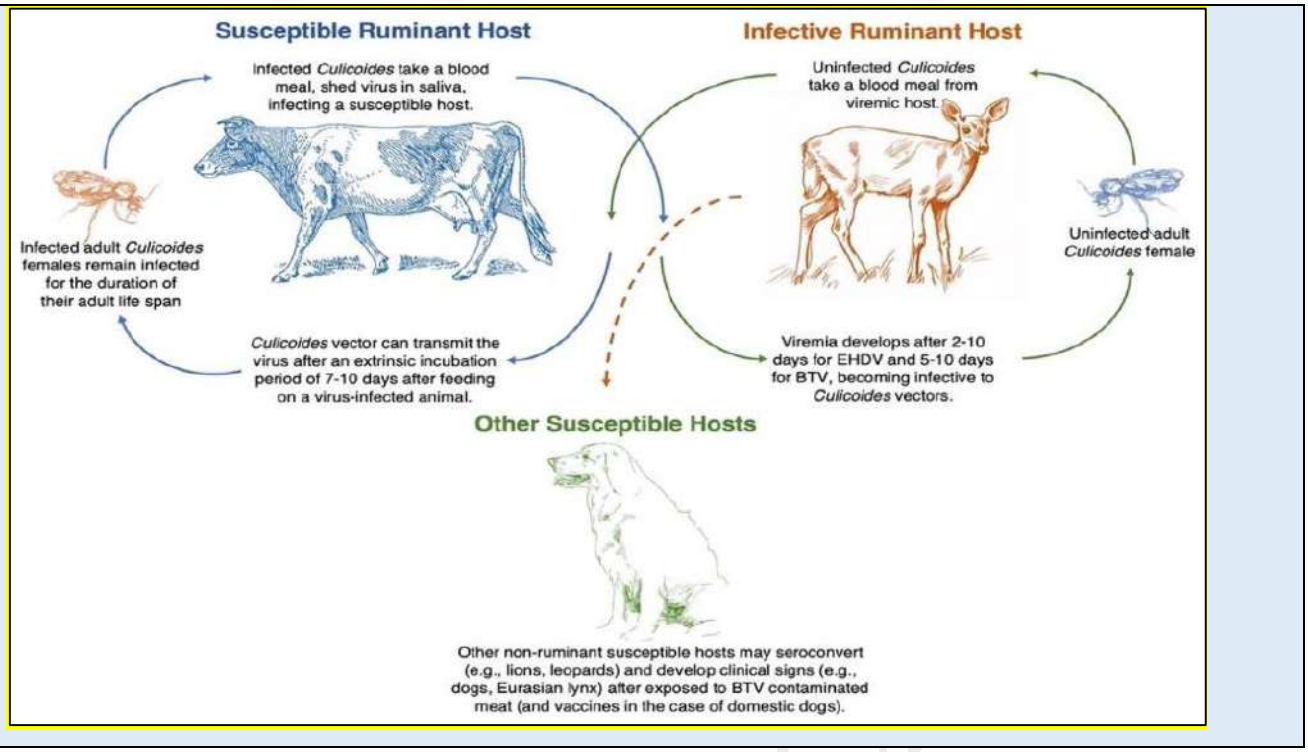
Haematophagous *means especially an insect or tick feeding on blood.*

- **India** – Includes 93 valid species, recognized as potential vectors of important pathogens of animal health.
- 13 new species recorded for the 1st time in India, in the Andaman and Nicobar Islands.
- **Feeds on** – The blood of livestock such as sheep, goats, cattle and wild animals like deer.
- **Transmitting agents** – 5 of the species are known to transmit the ***Bluetongue (BT) disease.***

A study conducted in 2022 and 2023, revealed that 17 of the 23 species identified are known to bite humans, although no human disease transmission has been reported.

Bluetongue (BT)

- It is an infectious, non-contagious, vector-borne viral disease.
- **Symptoms** – Blue discolouration of the tongue, fever, facial swelling and excessive salivation.
- **Causes** – It can potentially lead to death in affected animals.
- It poses a significant threat to livestock farming and the agricultural economy.
- It also impacts humans.



OTHERS

8.33 Kashmir Chinars

Why in News?

J&K Forest Research Institute (FRI) of J&K Forest Department recently geo-tagged and equipped with QR-code of chinar trees in Kashmir for digital protection and to conserve the rich heritage.

> ***'Char Chinar'** is an island on the Dal Lake in Srinagar, gets its name after the Chinar Tree.*

- It is a large *deciduous tree* with a spreading crown and a long life.
- **Scientific Name -** Platanus orientalis.
- Chinar is also known as *Oriental plane tree, maple tree* and locally it is called as Boueen.
- **Origin** - It is believed to have been introduced in Kashmir from Persia.
- **Height** - It can grow up to 30 meters in height and have a girth of 10 to 15 meters at ground level.
- It takes around 150 years for a Chinar to reach its full size.
- **Uniqueness -** Its ***leaves change colors***.
- During the summer season, the chinar tree's leaves are deep green.
- But, as the autumn season sets in, the leaves change color to a beautiful blood-red, amber and yellow.
- Kashmir is home to world's oldest Chinar, which is 647 years old.
- **Uses**
  - Ornamentation,
  - Leaves, and bark are used as traditional medicine,
  - Used for creating wood products,
  - Twigs and roots can be used as fabric dye.

8.34 Killer Whales

Australian authorities are euthanizing approximately 90 false killer whales that survived a mass stranding on a remote Tasmanian beach.

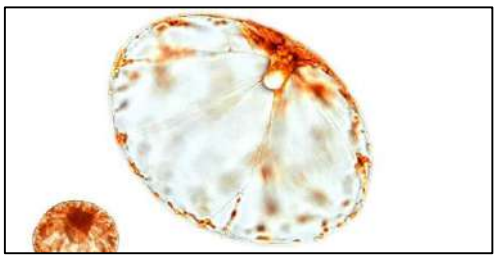
- It is a ***toothed whale*** and the largest member of the oceanic dolphin family.
- It is also known as *Orcas*.
- **Scientific Name -** Orcinus orca.
- **Type** – Carnivorous mammal that can weigh up to 6 tons.
- **Appearance** - Distinctive black-and-white coloring.
- **Distribution -** From the *Polar Regions to the Equator*.
- Most frequently in cold, coastal waters.
- **Features** - They are highly intelligent and able to coordinate hunting tactics.

- These are extremely fast swimmers and have been recorded at speeds of ***up to 54kph.***
- Whales are ***highly social mammals*** and are well known for stranding in groups because they travel in large, close-knit communities which rely on constant communication.
- They use *echolocation to communicate and hunt*, making sounds that travel underwater until they encounter objects, then bounce back, revealing their location, size, and shape.
- **Conservation Status**
  - **IUCN -** Data Deficient.

8.35 Pyrocystis noctiluca

The phytoplankton Pyrocystis noctiluca is able to navigate vertically upward in the ocean by ballooning to 6 times its size.

- It is a ***single-celled marine plankton*** that produces bioluminescence, or blue light, in response to water movement.
- **Appearance** - A spherical dinoflagellate alga that's 250–400 µm in size.
- **Habitat** - Lives in tropical and subtropical seas and oceans.
- **Diet** - Eats sugars produced through photosynthesis.
- **Predators** - Crustaceans like copepods.



- **Defense** - Uses bioluminescence to startle predators or highlight their movements to make them vulnerable to secondary predators.
- **Bioluminescence** - When mechanically stimulated, the cells produce a blue flash of light through a luciferin-luciferase reaction.
- **Photosynthesis** - It makes once-in-a-lifetime trip from about 125 meters deep to about 50 meters, where there's more of the sunlight that they need to photosynthesize.
- **Density** - It is denser than seawater and should sink. But at the beginning of its life cycle, it swells, reducing its density and traveling up the water column.
- At the end of its 7-day life cycle, the cell then starts to divide into two daughter cells as it sinks.
- When the division is completed, the two newborn cells inflate by filling up with seawater ballooning to six times their original size in around 10 minutes. And so the cycle begins again.

8.36 Nilgiri tit butterfly

Butterfly enthusiasts from the Nilgiris have recorded for the first time in India, the Nilgiri tit (Hypolycaena nilgirica) utilising a large terrestrial orchid plant as a host.

- It is a rare, endemic butterfly an uncommon species of lycaenid or blue butterfly.
- **Scientific Name -** Hypolycaena nilgirica.
- **Sexual dimorphism -** The male has a dark reddish purple-brown upper side with characteristic black spots capped in orange near its tails, while the female is pale brown.
- It has tapering patches of white dustings above the black spots and in the adjacent interspaces.
- Males engage in mud sipping and their flight is moderately fast and they visit flowers in hedges.
- They bask in the morning, but do not open their wings otherwise.
- **Habitat** - They inhabit forests and lush home gardens, especially those with orchids.
- **Distribution** – It is found in Western Ghats and Sri Lanka.
- **In India –**
    - **Tamil Nadu** - Geddai slopes of Nilgiris district,
    - Aiyannar Falls of Virudhunagar district,
    - Anamalais of Coimbatore district
    - Kalakkad Mundanthurai Tiger Reserve of Tirunelveli district
    - **Kerala-** Chinnar Wildlife Sanctuary of Idukki district, and
    - Silent Valley National Park of Palakkad district

- The Nilgiri tit was noted to lay its eggs on the inflorescence (complete flower head) of the larval host plant, ***Eulophia epidendraea***, a terrestrial orchid species.
    - This terrestrial orchid was found on rocky slopes in humid areas.
    - Eulophia epidendraea was mainly associated with grasses such as Cymbopogon flexuosus, Chrysopogon nodulibarbis, Melinis repens, among other floral species.
- **Conservation status**
    - Wildlife Protection Act - Schedule II.
    - IUCN Red List of Threatened Species – Not listed.

8.37 Hornets

A species of hornet that often munches on foods containing alcohol can hold its liquor, without any side effects, at levels that no other known animal can tolerate.

- Hornets are social insects and the largest of the ***eusocial wasps.***
- **Appearance** - They are known for their black or brown bodies with yellow or yellowish markings.
- It can resemble yellow jackets, which are their close relatives.
- **Size** -Some species of hornets can reach lengths of up to 5.5 cm.
- **Behavior -** They are known for *living in colonies* and can be quite aggressive when defending their nests.
- They *construct nests from a paper-like material* made from chewed wood fibers mixed with saliva.
- **Habitat** - Nests are typically found in trees, bushes, or sheltered areas.
- **Distribution -** Asia, Europe, and Africa, with one species introduced to North America.
- **Diet** - Oriental hornet (Vespa orientalis) consumes nectar and ripe fruits, including grapes.
- This fruit contains sugar that, when it naturally ferments over time, turns into ethanol.
- The oriental hornet shows *no behavioural changes when it spends a week drinking an 80% alcohol solution*.
- The hornets produce NADP+, which helps break down alcohol.

Fruit flies and tree shrews cannot digest more than 4% ethanol in their meals.

- **Toxicity -** Hornets, particularly larger species like the Asian giant hornet, are known to inject a larger amount of venom per sting compared to most other stinging insects.

8.38 Underground Animals near hydrothermal vents

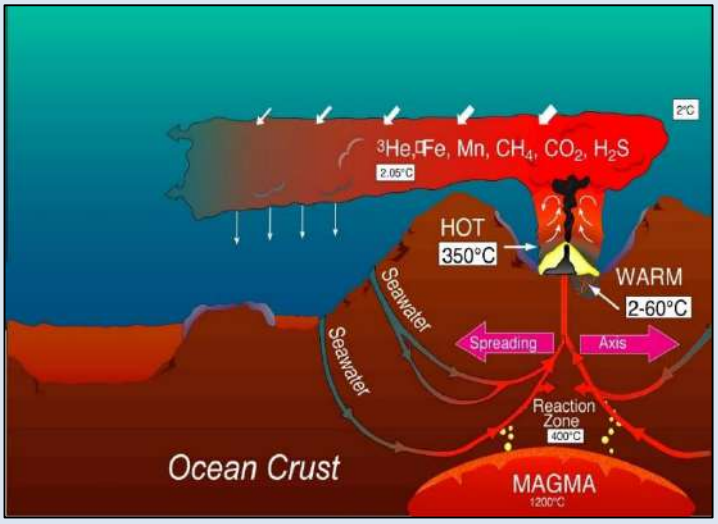
Recently, animals found living underground near deep-sea hydrothermal vents using the remotely operated underwater vehicle SuBastian.

- **Founded species -** Life flourishes around the vents including giant tubeworms reaching lengths of 10 feet, mussels, crabs, shrimp, fish and other organisms.
- The giant tubeworms do not eat as other animals do. Instead, bacteria residing in their body in a sack-like organ turn sulfur from the water into energy for the animal.
- Larvae from these animals may invade these sub seafloor habitats.
- They were living inside cavities within the Earth's crust at an ocean-floor site where the Pacific is 1.56 miles (2,515 meters) deep.
- All the species were previously known to have lived near such vents, but never underground.
- It is the *first time that animal life has been discovered in the ocean crust.*

Hydrothermal vents

- These are *fissures on the seabed* from which geothermally heated water discharges.
- **Occurrences** - They are commonly found near volcanically active places, areas where tectonic plates are moving apart at mid-ocean ridges, ocean basins, and hotspots.
- **Formation** - Seawater circulates deep in the ocean's crust and becomes superheated by hot magma.
- As pressure builds and the seawater warms, it begins to dissolve minerals and rise toward the surface of the crust.
- The hot, mineral-rich waters then exit the oceanic crust and mix with the cool seawater above.
- As the vent minerals cool and solidify into mineral deposits, they form different types of hydrothermal vent structures.
- **Species survival** - The ability of vent organisms to survive and thrive in such extreme pressures and temperatures and in the presence of toxic mineral plumes is fascinating.

*The deepest vent located so far is in the **Cayman Trough**, which is the deepest point in the Caribbean Sea. The trough is located along the boundary between the North American Plate and the Caribbean Plate.*



- The conversion of mineral-rich hydrothermal fluid into energy is a key aspect of these unique ecosystems.
- Through the ***process of chemosynthesis***, bacteria provide energy and nutrients to vent species without the need for sunlight.
- **Recent Exploration –** It was conducted at the ***East Pacific Rise***, a volcanically active ridge on the floor of the southeastern Pacific, running approximately parallel to South America's west coast.
- Earth's rigid outer part is divided into colossal plates that move gradually over time in a process called plate tectonics.
- The East Pacific Rise is located where two such plates are gradually spreading apart.
- This area contains many hydrothermal vents, fissures in the seafloor situated where seawater and magma beneath the Earth's crust come together.

***East Pacific Rise** (EPR) is a mid-ocean rise at a divergent tectonic plate boundary, located along the floor of the Pacific Ocean.*

- Magma refers to molten rock that is underground, while lava refers to molten rock that reaches the surface, including the seafloor.
- New seafloor forms in places where magma is forced upward toward the surface at a mid-ocean ridge and cools to form volcanic rock.
- The hydrothermal vents spew into the cold sea the super-heated and chemical-rich water that nourishes microorganisms.
- The warm venting fluids are rich in energy for example, ***sulfide that can be used by microbes,*** which form the basis of the food-chain.

8.39 Flamingos

Climate change impacting delicate balance of Tanzania's Lake Natron thus threatening flamingo's survival.

- Flamingos are famous for their bright pink feathers, stilt-like legs, and S-shaped neck.
- Their pink color comes from a *carotenoid pigment* present in the algae and crustaceans they eat.
    - Common Name - Greater Flamingo
    - Scientific Name - Phoenicopterus roseus
- **Diet -** shrimp, snails, and plantlike water organisms called algae
- Flamingos build nests that look like mounds of mud along waterways.
- **Habitat -** It is usually found in shallow, saline, alkaline wetlands, such as salt lakes, coastal lagoons, intertidal mudflats, and saltworks during the breeding season.
- **Distribution –** It inhabits Africa, the Middle East, southern Europe, and the Indian subcontinent.
- Greater flamingos produce a loud goose-like *honking call, 'ka-haunk'.*
- Greater flamingo is the ***state bird of the Gujarat.***

Lake Natron

- It is an alkaline or saline lake in ***Arusha Region of Tanzania.***
- It is located in the ***Gregory Rift***, which is part of the East African Rift Valley.
- It is situated on the border of Kenya and Tanzania.
- It is a part of ***Lake Natron Basin***, a Ramsar Site wetland of international significance.
- The Southern Ewaso Ngiro River, which originates from central Kenya is the main source of water supply for the Lake.
- The ***Gelai volcano*** is at the lake's southeastern edge.
- It is one of the most outstanding soda lakes in Africa because of the high PH of water which is always about 12.
- The lake is a regular feeding ground for the majority of the East Africa's lesser flamingos.

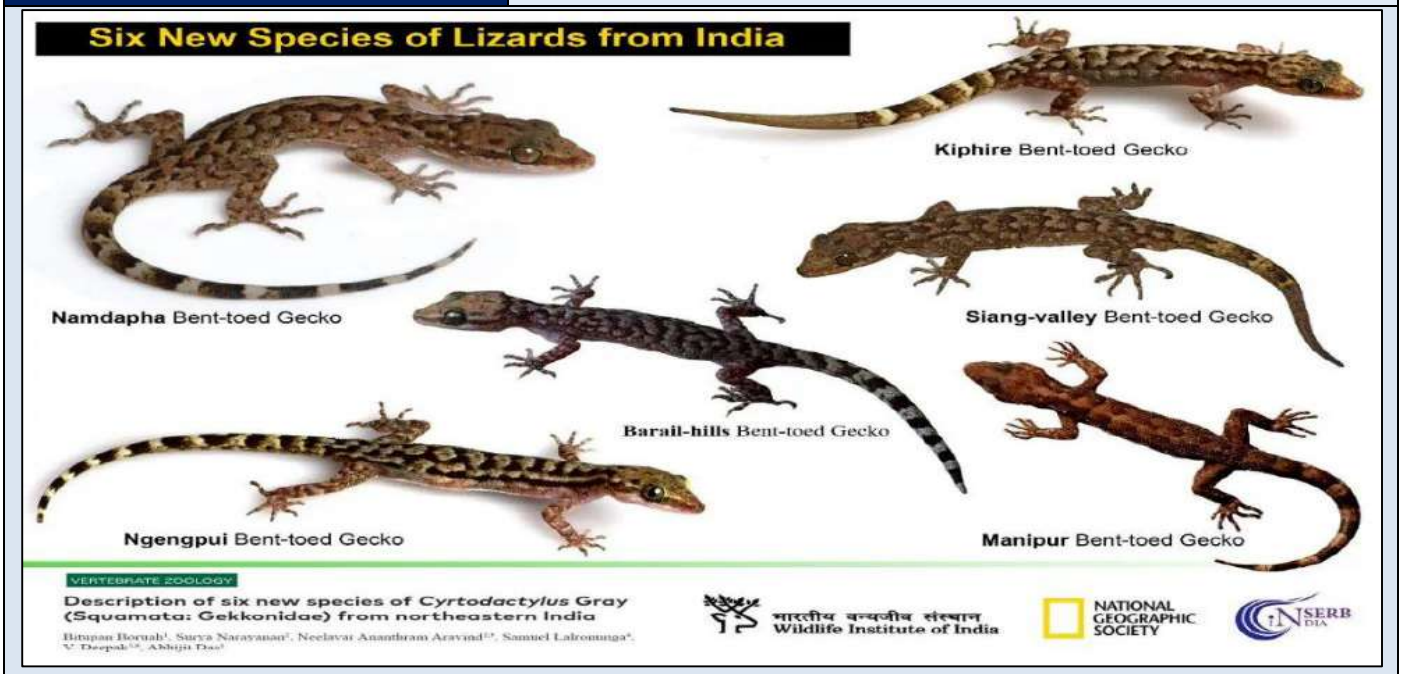
8.40 Bent-toed geckos

Scientists from India and the UK have recently discovered 6 new species of bent-toed geckos in Northeast India.

- Bent-toed geckos are a diverse group of geckos known for their distinctive bent or curved toes.
- **Genus-** Cyrtodactylus.
- **Features -** Typically small to medium-size.
- Their toes are notably bent, which aids in their climbing abilities.
- **Habitat-** They inhabit a variety of environments including forests, rocky areas, and sometimes urban areas.

- **Diversity-** Predominantly found in Southeast Asia, like ***India, Sri Lanka, Thailand, and Malaysia.***
- Most are ***nocturnal***, meaning they are active during the night.
- **Diet-** They are ***insectivorous***, feeding on small insects and other invertebrates.
- **Reproduction-** Bent-toed geckos lay eggs, with the number and size of eggs varying by species.

Details of the discoveries	
Namdapha Bent-Toed Gecko (Arunachal Pradesh)	Found in Namdapha and Kamlang Tiger Reserves, inhabit lowland evergreen forests and are seen near forest streams.
Siang Valley Bent-Toed Gecko (Arunachal Pradesh)	Named after Siang Valley, this species is notable for its distinct biodiversity.
Nengpui Bent-Toed Gecko (Mizoram)	Located in Ngengpui Wildlife Sanctuary, characterized by tropical semi-evergreen forests with Dipterocarpus spp. and palms.
Manipur Bent-Toed Gecko (Manipur)	Found near Lamdan Kabui village, perched on shrubs, along the Leimatak-Charoikhullen road.
Barail Hills Bent-Toed Gecko (Nagaland)	Known only from Peren District's Athibung Reserve Forest, in tropical to subtropical cloud forests.
Kiphire Bent-Toed Gecko (Nagaland)	Discovered in subtropical regenerating jhum forest, with the holotype collected from a shrub 2 meters up at night.



8.41 Sturgeon

Sturgeon fish species is being heavily poached & trafficked in the Lower Danube, said World-Wide Fund for Nature (WWF).

- It is the common name for the 28 species of fish belonging to the family ***Acipenseridae.***
- They are the ***world's most endangered*** fish.
- **Habitat** - Native to temperate waters of the Northern Hemisphere mainly Danube river.
- Most species live in the ocean while a few others are confined to fresh water.

- **Danube Sturgeons** – There were 6 sturgeon species formerly native to the Danube River.
- **CITES Regulation -** Since 1998, international trade in all species of sturgeons has been regulated.
- All sturgeons and parts or derivatives thereof (e.g. caviar, meat, skin, etc.) that enter international trade require the issuance of CITES permits or certificates.
- **Threats** - Poaching and trafficking.
- Heavily exploited globally for their roe/eggs (caviar) and meat.
- **IUCN Red List category**
    - **European sturgeon** (Acipenser sturio) - Locally extinct.
    - **The ship sturgeon** (A. nudiventris**) -** Locally extinct.
    - The remaining 4 sturgeon species in the Danube Basin are threatened.
    - **Stellate sturgeon (***A. Stellatus***) -** Critically Endangered.
    - **The Russian sturgeon** (*A. Gueldenstaedtii***)** - Critically Endangered.
    - **Beluga (***Huso huso*) - Critically Endangered.
    - **Sterlet** (*A. Ruthenus*) – Endangered.

8.42 Mettukurinji

The rare Mettukurinji flowers have blossomed over the hills of Idukki.

- Mettukurinji is a *small purple flowering shrub*.
- **Taxonomy**
    - **Scientific name** - Strobilanthes sessilis
    - **Family** – Acanthaceae
- **Nativity** – It endemic to Western Ghats.
- **Growing conditions –** Their delicate flowers are sensitive to rainfall, heat and synchronisation with the lifecycle of mutualists such as pollinators.
- **Blooming season** starts in August and ends in November.
- **Monocarpy** – They *flower only once in their life time* and then die.
- **Threat** – Climate change, frequent landslides, floods and unsustainable tourism.
- **Conservation** - *Kurinjimala Sanctuary* protects the core habitat of the plant in Kerala and the Eravikulam National Park in Kerala is known for widespread blooming of the kurinji plants.
- **Importance** – It is a *flagship species of the montane ecosystem*.
- They have anti-inflammatory properties and has a biological flavouring agent 'endo fenchyl acetate'.

	Neelakurinji	**Mettukurinji (*Topli karvy*)**
		
Botanical	*Strobilanthes kunthiana*	*Strobilanthes sessilis*

Name		
Blooming Cycle	14 years once	7 years once
Blooming Type	Individual Blooming	Mass blooming known as " Masting"
Location	shola grasslands of southern Western Ghats at an elevation of 1000 m	Steepest cliffs and plateaus of periphery of the northern side of the Western Ghats at 800 metres above sea level
Physical features	Presence of Leaf stalks	Absence of leaf stalks
Flower Arrangement	Flowers are attached distant from stem	Flowers are closely attached to the stem with long hairs between the leaf base and stem
IUCN Status	Vulnerable	Not listed
Wild life protection act,1972	Schedule III	Schedule III

8.43 Purandar figs

Agricultural and Processed Food Products Export Development Authority (APEDA) has recently facilitated the export of India's first ready-to-drink Purandar fig juice to Poland.

- Purandar figs are a variety of fig grown in the Purandar taluk of Pune district, ***Maharashtra***.
- They are known for their sweet taste, size, and nutritional value, and are considered one of India's best figs.
- Figs were commercially cultivated in ***1904*** at Jadhavwadi in Dive village of Purandar tehsil.
- This fig variety gained recognition in the 1920s.
- **GI tag-** Acquired in ***2016***, providing legal protection and promoting exports.
- **Features-** Known for their unique sweet taste, Purandar figs have an attractive ***violet color*** due to the high calcium and potassium content of the region's red and black soil.
- It is bell-shaped and larger than other varieties.
- Over ***80% of body are pulp***, with a pinkish-red color, rich in vitamins and minerals.

- **Growing conditions-** They are grown in areas with dry weather, hilly slopes, and well-drained medium land, and are cultivated using a ***salt-free irrigation technique***.
- They ripen twice a year, from May to June and December to January.
- ***Pune*** district is the top fig-producing area in Maharashtra.
- **Patent-** The product was granted a provisional patent, marking significant agricultural innovation.

APEDA	
About	Agricultural and Processed Food Products Export Development Authority
Establishment	1985
Governing Ministry	Ministry of Commerce and Industry
Key Functions	Promotion and development of the export of agricultural and processed food products from India
Headquarters	New Delhi

Geographical Indications (GI)	Involved in the promotion and registration of GI tags for Indian agricultural products
Product Coverage	Fruits, vegetables, meat, poultry, dairy products, alcoholic and non-alcoholic beverages, cereals, etc.

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