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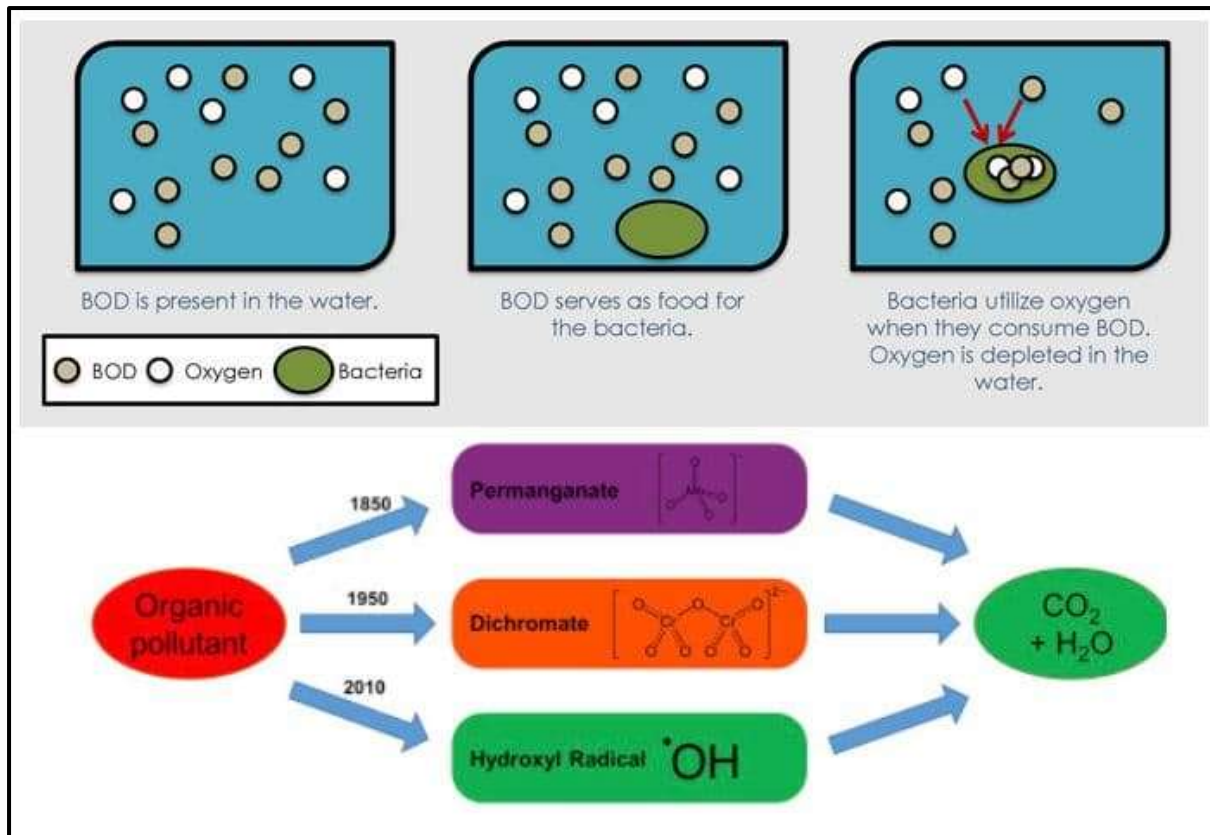
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Topic 1. BIOLOGICAL OXYGEN DEMAND

Important for subject: Environment



The National Green Tribunal recently fined the Uttar Pradesh government Rs 120 crore for contaminating groundwater in and around Gorakhpur.

Details:

- The Union Ministry of Environment, Forest and Climate Change (National Lake Conservation Project 2011) allocated Rs 124.3 crore to Ramgarh Tal, Gorakhpur.
- The lake's condition has dramatically improved since its inclusion in the National Lake Conservation Plan (2011).
- The lake's Biochemical Oxygen Demand (BOD) was 108 mg/litre. Since then, it has improved to 11 mg/L.

About the BOD

- BOD is the amount of oxygen bacteria and other microorganisms are consuming.
- In aerobic conditions, they decompose organic material.
- The biological oxygen requirement measures the amount of oxygen required to

remove organic matter from water in the aerobic bacteria process.

- BOD is mostly derived from leaves and other woody materials; dead animals, plants and other sources.
- Effluents from pulp and paper mills, wastewater treatment plants, feedlots, and food-processing plants; failing septic systems; and urban storm water runoff.
- Higher BOD can mean that more oxygen is required, which could indicate lower water quality.
- Low BOD means that water is removing less oxygen. This makes the water more pure.

Chemical Oxygen Demand (COD)

- COD can be used to calculate how much oxygen is being lost to water by bacteria.
- There is a distinction between COD (or Chemical Oxygen Demand) and BOD (or Blood Oxygen Demand).
- There is a difference between COD and BOD.
- Total Suspended Solids
- It is the dry weight for suspended particles that has not been dissolved in a sample
- Water that can be captured using a filter.
- These can be analysed using filtering methods.
- It can be used for determining the quality of any water specimen or water body.

Topic 2. THE TINIEST SPECKS OF PLASTIC CAN ENTER THE HUMAN FOOD CHAIN, FINDS A STUDY

Important for subject: Environment

EFFECTS OF PLASTIC

Microplastics are very small pieces of plastic that pollute the environment. They are not a specific kind of, but rather any type of plastic fragment that is less than 5mm in length. They enter natural ecosystems from a variety of sources, including cosmetics, clothing, and industrial processes. Scientists still know little about the effects of microplastics once they enter human food chain

ETHYLENE: Not recognized as a significant human health threat	Could cause genetic changes in body	intolerance
ETHYLENE TEREPHTHALATE: Poses significant human health threat	PHTHALATES: Affects endocrine system	FLAME RETARDANTS: Liver and kidney toxicity
VINYL CHLORIDE:	BISPHENOL A: Disrupts endocrine secretions and causes hormonal	NONYLPHENOLS: Disrupts functioning of endocrine system

DEBRIS FROM SEA TO COASTS

- > The quantity of debris flowing into the coastal ecosystem was found to be considerably higher during the full moon and new moon period coinciding with spring tides
- > It is estimated that during the pre-monsoon period, marine litter amounting up to 18kg per day enters the Arabian Sea through the mouth bar at Moothakunnam

GHOST NETS

- > Fishing nets that have been left or lost in the ocean by fishermen. They end up as debris collectors and causes damage to ships and fishing nets. The nets often end up with entangled ropes, plastic bottles, jugs, buoys, covers, thermocol, cans and jigs with steel hooks, among other things

WASTE FOUND IN OCEANS

Hykin mesh, ropes, plastic waste (cans, carry bags, sachets, water, medicine, beverage bottles, containers of milk, cream, oil, etc), metal, toothpaste, shavers, foot wear, thermocol

Illustration: Shinde Akkaraparambil

Plastic in the food chain

- Plastic pollution is a growing problem. It breaks down into smaller pieces and builds up in the environment.
- Researchers at the University of Eastern Finland discovered that Nano-plastics, which are tiny pieces of plastic, can travel through the human food web. This includes plants, insects, and fish.
- Nanoplastics are small plastic particles that are smaller than 1,000 nanometres (1nm equals one billionth of a meter).
- How the study was done
- Researchers have created a new method that uses metallic fingerprints to measure the amount of nanoplastics within organisms.
- They used the technique to study a model food chain with three trophic levels. (trophic level refers to the position that an organism occupies in a food chain.) The food chain contained lettuce as the primary producer, black soldier flea larvae as the primary consumer and roach as the secondary consumer.
- The researchers exposed the lettuce plants to the nanoplastics commonly found in plastic waste for the study -- polystyrene and polyvinyl chloride -- through contaminated soil over 14 days.
- The black soldier fly larvae were fed the insects, which are used in many countries as a source for protein and as feed for cattle and chickens.
- After five days of eating the lettuce, the insects were finally fed to the fish (roaches) for five more days.
- The roach (*Rutilus rutilus*), is a common species that can be found in both fresh and brackish waters.
- It is often eaten as bait and sometimes used as food.
- Moving up the food chain
- Images revealed that nanoplastics found in soil were taken up by the roots and accumulated in leaves.
- The nanoplastics were then transferred to the insects by the contaminated lettuce.
- The black soldier fly was able to be imaged and found that both PVC and PS nanoplastics were present in its digestive system.
- This is despite the fact that they could empty their stomachs for up to 24 hours.

- However, both the insects and lettuce contained lower amounts of PS particles than the PVC nanoplastics.
- The particles found in the liver, gills and intestine tissues of fish that had eaten the contaminated insects were detected.
- The highest concentration of nanoplastic was found in the liver, which indicates that this is the primary target tissue of nanoplastics entering vertebrates.
- There are no barriers to nanoplastics.
- Because of their small size, nanoplastics are likely to pass physiological barriers and get into organisms.
- Researchers note that measuring the amount of nanoplastics absorbed from soil by fruits and vegetables will allow us to determine if and how much nanoplastics can be introduced into our food chain, and our bodies.
- These results showed that lettuce can absorb nanoplastics from soil and then transfer them to the food chain.
- If these findings are generalized to other crops and fields, they could pose a risk to humans and herbivores.
- Further research is needed to understand the subject.
- Bioaccumulation
- This is often associated with toxic or dangerous chemicals being stored in living things.
- These chemicals are either not biodegradable or excretable by the body.
- This will lead to the chemical building up over time.

Bio magnification

- When plants are exposed to or absorb chemicals in soil or water, they will accumulate them.
- These chemicals are consumed by animals when they eat these plants.
- They consume more chemicals the more plants they eat. This is known as biomagnifications
- Biomagnification happens when the chemical moves higher up the food chain. Each level of the chemical increases or magnifies its amount.

Topic 3. COAL WILL STAY STRONG EVEN AS SOLAR SHINES IN INDIA'S ENERGY TRANSITION

Important for subject: Environment

Draft National Electricity Plan

- India's energy transition will see solar energy emerge as the dominant source of energy.
- However, coal will still be the nation's mainstay in the energy sector.
- India is expected to consume at least 40% more coal in the next decade.
- These trends are reflected by the draft of the National Electricity Plan (NEP), released by the Central Electricity Authority.

The Draft NEP Report-

- The Electricity Act of 2003 requires that the CEA prepares a National Electricity Plan every five years.
- The CEA has so far prepared three NEPs for 2007-2013 and 2018-2019.
- The CEA produces the report in two volumes. One focuses on energy generation, the other focuses on energy transmission.
- This draft report discusses estimates of energy production in the five-year and 10-year scenarios.
- The report's highlights
- According to the draft report, the contribution of renewable energy sources (RES) will amount to around 35.6% of total energy in the country by 2026-27 and 45.09% respectively by 2031-32.
- This highlights the need for additional coal-based capacity until 2031-32, which could vary between 17 GW and around 28 GW.
- This figure is more than the 25 GW of coal-based capacity that is currently under construction.
- Current scenario of energy consumption
- India's coal demand in 2021-22 was 678 Million tonnes (MT).
- It will rise to 831.5 MT in 2026-27, and 1018.2 MT in 2031-32.
- Currently, India's coal sector accounts for 51.1%.
- Of the 399.49 gigawatts of installed capacity, 236.10 GW is from thermal, 6.78 from

nuclear, and 156.60 from renewables.

- New Thermal Power Plants (TPPs), are needed Between 2017-22, there were 22.7 GW of coal-fired power plants scheduled to be retired.
- Only 7.35 GW of these were retired from the planned ones, which also include 4.5GW who have retired due to old age.
- It is estimated that between 2022 and 27 4.6 GW TPPs will be retired.
- Out of the 22 GW scheduled to retire, 16 GW of TPPs did not have enough space for flue gas desulphurisation. Controlling sulphur dioxide and other SOx emissions is essential.
- These TPPs did, however, not all retire. The central government has extended the deadlines for installing FGD.
- It is important not to get misled by the government's intentions regarding coal.
- The government talks about installing 17 GW thermal power plants under the most conservative scenario, and 28 GW under the most optimistic.
- The energy transition is underway
- India has focused on increasing its capacity to meet energy demand since independence.
- The country only had 1.36 GW installed capacity in 1947.
- Comparatively, the country's installed energy generation capacity was 399.49 GW in March 2022.
- India is now not just looking to increase its capacity, but also focusing more on clean fuels to meet its energy needs.
- According to the draft NEP, the country will have 865.94 GW of installed capacity by the end of the year 2033-32. Half of that will come from non-fossil fuels.
- This is India's commitment towards the global community in fighting global warming.
- India will add 35 GW to its existing coal capacity by 2031-32.
- The country will add 279.48 GW solar power and 93.6 GW wind to its fleet in the same period.
- **Transition to Renewable Energy: Issues**
- Gas and coal as a mixture have been the dominant players so far. Only 10% of total power generation is generated by renewable energy.
- It is not a problem right now.

- If we think of a grid where renewables are 45%, it will become a problem.
- We are replacing a reliable source of coal with a variable, renewable source.
- Grid management becomes a problem in this instance.
- The country requires reliable energy sources to generate its electricity.
- This could be either a hydroelectric or storage battery.
- We have enough hydropower to meet these needs for the next five-years.
- Hydropower will not be able offer this reliability beyond 2026.
- A battery energy storage system is needed (BESS).
- It is evident that the draft report is very clear and emphasizes the fact that 51 gigawatts will be needed for storage capacity by 2031-32.
- India's efforts to achieve this goal
- India is not adding between 10 and 12 GW of renewable capacity each year. It isn't enough.
- It is essential that the country adds 40 to 50 GW each year if it wants to achieve its ambitious goals. It also requires a large investment.
- NEP draft reports also give a glimpse by saying that BESS requires a total investment in the region of Rs 3.4 trillion and renewables, Rs 12.52 trillion by 2031-32.
- Under-utilisation remains a concern-
- Although capacity addition is still a top priority for the country's energy ambitions, it remains difficult to properly utilise existing capacity (including TPP and gas)
- A plant load factor (PLF) is used to measure the power plant's performance.
- This indicates the power plant's output compared with its maximum output.
- This means that a power plant with a higher PLF is producing more electricity at a lower price (per unit).
- This bitter truth is highlighted in the CEA draft NEP.
- **TPPs:** It states that once the power plant is commissioned, the greatest challenge will be to maintain a high PLF.
- The national PLF was 77.55% in 2009-10. In 2021-22, it has fallen to 58.87%.
- Draft NEP document forecasts further decline, and projects it to reach 55% by 2026-27.
- Over the years, the PLF of coal-based power plants in the country has been steadily decreasing.

- The PLF fluctuated from 60.5 % in 2017-18 to 60.9 % 2018-19, 55.9% 2019-20, 54.6% 2020-21, 54.9 % in 2019-20 and 58.8 percent during 2021-22.
- The draft NEP also discusses gas infrastructure.
- The PLF for gas power plants has been around 23%.
- Low PLF is not due a shortage of pipeline infrastructure for natural gas, but to the inability to find cheap natural gas sources.
- It claims that there will be improvements after that, and that the PLF of thermal energy plants will be approximately 62% in 2031-32.
- It does not explain how it will improve.

Topic 4. ASBESTOS

Important for subject: Environment



Asbestos is a silicate chemical found naturally in the environment. The mining operations that extracted it from the hills, which were rich in this compound, used to be called asbestos.

- Asbestos, a strong incombustible fiber, is used to fireproof and insulate.
- It has an extremely high tensile force.
- It is used in cement roofing sheets, piping, and the textile and automotive industries.

Human Health and Asbestos:

- According to the World Health Organisation (WHO), all forms of asbestos can cause cancer and about half of occupational cancer deaths are due to asbestos.
- Globally, around 70 countries have banned asbestos use, while those in India, China, and the USA have not.
- Asbestosis, a notified disease according to The Mines Act 1952. Asbestosis can manifest over a period of 20-30 years.
- Working environment, indoor air, and ambient air near point sources like factories handling asbestos. WHO estimates that approximately 125 million people are exposed to asbestos at work.
- Status of Asbestosis in India
- Many countries have banned the extraction and use of this compound.
- India imports the compound, but it is still used in construction, automobile, and other industries.
- According to data from the government, India imported 361,164 tonnes asbestos in 2019-20.
- Imports from India were dominated by Brazil (85%) and Russia (85%).
- Three percent each for Hungary and Kazakhstan, plus imports from South Africa and Poland. India is the world's largest asbestos importer.
- The government records show that imports have decreased in recent years.

The Battle:

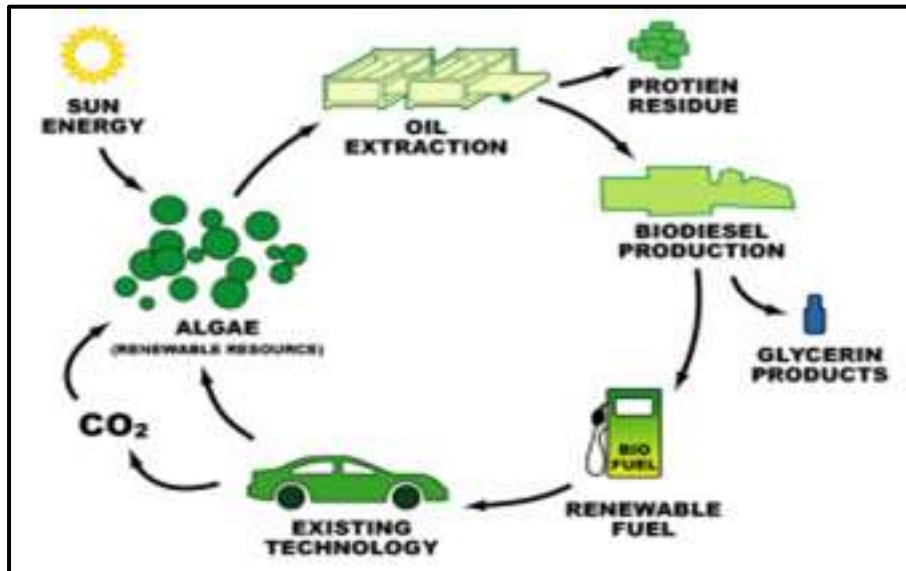
- The 1988 Mineral Conservation and Development Rules (GOI) discussed the restoration and reclaiming of mined areas in order to ensure sustainable development.
- Many miners ignore the reclamation laws and continue to disregard them, despite the fact that they are there.
- In 1995, the Supreme Court of India issued a landmark judgment requiring the asbestos industry to compensate their workers for their health risks.
- It also ordered the industries to keep records of employees' health for up to 40 years from their initial recruitment and for 15 years after their departure.
- The National Green Tribunal (NGT), in 2019, asked the Jharkhand government for scientific removal of dumped asbestos from Roro Village. '
- The state government promised to use funds from the District Mineral Foundation

(DMF), and other resources, to reduce the impact of asbestos exposure in the village.

- However, in 2022 the dump waste remains open and the village's tribal community is still exposed.

Topic 5. WILL ALGAE BIOFUELS BECOME VIABLE?

Important for subject: Environment



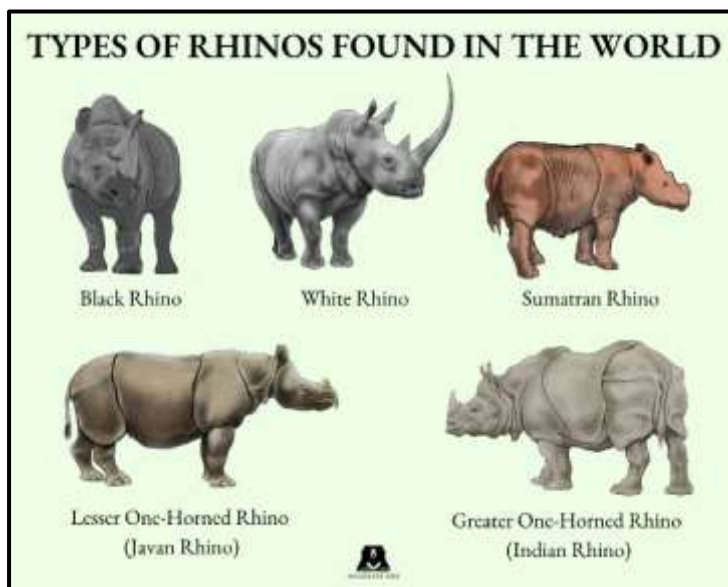
More algae biofuels becoming common

- Algae was a key player in the fight against climate change in the world about a decade back because of its immense benefits in industrial production
- It can synthesize large quantities of oil (20x more than mustard per acre), grow quickly (10x faster than terrestrial plants), and capture carbon dioxide (CO₂).
- Many companies and startups have worked since then to commercialize gas-based biofuel processes in order to decrease our dependence on fossil fuels such as petrol and diesel.
- India's Reliance Industries Ltd has developed a catalytic hydrothermal liquidification technology at Jamnagar to convert alga biomass into oil.
- This process uses water to extract oil from biomass at high temperatures and pressures.
- This technology has many benefits, including direct utilisation of moist biomass without drying and the conversion of all organic parts of biomass into oil with no wastage.

- Japan's companies have teamed up with global corporations to plan mass-scale algae production in Malaysia.
- In 2022, Turkish Airlines partnered with Bogazici University in order to construct an algal-based demonstration plant for jet fuel in Istanbul. This was funded by the European Union.
- More than 25 companies around the world who originally pitched in to make alga biofuels have gone bankrupt, or switched to other products like Algenol, Shell, and Chevron.
- The energy return on investment (EROI), which measures the ratio of energy produced from a source to the energy needed to produce it, is an indicator of sustainability.
- If the EROI falls below 1, it takes more energy to make a fuel than the fuel and its co-products.
- The predicted EROI for algal biofuels made in photobioreactors or open ponds is 0.13 to 0.71. A fuel must have an EROI of greater than 3.
- Phycobloom is a Cambridge and Oxford alum startup that has created an engineered strain of algal that produces oil efficiently without any downstream machines.

Topic 6. RHINOS

Important for subject: Environment



Three dead rhinos emerged from the ashes at the Kaziranga National Park & Tiger Reserve,

where they were the most prominent herbivore.

- The endangered rhinoceros is listed in Schedule 1 of the Wildlife (Protection) Act, 1972).
- There is also an international ban on rhino horn trade under CITES (Convention on International Trade in Endangered Species of Wild Flora and Fauna).
- Three rhino--black, Javan and Sumatran species are critically endangered.
- A small number of Javan rhinos can be found today in a single national park at the northern tip of Java, Indonesia's island.
- In 2011, Vietnam declared an endangered subspecies of Javan rhinos from the mainland.
- Conservation efforts that have been successful have resulted in an increase of greater one-horned rhinos (or Indians) from 200 at the beginning of the 20th Century to approximately 3,700 today.
- Indian Rhino Vision 2020
- Indian Rhino Vision 2020 was launched in 2005. It aims to establish a wild population at least 3,000 more one-horned rhinos in seven protected areas of Assam, India by 2020.
- There are seven protected areas: Kaziranga and Pobitora; Orang National Park, Manas National Parks, Manas National Parks, Laokhowa wildlife refuge, Burachapori Wildlife Sanctuary, Dibrusaikhowa biodiversity sanctuary.
- This collaboration involves several organizations, including the International Rhino Foundation and Assam's Forest Department.
- It also includes the Bodoland Territorial Council and the World Wide Fund - India.

Kaziranga National Park

- It is located in Assam, and it covers 42,996 Hectares (ha). It is the largest undeveloped and representative area of the Brahmaputra valley floodplain.
- Status of the National Park:
- In 1974, it was designated a National Park. Since 2007, it has been designated a tiger reserve.
- The total area of the tiger reserve is 1,030 sq. km, with a core of 430 sq. km.
- It was designated a UNESCO World Heritage Site by the United Nations in 1985.

- Bird Life International has designated it as an Important Bird Area.

Important Species Found

- It is home to the most one-horned rhinos in the world.
- Pobitora Wildlife Sanctuary is home to the largest concentration of one-horned rhinos worldwide and the second highest number in Assam of Rhinos after Kaziranga National Park.
- Conservation efforts in Kaziranga have a lot of focus on the 'big 4' species, which include Rhino, Elephant and Royal Bengal Tiger, as well as the Asiatic water buffalo. Kaziranga also houses 9 of the 14 primates that are found in the Indian subcontinent.

Highways and rivers:

- Through the park is the National Highway 37.
- In addition to the Diphlu River, there are more than 250 water bodies that can be found in the park.

There are also other national parks in Assam:

1. Dibru-Saikhowa National Park,
2. Manas National Park,
3. Nameri National Park
4. Rajiv Gandhi Orang National Park

Topic 7. ACTS GOVERNING FORESTS IN INDIA

Important for subject: Environment

Assam Chief Minister Himanta Biswa Sarma and spiritual leader Sadhguru Jaggi Vasudev visited Kaziranga National Park after sunset

- **In India the entry into forests is controlled by two laws:** the Indian Forest Act, 1927 The Indian Forest Act, 1927, as well as The Wildlife Protection Act, 1972.
- The Indian Forest Act, 1927 is applicable to all reserve forest and prohibits that are trespassing.
- Anyone else, excluding those who live in villages located within reserve forests must

obtain permission from the forest divisional officer responsible for accessing these forests for any reason.

- The Wildlife Protection Act empowers the Chief Wildlife Wardens of a state to create rules for visitors entering Protected Areas -- sanctuaries and national parks.
- In the same Act under the same Act, the National Tiger Conservation Authority (NTCA) is empowered to establish rules for reserve tiger habitats.
- Kaziranga National Park is also an NTCA-approved designated tiger reserve.

Indian Forest Act (IFA), 1927:

- It creates a legal basis to ensure the protection and management of forests, the transit of forest timber and produce, as well as duties that may be imposed on forest products and timber.
- IFA can be described as an umbrella law which establishes the foundation to manage forests throughout the country.
- It also provides mechanisms for notification of reserve, protected and village forest, protection of forests, wildlife and biodiversity of the country.

Reserved Forests

- Reserved forests comprise more than half of total area of forest in India.
- It is protected by a certain amount of protection.
- They are protected by their respective state governments , unlike national parks and wildlife sanctuaries which are overseen through The Government of India.
- It is thought to be the most valuable kind of forest from the standpoint of conservation.
- The rights to collect timber , grazing cattle, hunting or public entry are not permitted in these forests.

Protected Forests

- Forests that are protected come in two kinds: demarcated and not-marcated
- They only have a certain degree of safety.
- These are managed by the authorities, but specific activities such as hunting, grazing or wood gathering are permissible to people who live in the midst of forests.
- They are also completely or in part dependent on forests for their livelihoods in the event that they do not create a significant damage to the forests.

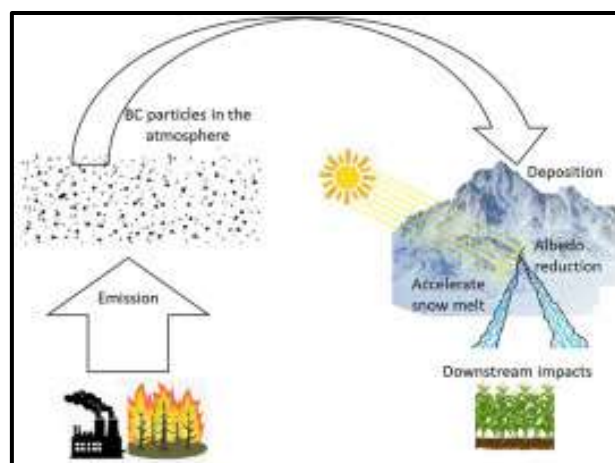
- Village Forests
- Forests in villages are protected and maintained by village communities that are given by government of the state.
- Local communities may utilize it to harvest timber or other forest products such as plantation, recreation, pasture and many other things under specified conditions by the state governments.

Wildlife (Protection) Act, 1972:

- The Act was passed to ensure protecting plants as well as animals.
- It comes with six schedules, each of which provides different levels of protection.
- Part II and Schedule I in Schedule II provide absolute protection The offenses that are deemed to be in violation of these are spelled out with the most severe penalties.
- The species that are that are listed as protected species in Schedule III and Schedule IV are also protected.
- However, the penalties are significantly smaller.
- Schedule V covers animals that are hunted.
- The endemic plants listed included in Schedule VI are prohibited from cultivation and plantation.
- The Enforcement authorities can add offenses to this schedule (i.e. they can impose fines to the offenders).
- The law was modified in 1982, 1986 1991, 1993, 2002, 2006 and 2013.

Topic 8. BLACK CARBON AND MELTING OF GLACIERS

Important for subject: Environment



The glaciers of the western Himalayas that provide drinking water to Jammu, Kashmir and Ladakh melting at a rapid amount due to the rising quantity of black carbon aerosol and greenhouse gases that causes increasing the color of the area's snowpack, which researchers have observed in numerous studies.

- In a study that was conducted recently, about 77 glaciers located in the Drass basin of the Ladakh region were analyzed with satellite images.
- The study was designed to examine decrease in the snout, retreat of the snout change in ice thickness mass loss, and velocity variations of these glaciers from 2000 and 2020.
- The research revealed that the glaciers of the Drass region have shrunk by 1.27 meters between 2000 and 2020.
- Alongside the rising temperatures in the region research suggests that the area's black carbon (or soot, a constituent of particulates) has increased from 390 nanograms to 680 nanograms in the period 1984-2020.
- The study attempted to establish a connection between greenhouse gases black carbon, greenhouse gases and the increase in melting of glaciers within the Himalayas.
- The black carbon deposition on glaciers reduces the reflection of the ice's surface leading to faster melt of ice.
- Additionally, the increasing the amount of black carbon in the atmosphere, boosts radioactive force and, upon the deposition of glaciers, it will absorb solar energy, eventually being a factor in the fast melting of glaciers and snow in the mountains.

Albedo Effect:

- Albedo is a term used to describe the capability surface surfaces reflect light (heat that comes from sun).
- The light-colored surfaces reflect a huge portion of sun's rays back towards the sky (high albedo). Darker surfaces absorb the sun's rays (low albedo).
- The areas that are covered in snow and ice have high albedo. an snow-covered Arctic reflect solar radiation that could otherwise be taken up by oceans, causing the surface of the Earth to heat up.
- The portion of surface of the Earth that is covered in snow and ice is a significant

factor to indicate the extent to which sunlight is reflecting back or absorption.

- The low level of albedo (dark surfaces) results in higher absorption of energy and, consequently warming.
- Furthermore, as more snow and ice melt it will result in greater dark areas. This creates an effect that self-reinforces.
- The climate change that is occurring that occurs in the Arctic is therefore crucial for the evolution of global climate change.

Main Cause of Black carbon

- In Kashmir one of the major reasons that contributes to the rise in charcoal is that it's burned from trimmed branches of orchard trees during the fall and woody biomass for heating during winter, primarily driven by economic reasons as the horticulture industry gives five to six times more financial benefits to farmers than paddy cultivation.

Long Term Consequence

- The downstream communities in that region. Indus basin. It includes all of the Union Territory of Jammu and Kashmir and the states of Himachal Pradesh Punjab along with a small portion of Rajasthan, Haryana, and Union Territory of Chandigarh, covering an area of 3,212,289 sq. km. approximately eight percent of the territory of the country.
- The Indus is the largest river in the western system of the subcontinent. Jhelum, Chenab, Ravi, Beas and Satluj are the main tributaries.
- Over 12000 glaciers exist located in the Jammu, Kashmir and Ladakh region, making up the upper Indus basin (UIB). The melt water that flows from these glaciers, in the UIB satisfy about 80% of the requirements of the neighboring Pakistan.
- Thus, melting glaciers, if their causes aren't understood in the correct way could impact how security is managed within South Asia because of the transboundary nature of the rivers

About Black Carbon:

- BC is a pollutant with a short life that contributes the second most to global warming, second only to CO₂. (CO₂). Black carbon is a type of aerosol. An aerosol is a

suspended consisting of solid fine particles, or droplets that are suspended in the air.

- Black carbon is often referred to as soot. Soot is a kind of particulate air pollutants that is produced by insufficient combustion.
- India along with China are the two largest black carbon emitters in the world.
- It is released by diesel and gas engines as well as coal-fired power plants and other sources of burning fossil fuel. It is a large portion of particulate matter, or PM2.5 that is an air-pollutant.
- In contrast to other greenhouse gases, BC is quickly washed out and is removed from the atmosphere when emissions cease.
- As opposed to the carbon emissions of the past, it is also a localized source with a more local impact.
- It emits radiation infra-red that can raise the temperature.
- Black carbon can have an impact on climate warming at 460-1500 times greater than CO2 per unit mass
- The average lifetime for black carbon particles is between 4 and 12 days.

Climate and Clean Air Coalition (CCAC):

- The Climate and Clean Air Coalition is a non-profit partnership made up of governments and intergovernmental organizations, business as well as scientific institutions, and civil society organizations dedicated to improving air quality and preserving the climate by measures to cut down on short-lived greenhouse gases, which include Methane black carbon, methane, hydrofluorocarbons (HFCs) as well as other pollutants.

What are the short-lived climate pollutants?

- Climate pollutants with short-lived lives are substances that are found to be short-lived in the atmosphere.
- They are also referred to for their Super Pollutant toxicity.
- Black carbon, methane as well as Hydrofluorocarbons (HFCs) are a few examples of pollutant with a short-lived life.
- They are several times more potent than carbon dioxide in warming the earth. However, since they're short-lived within the air, stopping emissions will slow

the speed of warming.

Methods for reducing Black Carbon:

- To power up transportation in urban zones
- Replace coal by renewable energy sources
- Make sure that your vehicle is updated to the most current standards for auto emissions (Bharat Stage VI)
- Switch to cleaner cooking fuels and more efficient brick production techniques and implementing new policies later and integrating them into regional cooperation between states as well as the neighboring states (i.e., Nepal, Bhutan, Bangladesh, and Pakistan) will reap greater advantages

Topic 9. STOCKHOLM CONVENTION TO TAKE FINAL CALL ON 5 PERSISTENT ORGANIC POLLUTANTS

Important for subject: Environment

The 18th meeting of Persistent Organic Pollutants Review Commission of Stockholm Convention is taking place this week in Rome.

- The 18th session of the Persistent Organic Pollutants (POP) Review Committee (POPRC-18) to the Stockholm Convention has included five additional chemicals on the agenda.
- The chemicals listed comprise a pesticide, a flame retardant, and a few plastic stabilising chemicals.
- Three of the chemicals listed such as chlorpyrifos, paraffin containing chlorinated chlorination that exceeds standards prescribed and long-chain perfluoro-carboxylic acids -- had already been named at the 17th POPRC session (POPRC-17) on January of this year.
- Experts will establish whether these chemicals constitute POPs that require global action because of their harmful impacts on human health as well as the environment.
- Their risk profiles in draft form will be adopted, and global action will be required when they fall within the category of hazardous chemicals.
- The chemicals will be added to 3rd review (Annex-F) as well as risk management assessment.
- Social and economic considerations that could be a part of controls are assessed at this

point.

- They will then be considered as a recommendations for the Conference of the Parties to be included in the Stockholm Convention.
- **Two chemical compounds** -- dechlorane plus an anti-flammable agent, and UV-328, which is a stabiliser that is used in a few personal care products that have been approved to be evaluated for risk management during the POPRC-17 meeting will be assessed in this session.
- POPRC-18 seeks to list all one of the chemicals listed within Annexe A (elimination) or B (restriction) or C (unintended release) of the Stockholm Convention.

India's resistance:

- The UN Environment Programme's suggestion to list chlorpyrifos as a POP was opposed by India. But, chlorpyrifos was nonetheless listed as persistent organic pollutant.
- Chlorpyrifos isn't a carcinogen and the concentrations are low.
- India was also against the idea of listing the e-cigarette dechlorane, a flame retardant.
- Chlorpyrifos was licensed in the Insecticide Act of 1968 since 1977.
- Anupam Verma Committee recommended its review to be continued in 2015.
- China along with India both are the top producers of chlorpyrifos.
- Nearly 48 percent of chlorpyrifos (or 24,000 tonnes) was made in India.
- In the world, around 10,000 tonnes of chlorpyrifos are used each year according to estimates from the China Crop Protection Industry Association.
- Chlorpyrifos was authorised for use in agriculture in 2021.
- This includes its application as a pesticide insects that affect Bengal rice, gram and cotton.
- It is among the pesticides that will be that will be banned from the Punjab and Haryana government in August 2022.
- Chlorpyrifos has been approved for 18 varieties in India and was previously used for 23 crops.
- The Stockholm Convention has listed 31 chemicals for December 2020.
- This list is expected to be expanded further due to evidence that points to the dangers to health associated with hazardous substances and pesticides.

Why is ban important?

- Pesticide poisoning that is acute is a constant public health issue across the globe that has a staggering 385 million cases of accidental acute poisoning by pesticides and 11,000 deaths per year, as per an international study.

Topic 10. BASEL COMPLIANT BONDS

Important for subject: Economy

Indian banks may continue their fundraising by issuing Basel III-compliant and infrastructure bonds as they rush to meet rising credit demand and lock in funds at cheaper rates.

- State-run banks have already raised ₹281 billion through a combination of Basel III compliant additional Tier I perpetual bonds, Tier II bonds and infrastructure bonds in the last three months.

AT1 bonds

- AT-1 bonds are a type of unsecured, perpetual bonds that banks issue to shore up their core capital base to meet the Basel-III norms.
- These bonds were introduced by the Basel accord after the global financial crisis to protect depositors.
- There are two routes through which these bonds can be acquired:
 - Initial private placement offers of AT-1 bonds by banks seeking to raise money.
 - Secondary market buys of already-traded AT-1 bonds.
- These bonds are also listed and traded on the exchanges. So, if an AT-1 bondholder needs money, he can sell it in the secondary market.
- Investors cannot return these bonds to the issuing bank and get the money. i.e there is no put option available to its holders.
- The issuing banks have the option to recall AT-1 bonds issued by them (termed call options that allow banks to redeem them after 5 or 10 years).
- Banks issuing AT-1 bonds can skip interest payouts for a particular year or even reduce the bonds' face value.
- These bonds are perpetual in nature — they do not carry any maturity date.
- They offer higher returns to investors but compared with other vanilla debt products, these instruments carry a higher risk as well.

- These bonds are subordinate to all other debt and senior only to equity.
- Basel-III-compliant AT 1 bonds come with a built-in ‘loss absorbency’ clause which means that in case of stress, banks can write off such investments or convert them into equity.
- The principal loss absorption (through write-down or conversion into equity shares) can be triggered by pre-specified trigger of CET1 falling below 5.5 percent before March 2019 and 6.125 per cent thereafter.
- At the instance of the RBI, bonds can also be written down upon a point of non viability (PONV) event happening.
- The PONV trigger event is the earlier of a) decision that a conversion or write-off, without which the firm would become non-viable, is necessary, b) decision to make a public sector injection of capital, or equivalent support, without which the firm would have become non-viable.
- The norms also state that if the authorities decide to reconstitute a bank or amalgamate a bank with any other bank under Section 45 of BR Act, 1949, then such a bank will be deemed as non-viable or approaching non viability.
- If the bank reaches the point of non-viability, AT1 bonds are the first part of debt that will be written down.

Tier 2 bonds

- These are components of tier 2 capital, primarily for banks.
- These are debt instruments like loans, more than they are equity features like stocks.
- As with all bonds and other debt instruments, they do not give ownership or voting rights, but they do offer interest earnings to bondholders or owners.
- “Guaranteed” is not an appropriate word to be used for tier 2 bonds but it “specifies” earnings as interest rates.
- Tier 2 bonds are typically subordinated debt, behind tier one debt such as commercial loans.
- In the case of Basel III Tier 2 bonds, the principal can be fully written down at the PONV.
- While both Tier-1 and -2 instruments have significant loss-absorption features, the former are meant to absorb losses on a going-concern basis — the loss-absorption

trigger kicks in fairly early. Hence, the high loss-absorption features of Tier-1 bonds can bail out depositors as well as investors in Tier 2 bonds, well ahead of a crisis or stress.

- The relatively lower risk in Tier 2 bonds compared to AT 1 bonds is reflective in the ratings of these bonds.
- Ratings for tier 1 instruments are notched down by both domestic and global rating compared to ratings assigned to the Tier 2 bonds.
- Infrastructure bonds
- These are borrowings to be invested in government funded infrastructure projects within a country.
- They are issued by governments or government authorised Infrastructure companies or Non- Banking Financial Companies.
- They offer a decent rate of interest and tax benefits.
- The maturity of these bonds is often between 10 to 15 years with an option to buy back after a lock-in of 5 years.
- These bonds are listed either on or both National Stock Exchange or Bombay Stock Exchange that provides you with an option to exit after the lock-in period.
- A Lock-in period is when you cannot sell a particular instrument.
- These bonds provide deductions up to Rs 20,000 from the taxable income under section 80CCF of the Income Tax Act; however the interest on the bonds is taxable in the hands of investors.
- So, the tax-saving long-term infrastructure bonds were basically not the tax free bonds.

Topic 11. FED POLICY

Important for subject: Economy

Open market operations:
Central bank purchases and sales of securities in the open market as a way to implement monetary policy.

What is this monetary policy tool used for?
This tool helps the Fed promote stable prices and maximum employment by changing the supply of reserves in the banking system, which influences interest rates and the supply of credit.

EXAMPLES

Expansionary monetary policy:
Like tapping the accelerator.
The FOMC wants interest rates to decrease:
• The Trading Desk is directed to engage in open market operations, including purchases of government securities.
• This injects reserves into the banking system.
• This puts downward pressure on the federal funds rate and, thus, other interest rates, encouraging borrowing.

Contractionary monetary policy:
Like tapping the brakes.
The FOMC wants interest rates to increase:
• The Trading Desk is directed to engage in open market operations, including the sale of government securities.
• Banks have fewer reserves available to lend.
• This puts upward pressure on the federal funds rate and other interest rates, encouraging saving.

Wednesday's Federal Reserve raise the key US interest rate and signals more increases. This aggressive stance has raised concerns about a possible recession.

- This increase would bring the policy rate up to 3.0-3.25% rates. It would be 4.4% at the end 2022, and 4.6% the following year. This is a more hawkish shift.
- Rates will likely be reduced by policy makers in 2024 to 3.9% and 2.9% respectively in 2025, according to experts.
- Fed Reserve and the Monetary Policy
- The Federal Reserve's monetary policy in the United States includes communications and actions to promote maximum employment, stable prices and moderate long-term rates of interest. These are the economic goals that Congress has directed the Federal Reserve to pursue.
- The Federal Reserve Act of 1913 gave authority to the Federal Reserve for monetary policy setting.
- The Federal Open Market Committee FOMC is the primary instrument for adjusting monetary policy's stance. It does this by changing the target rate for federal funds.
- The Federal Funds Rate is the interest rate at what depository institutions lend

overnight balances at Federal Reserve to other institutions.

- The FOMC can influence the federal funds rates and thus the cost of inter bank credit in the short-term by changing the interest rate the Fed pays on the Fed's reserve balances.
- A bank will not lend money to another bank or to customers at a lower interest rate than what it can earn from its Fed Reserve balances.

Impact:

- The rate of interest charged by banks and other lenders on short-term loans to households, individuals, and non-financial entities, has risen rapidly due to Federal funds rate changes.
- The rate of rise in deposit rates and other returns-The rates for return on U.S. Treasury bills and commercial paper, which are short-term debt securities that have been issued by private companies to raise funds, move in line with the federal funds rate.
- Relative increase in US interest rates leads to capital inflows. Capital outflows from other nations into the US are the result.
- Appreciation of dollar and depreciation of other currency-Changes in the relative attractiveness of U.S. assets will move exchange rates and affect the dollar value of corresponding foreign-currency-denominated assets (appreciation of dollar)
- After the US Federal Reserve's interest-rate hike and its hawkish stance, the rupee fell to an all-time low at 80.86 against US dollars.
- The Rupee and other Asian peers fell to a new record low.

Topic 12. FOREIGN TRADE POLICY***Important for subject: Economy***

In the next week, the Government will announce a new foreign trade strategy. It could include measures to increase goods and services exports and rein in the runaway import bill. The current trade policy was adopted in 2015.

- Expect new initiatives under the FTP.
- Three new chapters will be added to the foreign trade policy: e-commerce, export hubs in districts, and SCOMET (dual-use items for civilian/industrial or military use). This puts a special emphasis on them. The new chapter on ScoMET (Special

Chemicals, Organms, Materials, Equipment and Technologies), is intended to clarify trade provisions for dual-use items.

- FTP will also promote and diversify services exports outside the US and EU.
- This policy will allow for coordinated actions between countries and missions overseas to develop and implement the trade promotion strategy.
- To increase ecommerce exports to India, there will be a lot of emphasis on cross-border ecommerce.
- FTP could also allow concessions from schemes such as Remission of Duties & Taxes On Exported Products (RoDTEP), and EPCG if the transaction is settled not in dollars or euros but in rupees. This is consistent with RBI's approval of rupee trade.
- Highlights of Foreign Trade Policy (FTP), 2015-20
- FTP 2015-20 was a framework to increase exports of goods, services and create employment. It also facilitated value addition in the country in line with the "Make in India" programme.
- FTP 2015-20 introduced two new programs: 'Merchandise Exports from India Scheme' (MEIS), for the export of specific goods to certain markets, and 'Services Exports from India Scheme' (SEIS), for increasing exports notified services.
- The EPCG scheme has taken measures to encourage the procurement of capital goods by indigenous manufacturers. This was done by reducing the specific export obligation to 75 per cent.
- To boost exports of defense and high-tech products, measures were taken. For targeted interventions to increase exports, 108 MSME clusters were identified. The 'NiryatBandhu Scheme was therefore galvanized and repositioned in order to reach the goals of 'Skill India.
- FTP also focused on trade facilitation and improving the ease of doing businesses. FTP's main objective is to promote paperless work in a 24-hour environment.

Topic 13. WHITE GOODS

Important for subject: Economy

White goods can be large appliances like stoves and refrigerators.

- These large electrical goods are for the house and were previously only available in

white.

- They can still be purchased in many colors today, but they are still called white goods.
- Major appliances, which are made from enamel-coated sheet metal and are considered consumer durables, are the same as white goods.
- This term can also be used to describe white fabrics, particularly linen or cotton, which are articles like curtains, towels, and sheets made from white cloth.
- Brown Goods: These are electronic consumer durables that are light in weight, such as computers, digital media players and TVs, or radios.

Farzad-B Gas Field:

- It is located in Persian Gulf (Iran).
- In 2002, ONGC Videsh and Oil India signed the contract to explore the field.
- After the declaration of commerciality of the area, based upon the gas discovery, the contract was terminated in 2009. It holds gas reserves greater than 19 trillion cubic feet.
- ONGC has made investments of approximately USD 100 millions.
- The consortium has been working since then to secure the contract for the development of the field.

Topic 14. COMMODITY DERIVATIVE MARKET

Important for subject: Economy



The Securities and Exchange Board of India has permitted foreign investment portfolios (FPIs) to join ETC derivatives (ETCDs) market, subject to certain risk management

procedures.

- Its goal is to increase the quantity and quality of liquidity available in the market for commodity derivatives.
- FPIs are permitted only in cash-settled commodity derivative contracts, as well as a handful of non-agricultural indexes.
- The previous Eligible Foreign Entity (EFE) method has been discontinued because of non-participation.
- In October of 2018, Sebi had permitted eligible foreign entities (EFEs) that have exposure to Indian commodities markets to take part in the commodity derivatives segment of recognized stock exchanges primarily for hedging their exposure.
- FPIs apart from corporates and family offices can be involved in commodity derivatives as "clients" and be subject to the rules and limitations on position.
- FPIs who fall under groups like family offices, individuals and corporates are allowed the right to position a maximum of 20 percent of the client the limit for a specific commodity derivative contract
- Derivatives are financial contracts that get their value from fluctuation of the prices of the assets they are based upon like currencies, stocks bonds, commodities, etc.

Two kinds of derivatives:

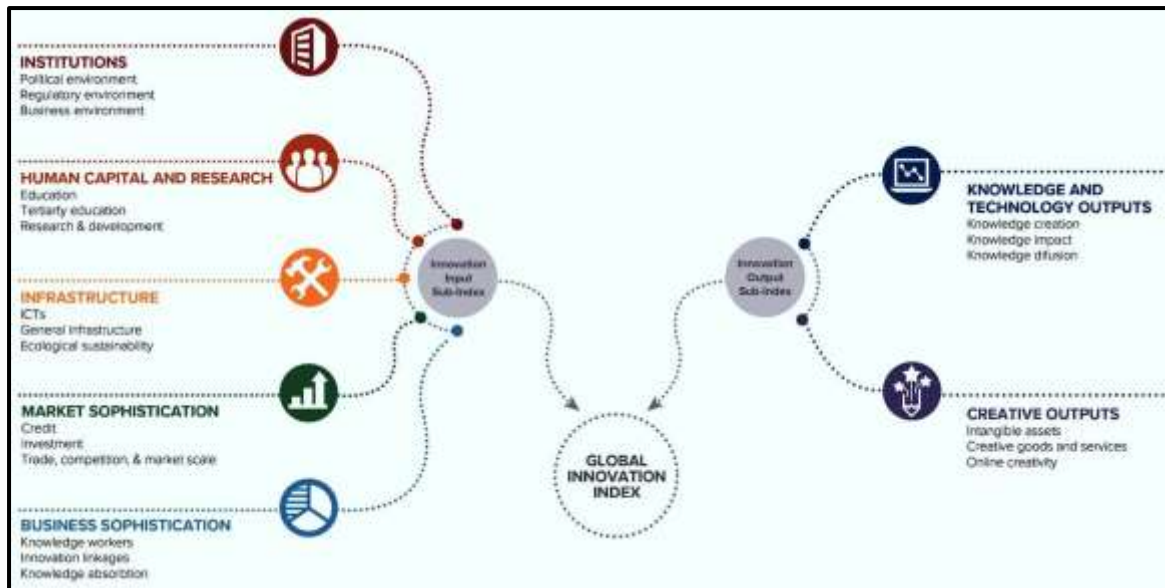
- A derivative that has the standardised terms and conditions which is why it is traded on the stock exchanges, and referred to by the name of Exchange Traded Derivatives (ETDs) A second kind of derivative that is exchanged between private counter-parties without an official intermediary, and is known under the term Over the Counter (OTC) derivatives.
- Commodity derivatives can be described as financial tools that permit investors to make money from commodities without actually holding them.
- A derivatives contract gives the possibility of exchanging an item at a later date , for the specified amount
- The market for commodity derivatives is a market where investors can invest in commodities, rather than major companies who are trading in these commodities.

Two distinct market for commodities:

- The spot markets can also be referred by the name of "cash market" as well as "physical markets" in which traders trade physical commodities and this too, for immediate delivery.
- Markets for derivatives in India comprise two kinds of commodity derivatives, namely futures and forwards. These derivatives contracts utilize spots as the base asset, and provide owners control over the same at a certain point in the near future, at the price determined in the current.
- At the time the contracts expire the asset or commodity is physically delivered.
- **Commodities ETDs:** These kinds of Exchange Traded Derivatives are based on commodities as their underlying asset and are traded based on the fluctuation in the prices of commodities.
- A few examples of standard contracts for commodities are gold, silver, crude oil, natural gas, copper, zinc, etc.
- It is the Multi Commodity Exchange of India Limited (MCX) is India's first exchange that is listed is a top-of-the-line commodity derivatives exchange that allows the online trading of commodity derivatives transactions, providing an opportunity for price discovery as well as risk control.
- Foreign portfolio investments (FPI) is the popular method of investing in foreign economies.
- It covers financial and securities assets owned by investors from another country.
- Securities are stocks, and American Depository Receipts (ADRs) that are issued by corporations from nations that are not the country of the investor.
- Additionally, it includes bonds or other loans issued by these firms or foreign government agencies, mutual funds as well as exchange-traded funds (ETFs) which invest in assets overseas or elsewhere.

Topic 15. ABOUT THE GLOBAL INNOVATION INDEX–GII

Important for subject: Economy



India is now at the 40th position within the Global Innovation Index of WIPO which is a massive jump of 41 places within 7 years

Findings:

- The future of innovation is in flux, as we come out of the pandemic, and are facing global uncertainty and a lack of productivity driven by innovation.
- Switzerland continues to be the world's top leader in the field of innovation for the 12th time in a row.
- The second spot was secured through United States (US) followed by the United States (US) followed by Sweden and The United Kingdom (UK) and the Netherlands.
- Emerging economies are consistently showing good performance, including India as well as Turkey.
- India is the leader in innovation within the lower middle-income bracket.
- India has been ranked 40th on the Global Innovation Index.
- The first time that the country has been in the top 40.
- The year before, India was at the 46th spot.
- The world's leading company with respect to ICT services exports, and has the top position in other indicators, such as the value of venture capital receipts as well as finance for startups and scale-ups, graduates from engineering and science,

productivity and diversification of industry

About the Global Innovation Index-GII:

- This publication was created the World Intellectual Property Organization (WIPO) in collaboration together with Portulans Institute and with the assistance by its partners in business, including those from the Confederation of Indian Industry (CII) and the Brazilian National
- Confederation of Industry (CNI), Ecopetrol (Colombia), and the Turkish Exporters Assembly (TIM).
- The GII seeks to highlight the many aspects of ranking innovation and deep analysis that focuses on 130 economies.
- Indicators This index ranks economies based on their capabilities to innovate and is comprised of around 80 indicators that are grouped into outputs and inputs for innovation.

Components:

- Innovation Input Sub-Index Five input pillars are aspects of the Scie that allow and encourage innovative activity.
- Innovation inputs Institutions Research and human capital Infrastructure; Market sophisticated Business advanced.
- Innovation Output Sub-Index Innovation outputs come from ingenious economic activities.
- **Innovation outputs:** Technology and knowledge outputs; creative outputs it is true that the Output Sub-Index includes only two components, it has the same weightage that the Input Sub-Index in calculating the total GII scores.
- The total GII score represents the sum between two sub-indicators, the Input as well as Output sub-indicators from which the GII economic rankings are created.
- World Intellectual Property Organization (WIPO)
- It is the world's forum to discuss Intellectual Property (IP) products, services policies information, and cooperation.
- It is a self-funded agency under the United Nations, with 193 members states.
- The mission is to lead the creation of a fair and efficient internationally-based IP

system that encourages creative thinking and innovation to everyone's benefit.

- The organization's mission, its the governing bodies, and the procedures are laid out by the WIPO Convention which was signed by WIPO in the year 1967.

Topic 16. KYRGYZSTAN AND TAJIKISTAN BORDER CONFLICT

Important for subject: International Relations



Over the past week, nearly 100 people were killed and scores more injured in violent border clashes that broke out between Kyrgyzstan (Tajikistan)

Border Conflict

- The current Kyrgyz-Tajik border configuration is the result of Soviet mapmakers who created the lines that divided Soviet republics following the collapse of the Union of Soviet Socialist Republics in late 1991.
- Particularly tension is felt at the boundary between Tajikistan, Kyrgyzstan, which runs for over a third its 1,000-km length.
- Nearly half of the 1000 km border is in dispute.
- In the past, the Tajik and Kyrgyz populations had equal rights to natural resources.

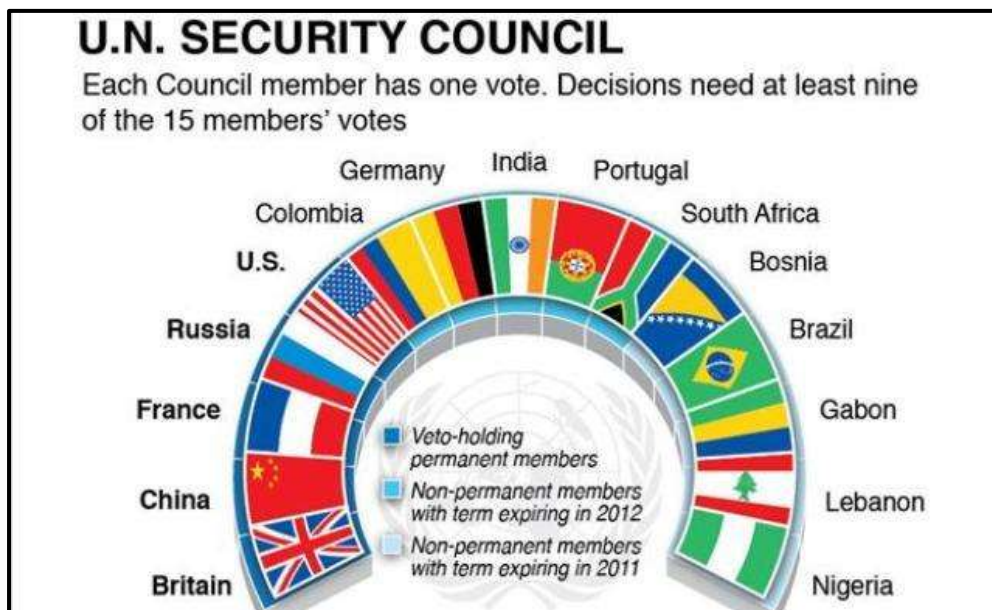
- Despite regular talks being held to resolve the problem, there is still disagreement over the map that should be used for demarcation purposes.
- In the past, deadly clashes have resulted from restrictions on land and water resources that were not considered theirs.

Map

- The central asia region includes Tajikistan and Kyrgyzstan.
- The region also includes Uzbekistan, Turkmenistan and Kazakhstan.
- Both Tajikistan and Kyrgyzstan border Uzbekistan, China.
- Communism peak can be found between Kyrgyzstan, Tajikistan.
- The Aral Sea is shrinking, and it lies between Kazakhstan and Uzbekistan.
- Syr Darya and Amu Darya Drain in Aral Sea
- The Ust-Urt plateau lies between Kazakhstan and Uzbekistan.
- Caspian Sea is only bordered by Turkmenistan and Kazakhstan.

Topic 17. UNSC REFORMS

Important for subject: International Relations



S. Jaishankar, External Affairs Minister, visited the United Nations to discuss reform.

- Following the BRICS meeting, he met his counterparts from Japan, Brazil, and Germany under The Group of Four (G4) banner.
- This group is focused on reform of the UN Security Council (UNSC), and permanent

membership for members of G4. They reiterated their resolve to push for reform on Thursday and expressed dissatisfaction with the lack of progress.

- India is currently a member non-permanent of the Council.
- G4 ministers were concerned that the UN General Assembly's 76th Session did not make "meaningful advances" in Inter-Governmental Negotiations (IGN), as the G4 stated.
- The G4 nations, which include Brazil, Germany and India, are four countries that support each other in their bids to be permanent members of the United Nations Security Council.
- G4's main goal is to secure permanent seats in the Security Council.
- Since the UN's inception, each of these four countries has been represented among the non-permanent elected members of the council.
- Their political and economic influence has increased significantly over the past decades to a level comparable with permanent members (P5).
- The Uniting for Consensus movement and especially their economic rivals or political rivals often oppose the G4's bids.
- 1945 saw the UN Charter establish the Security Council.
- It is one the six major organs of United Nations.
- The General Assembly, the General Assembly and the General Secretary are the other five organs of United Nations.
- Trusteeship Council and the Economic and Social Council. The International Court of Justice and the Secretariat.
- It is responsible for ensuring international security and peace.
- The council consists of 15 members, including 10 permanent members and five non-permanent members who are elected for a two-year term.
- The five permanent members of the United States, Russia Federation, France and China are the United States, France, China, France, and the United Kingdom.
- Each member of Security Council is entitled to one vote. Security Council decisions
- The nine permanent members, together with the concurring votes, vote affirmatively to create the Council on Matters.
- The resolution cannot be passed if one of the five permanent members votes "No".
- Any member of United Nations that is not a member or a deputy member of Security

Council can participate in the discussion of any question before it, provided that they do not consider that their interests are being adversely affected.

- The presidency of the council is a rotating position that alternates each month between its 15 members.
- New York is the headquarters of the council.

Topic 18. THE CHARTER OF THE UNITED NATIONS

Important for subject: International Relations

On Wednesday, US President Joe Biden said that Russia had "shamelessly broken" the fundamental tenets in the United Nations Charter

- The founding document of the United Nations is the Charter of the United Nations. It was signed in San Francisco on 26 June 1945 at the conclusion the United Nations Conference on International Organization. It entered into force on 24 Oct 1945.
- Because of its international character and the powers conferred by its Charter (which is an international treaty), the United Nations can act on many issues.
- The UN Charter is therefore an instrument of international legal law and UN Member states are bound by it. The UN Charter codifies major principles of international relationships, including sovereign equality of states and the prohibition of using force in international relations.
- The UN was founded in 1945. Since then, its mission and work have been guided and guided by the principles and purposes contained in the founding Charter. It has been amended three times, in 1963, 1965 and 1973.
- The International Court of Justice is the main judicial organ of United Nations. It functions according to the Statute of International Court of Justice. This annexed document forms an integral part of the UN Charter.
- The Charter is composed of a preamble, 111 articles and 19 chapters.
- The preamble is composed of two main parts.
- The first section contains a call to international security and peace, and the respect for human rights.
- The preamble's second section is a declaration in contractual form that the governments of all the nations of the United Nations have accepted the Charter. It is the first international document on human rights.

- Preamble to the Charter
WE, THE PEOPLE OF THE UNITED NATIONS DETERMINED
- To save the future generations from the horror of war.
AND FOR THESE ENDS
- To practice tolerance, live in peace with each other as good neighbours, to unite our strength for international security and peace, and to ensure that no armed force is used except in the common interest.
HAVE RESOLVED to COMBINE OUR EFFORTS IN ORDER TO ACCOMPLISH THESE AIMS.
- Our respective Governments, represented in San Francisco by representatives, have accepted the present Charter of the United Nations. We hereby create an international organization called the United Nations.

UN Charter Chapters

- The purpose of the United Nations is set out in Chapter I, along with the important provisions regarding the maintenance of international security and peace.
- The criteria for membership to the United Nations are defined in Chapter II.
- The bulk of the document is divided into Chapters III-XV which describes the UN's organs and institutions and their respective powers.
- Chapters XVII and Chapter XVII detail the arrangements for integrating UN law with international law.
- The Charter can be amended and ratified by Chapters XVIII or XIX.
- These chapters cover the enforcement powers of UN agencies:
- Chapter VI describes the power of the Security Council to investigate and mediate conflicts
- Chapter VII discusses the power of the Security Council to authorise economic, diplomatic and military sanctions as well as the use military force to settle disputes.
- Chapter VIII allows regional agreements to preserve peace and security in their region.
- The UN's economic and social cooperation powers are described in Chapters IX and X, as well as the Economic and Social Council which oversees these powers.
- Chapters XII-XIII are about the Trusteeship Council that oversaw decolonization.

- The powers of the International Court of Justice (ICC) and the United Nations Secretariat (UNSEC) are respectively established in Chapters XIV & Chapter XV.
- The chapters XVI-XIX cover XVI: Miscellaneous Provisions.
- Chapter XVII: Transitional security arrangements in relation to World War II.
- The charter amendment process is Chapter XVIII
- Chapter XIX: Ratification of the charter

Topic 19. INTERNATIONAL CIVIL AVIATION ORGANIZATION AND CORSIA

Important for subject: International relations



The first review of the Carbon Offsetting and Reduction Scheme For International Aviation will take place at the 41st session International Civil Aviation Organization General

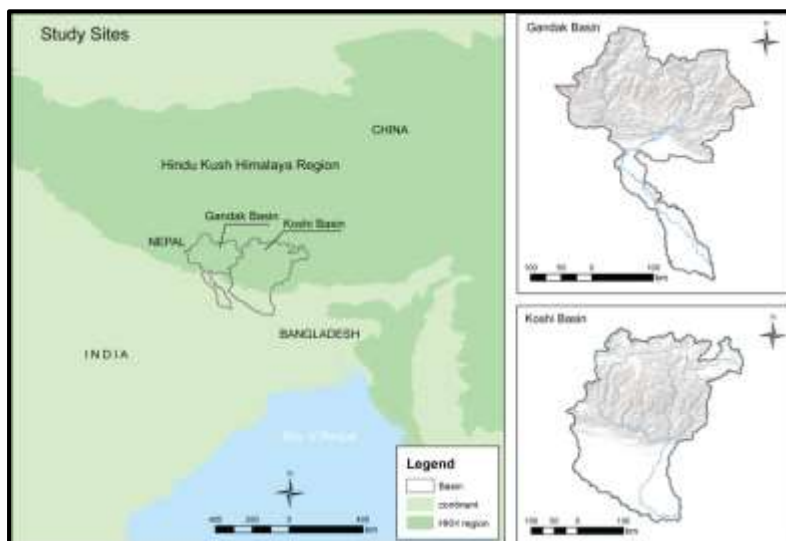
Assembly.

- The International Civil Aviation Organisation (ICAO) was established in 1944 by Chicago Convention to promote safe and orderly growth of civil aviation worldwide.
- The Chicago Convention established the principles that allow international air transport and led to the establishment of the ICAO.
- To manage and govern the Convention on International Civil Aviation (Chicago Convention), the International Civil Aviation Organization (ICAO) was created.
- ICAO (International Civil Aviation Organization) is a United Nations (UN), specialized agency.
- Its purpose is to encourage the planning and development international air transport in order to ensure safe and orderly growth international civil aviation.
- India is one of its 193 members.
- Its headquarters are located in Montreal, Canada.
- The ICAO established the guidelines and procedures that allow for peaceful global air navigation.
- It works to achieve consensus on Standards and Recommended Practices, (SARPs), and policies for international civil aircraft.
- These policies and SARPs are used by ICAO member states to ensure that local civil aviation operations and regulations comply with global norms. This allows more than 100,000 daily flights to be safely and reliably carried out in all regions of the globe's aviation network.
- The ICAO Council is responsible for governing the organization. It is headed by a President.
- International Aviation Carbon Offsetting and Reduction Scheme (CORSIA).
- It was created by the International Civil Aviation Organization (ICAO), and adopted in October 2016.
- This global scheme is being implemented by ICAO to reduce CO2 emissions from international aircraft above 2020 levels.
- It aims to achieve carbon neutral growth by 2020.
- It covers the greatest amount of greenhouse gas emissions and is therefore one of the most important carbon pricing instruments.
- CORSIA uses market-based environmental policies instruments to offset CO2

- emissions. Aircraft operators must purchase carbon credits from a carbon market.
- CORSIA is voluntary for countries that are least developed, small island developing states, and landlocked Developing Countries. However, it is not mandatory.
 - All ICAO member countries with international flight operators are required to monitor and report carbon dioxide emissions every year starting in 2019.
 - The scheme will be voluntary in all countries up to 2027, and it will begin in 2021.
 - CORSIA reporting requirements are not applicable to any aircraft operator whose CO2 emissions are less than or equal 10,000 tonnes.
 - CORSIA does not include emissions from domestic air travel.
 - Domestic aviation emissions are considered under the UNFCCC. They are calculated as part the Nationally Determined Contributions.
 - The CORSIA offset requirements for Indian Operators will apply from 2027, i.e. The mandatory phase of CORSIA implementation.
 - CORISA will be used to complement other planned measures, such as: aircraft technology evolution operational improvement and greater use sustainable aviation fuels.
 - The International Civil Aviation Organization (ICAO) adopted the 2018 international Standards and Recommended Practices for CORSIA.

Topic 20. FLOODS AND TRANSBOUNDARY RIVERS

Important for subject: International Relations



There is an increased severity as well as the frequency and severity of flooding in various

areas of the globe.

- This is further exacerbated due to the lack of clarity when it comes to sharing of hydrological data and information related to specific activities (such as one state with a riparian border) which can be transboundary (affecting other states in the riparian zone) and thus posing an obstacle to understanding the extent of flooding.
- International obligation to use natural resources that are transboundary:
- A state is not required to make use of the territory of its state in a way that harms another state when making use of a natural resource shared by the two states.
- Therefore, there is a legally binding obligation for all states not to let water flow into the river to cause flooding in the other co-sharers of the river's waters.
- International Court of Justice (ICJ) ruling on transboundary river crossings:
- The ICJ within the Pulp Mills on the River Uruguay (Argentina vs Uruguay) case (2010) was able to confirm that the need to conduct a transboundary environment impact analysis (TEIA) of the planned measures or projects in the shared watercourse is an integral part of international customary law.
- Additionally The ICJ stated that the executing state is required to notify the affected party about the outcome of TEIA.

India's issues with Brahmaputra:

- China is the highest one of the riparians of the Brahmaputra therefore is a clear leverage over the lower-riparian India.
- Dams being built through China and the excessive release of water as "dam controller" which is in breach of customary international law, has the potential to cause more the flooding of Assam in the near future.
- Insufficient sub-basin coverage or basin-level mechanism that can handle the water management of Brahmaputra.
- India along with China are not part of either the United Nations Convention on the Law of the Non-Navigational Uses of International Watercourses (UNWC) 1997 or to the United Nations Economic Commission for Europe (UNECE) on the protection and Use of Transboundary Watercourses and International Lakes 1992 (Water Convention).
- The existing mechanism that binds India as well China:

- India has signed a memorandum (MoU) in 2013 with China in 2013 in the hope of sharing hydrological data throughout the season of flooding (June through September).
- However, the MoU doesn't allow India an access point to urbanisation or forest clearing activities from that Chinese portion of the River Basin.

India and Nepal:

- Floods are also a frequent issue throughout areas like the Koshi and Gandak river basins , which have been shared between India along with Nepal.
- The Indian-Nepal Koshi agreement of 1954 (revised in the year 1966) is designed to limit floods that cause destruction within the basin of rivers. Joint bodies based on the treaty have also worked to improve the early warning systems used for flood forecasting.

The way forward

- Procedural standards that aid in the management of floods that include the notification of proposed measures as well as the sharing of data and information as well as participation of the public.
- India as well as other parties like China, Nepal and Pakistan could be a part of either the UNWC or the Water Convention which could lay the foundation for a bilateral treaty regarding the Brahmaputra but with the restriction that it must not require the inclusion of a dispute resolution mechanism clause.
- The Convention on the Law of Non-Navigational Uses of International
- Water courses , also known by "the UN Watercourses Convention, is an international treaty which was adopted in the United Nations on 21 May 1997, with respect to the use and conservation of all water bodies that cross international borders, groundwater and surface waters.
- It became effective on the 17th of August, 2014.
- Each state sharing in a resource has to inform other sharing states on the state of the watercourse as well as their plans for its use giving enough time to others sharing states investigate the usage and protest when they believe the use as damaging.
- The treaty also requires that states take reasonable measures to limit damages, for

instance those caused by pollution or introduction of non-native species to the watercourse. The treaty also states are required to take steps who cause harm to water resources that are shared to make steps to repair the harm or pay sharing states compensation for any loss.

- The Convention on the Protection and Use of Transboundary Watercourses and International Lakes (Water Convention)
- It was adopted by Helsinki in 1992, and came into force in.
- It is a distinctive legally and legally binding instrument of international legality as well as an intergovernmental platform designed to promote sustainable utilization of transboundary water resources through facilitating collaboration. Initially it was negotiated as a regional instrument and then open to accession by all UN Members States in the year 2016.

Topic 21. ELECTION COMMISSION OPINION REGARDING DISQUALIFICATION

Important for subject: Polity

The request by the Jharkhand Chief minister to reveal its joint opinion with the Governor of the state in respect of the disqualification case against him was turned down by the Election commission.

- EC stated that any communication between the EC or a Governor is "privileged".
- According to Article 192(2) of the Constitution, if you reveal it before an order has been passed by the Governor, that would be a breach of constitutional propriety.
- The EC stated that any document pertaining a reference received by the Governor under Article 192(2) was also exempted from disclosure under RTI Act unless a final Order is passed.
- The poll panel sent its opinion to Governor on August 25. It recommended Soren's exclusion under Section 9A, the Representation and the People Act, 1951. Soren was accused of using his position to give a lease for stone-mining to himself last year.
- Section 9A forbids elected representatives to enter into contracts with the government for "supply or execution of any works undertaken" by them.
- Article 191 Indian Constitution Decision on Questions Concerning Disqualifications of Members.
- **Article 191 (1):** Any person who holds any office of profit under either the

Government of India, or the Government of any State listed in the First Schedule other than one declared by the Legislature of that State by law not disqualifying its holder, shall be disqualified from being elected as or for remaining a member of a State's Legislative Assembly.

- If there is any doubt as to whether a member of the Legislature of a House of Representatives of a
- If a state becomes subject to any disqualifications listed in clause (1), article 191, the question will be referred to the Governor for his decision. His decision shall be final.
- Article 191(1)(e), which also covers legislators who hold government positions, protects them if they are not exempt from disqualification by law.
- Article 191 (2). Before deciding on any question, the Governor must obtain the opinion from the Election Commission.

Concept of the 'Office of Profit'

- The office of profit is a position that provides financial gain, remuneration, or benefit to its holder. It is not important how much such profit.
- This concept prohibits members of parliament from accepting a profit-making office under the executive to preserve the autonomy of the legislature as well as the separation of power.
- It is intended to avoid conflicts of interest between the duties and the interests of elected members.

What is an "Office of Profit"?

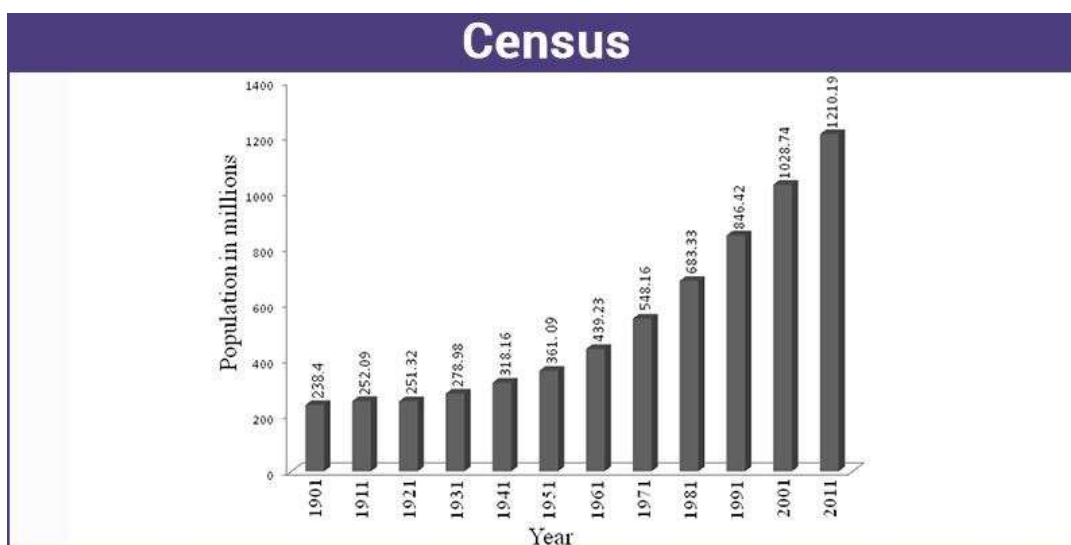
- The phrase is not defined in the constitution.
- It has changed over the years with subsequent judicial pronouncements.
- The Supreme Court has identified certain factors when considering the 'office profit'.
- The government or the government can appoint the authority
- What authority the government has to end the appointment
- The government can decide the remuneration
- What is the source for the remuneration? Statutory provisions relating to the 'Office of Profit'
- **Union law:** The Parliament (Prevention of Disqualification) Act (1959) was also

passed by Parliament.

- It has been amended numerous times to increase the exempted lists.
- **1951 RPA Act:** Clause 9A states that a contract that involves a person in the conduct of his trade or business with the relevant Government for the supply or execution of goods or works by that Government shall disqualify him.
- State laws: Some state legislatures have passed laws exempting some offices from the scope of office profit.

Topic 22. CENSUS

Important for subject: Polity



The census gives information about the size, distribution, socio-economic, demographic, and other characteristics of the country's population.

- The administrative report "Ain-e-Akbari" was created during the Mughal king Akbar's regime. It included detailed data about population, industry, wealth, and many other characteristics.
- In its current form, a systematic and modern population census was not conducted synchronously between 1865-1872 in different parts.
- The first Indian synchronous census was conducted in 1881. Since then, censuses have been conducted continuously once every ten year.
- The decennial Census takes place by the Office of the Register General and Census Commission, Ministry of Home Affairs.
- agro - and marine-based industry (242 numbers) that operate in this District.

Topic 23. CENTRE APPOINTS SENIOR ADVOCATE R
VENKATARAMANIASNEXT ATTORNEY GENERAL FOR INDIA

Important for subject: Polity

Attorney General (AG)

- The Attorney General (AG) of India is member of the Union Executive. AG is the top law official in India.
- In Article 76, the Constitution stipulates the position that of AG of India. AG can be appointed by the president, based on the recommendations by the government.
- The applicant must be one who has the qualifications to be appointed as a judge of the Supreme Court, i.e. they must be citizens of India and be an adjudicator of a higher court in the last five years, or an advocate for the highest court for 10 years or be a renowned jurist, according to the opinion by the president.
- The term of office The term of office is not fixed through the constitution.
- The procedure and the grounds for elimination of AG are not outlined within the Constitution.
- The AG is in office at the prerogative that is granted by the president (may remove by Presidents at any point).

Duties and Functions:

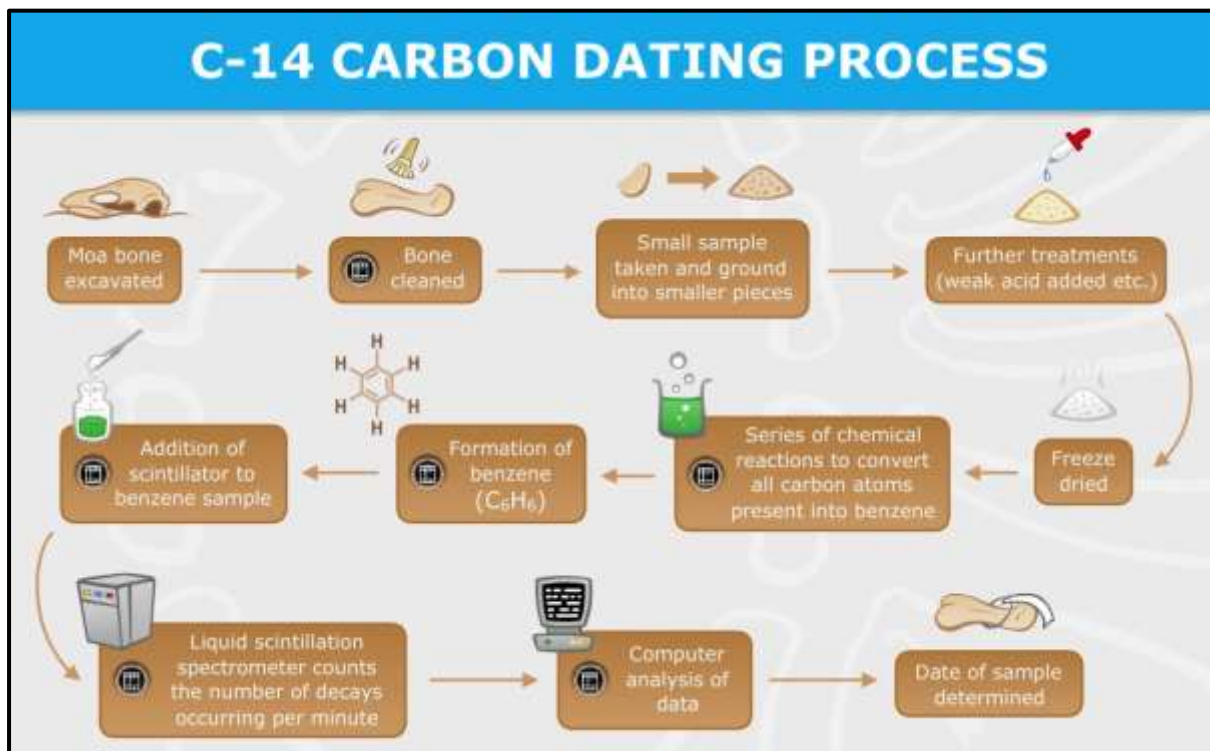
- To provide suggestions on behalf of GoI Government of India (GoI) on legal issues, which are brought to her/him by President.
- to perform other legal obligations of a nature that are given to her or him by the President.
- In the capacity on behalf of GoI in all matters before the Supreme Court or in any instance before the High Court in which the GoI is involved.
- Assist the GoI when a reference is from the president in any matter to the Supreme Court under Article 143 (Power of the President to consult with the Supreme Court) of the Constitution.
- To fulfill the duties assigned to them through the Constitution or other laws.
- Rights and Limitations:
- The AG is entitled to speak and participate in discussions of Chambres of Parliament or their joint sitting , and all committees of Parliament of which he/she could be

designated a member however, without the ability to cast a vote.

- The AG is entitled to all privileges and immunities available to members of Parliament.
- The AG is not part of the category of government employees. The AG is not exempt from practicing law in private.
- However, the AG should not give advice or issue a statement on behalf of the GoI.
- the Solicitor-General of India and the Additional Solicitor General India help the AG in the discharge of official duties

Topic 24. CARBON DATING TECHNIQUE

Important for subject: Science & Technology



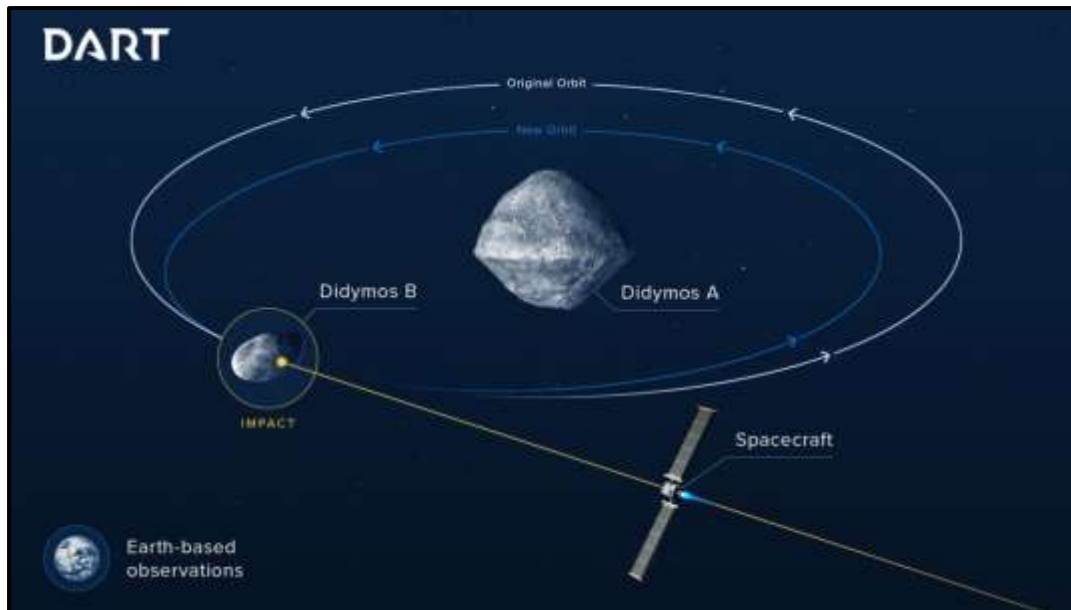
Thursday's Varanasi district court granted a petition for carbon dating to be done on the Gyanvapi mosque structure. The Hindu side claims it is a Shivling.

- Notices have been sent by the court to other parties requesting information about objections to carbon dating.
- Radiocarbon dating:
- Radiocarbon dating, also known as carbon dating or Carbon-14 dating, is a method to determine the age of carbon-based materials (Organic material) that were created from living organisms.

- A measure of the carbon-14 in the sample can be used to estimate its age. This is then compared against an internationally accepted reference standard.
- Willard Libby, University of Chicago, developed the method in the late 1940s.
- The Basic Principles of Carbon Dating
- Radiocarbon (carbon 14), an unstable radioactive isotope, is an isotope that contains the element carbon.
- Carbon 12 and carbon 13 are the stable isotopes.
- The effect of cosmic radiation neutrons on the nitrogen 14 atoms is constantly creating carbon 14 in the upper atmosphere.
- It quickly oxidizes in air to make carbon dioxide, and it enters the global carbon circle.
- Throughout their lives, both plants and animals absorb carbon 14 from carbon dioxide.
- They stop exchanging carbon with other living things and their carbon 14 level starts to decline at a rate that is determined by radioactive decay law.
- Radiocarbon dating is a method that measures residual radioactivity.
- How does carbon dating work?
- Carbon-14, also known as radiocarbon or radiocarbon, is a radioactively weakly radioactive carbon isotope. It is also an isotopic chronometer.
- C-14 dating can only be used for organic and inorganic materials. It is not applicable to metals.
- It cannot, in particular, be used to determine age of non-living things like rocks.
- Carbon dating cannot also determine the age of things older than 40,000 to 50,000 years.
- Because after 8-10 cycles of half-lives have been completed, carbon-14 is almost non-detectable.
- The three main radiocarbon dating methods are gas proportional counting, liquid scintillation counting, and accelerator mass spectrometry.

Topic 25. DART MISSION

Important for subject: Science & Technology



NASA is set to launch a spacecraft that will have one mission: Smash into an Asteroid at 15,000 mph.

- Double Asteroid Redirection Test (or DART) is a mission that leaves Earth early to see if crashing a spacecraft into an asteroids can help it move in a different direction.
- If the test is successful, it will be useful if NASA or other space agencies need to deflect an asteroids to save Earth from a devastating impact.
- The spacecraft's target is a small moonlet named Dimorphos (Greek meaning "two forms") that orbits an asteroid named Didymos (Greek meaning "twin") every 11 hours and 55 min.
- Astronomers refer to these two asteroids as a binary system. One is a mini-moon and the other is the sun. The two asteroids orbit the sun in a single full orbit every two years.
- It poses no threat to Earth. It is basically a target practice. DART's impact on Earth will occur in September or October next year when binary asteroids are approximately 6.8 million miles from Earth.
- About the Mission
- DART is a low cost spacecraft. It is equipped with two solar arrays, and it uses hydrazine propellant to maneuver the spacecraft.

- It also carries around 10 kg of xenon, which will be used for demonstrations in space of the new NASA Evolutionary Xenon Thruster Commercial (NEXT-C) thrusters.
- NEXT C gridded ion thruster systems provide a unique combination of performance, spacecraft integration capabilities, and are well-suited for deep space robotic missions.
- The spacecraft carries a Didymos Reconnaissance and Astronomy Camera for Optical Navigation (DRACO) high-resolution camera.
- Images from DRACO, which will send images to Earth in real time, will allow for the study of the impact site and surface on Dimorphos (the target asteroid).
- DART will also be carrying a small satellite, or CubeSat, named LICIACube (Light Italian CubeSat to Imaging of Asteroids).
- LICIACube will capture images of the impact as well as the impact crater that resulted from it.
- Reasons for choosing Dimorphos
- This variation in brightness can be observed by Earth-based telescopes. It will help us understand the time it takes Dimorphos for Dimorphos orbit Didymos.

Topic 26. EVOLUTION OF LUMPY SKIN DISEASE VIRUS

Important for subject: Science and Technology

Lumpy skin disease

Clinical signs

Incubation period

- Between 4 and 14 days post-infection

Initial period

- High fever (41°C)
- Swollen lymph glands

• Animal may develop large, firm nodules of 5 cm in diameter in the skin

• Depression, anorexia, rhinitis, conjunctivitis, excess salivation

Marked decrease in milk production

Morbidity

Between 5% and 45%

Necrotic lesions can develop in respiratory and gastrointestinal tract

Lumpy Skin Disease (LSD), a virus that causes Lumpy Skin Disease, is primarily affecting

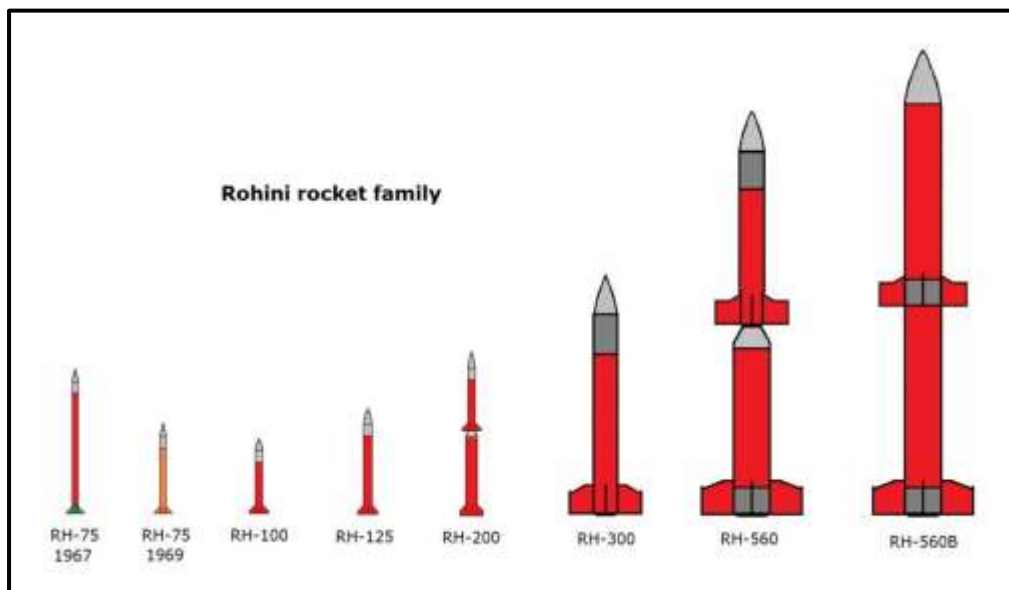
cattle. LSD virus (LSDV), is a poxvirus belonging to the genus.

- In 1929, a virus called LSD was discovered in Zambia. Prior to 1980s, LSD epidemics were rarer than they are today.
- In 1989, Israel was the first country to report HIV cases outside of Africa.
- It is not a zoonotic illness, so it cannot spread to humans.
- It is contagious and spreads by vectors such as mosquitoes and some butterflies. Usually, it affects the host animal, which can be a cow or water buffalo.
- It is mainly composed of fever, fluid excretion, fluid from eyes and noses, dribbling saliva from the mouth, and blisters on your body.
- This causes the animal to stop eating or has problems chewing, which can lead to a drastic drop in milk production.
- It is safe to drink milk from infected cows. Recombinant viruses
- Between 2015 and 2016, Russia experienced epidemics of LSD. The virus genomes that were isolated in 2015-2016 were very similar to the ones from previous years.
- Despite the introduction of homologous (attenuated LSDV) vaccination in 2016, the spread of the disease continued. In 2017, vaccine-like isolates from infected cattle were also obtained.
- All LSDV field isolates from Russia were replaced by viruses expressing the genetic signatures for the LSDV vaccine by 2018. This suggests that the 2017-2019 LSD epidemic in Russia was caused a unique LSDV recombinant.
- After multiple outbreaks, LSDV infections in China were first detected in 2019.
- Whole genome sequencing revealed another vaccine-recombinant strain that had 25 recombination events. This strain is a cross between a field strain of the virus and a vaccine strain.
- The strain found in China was however quite different from those discovered in Russia. This suggests that an unknown virulent recombinant LSDV was responsible for the LSD epidemics in 2019 and 2020 in China.
- The poxvirus DNA polymerases mediate recombination events in cells that have been infected with the same virus or another genus.
- Recombination of vaccine and pathogenic strains is possible when infected animals are immunized or when the infection occurs in the pre-immune stage after vaccination.

- Before homologous attenuated vaccinations are widely distributed, it is important to exercise extreme caution and conduct genetic follow-up research.
- There is also evidence of another mutation in two Indian samples of the same animal. The high number of mutations suggests that LSDV could be able rapidly evolve within its host.
- Attenuated Vaccine - There are many ways to make attenuated vaccines.
- One of the most popular methods is to pass the virus through cell cultures or embryos from animals (typically chick embryos).
- The vaccine virus will not be capable of reproducing enough to cause disease in humans, but it will still trigger an immune response that could protect against future infections.

Topic 27. ROHINI RH 200 SOUNDING ROCKET

Important for subject: Science & Technology



ISRO celebrates 200th successful launch RH-200 sounding rocket rocket.

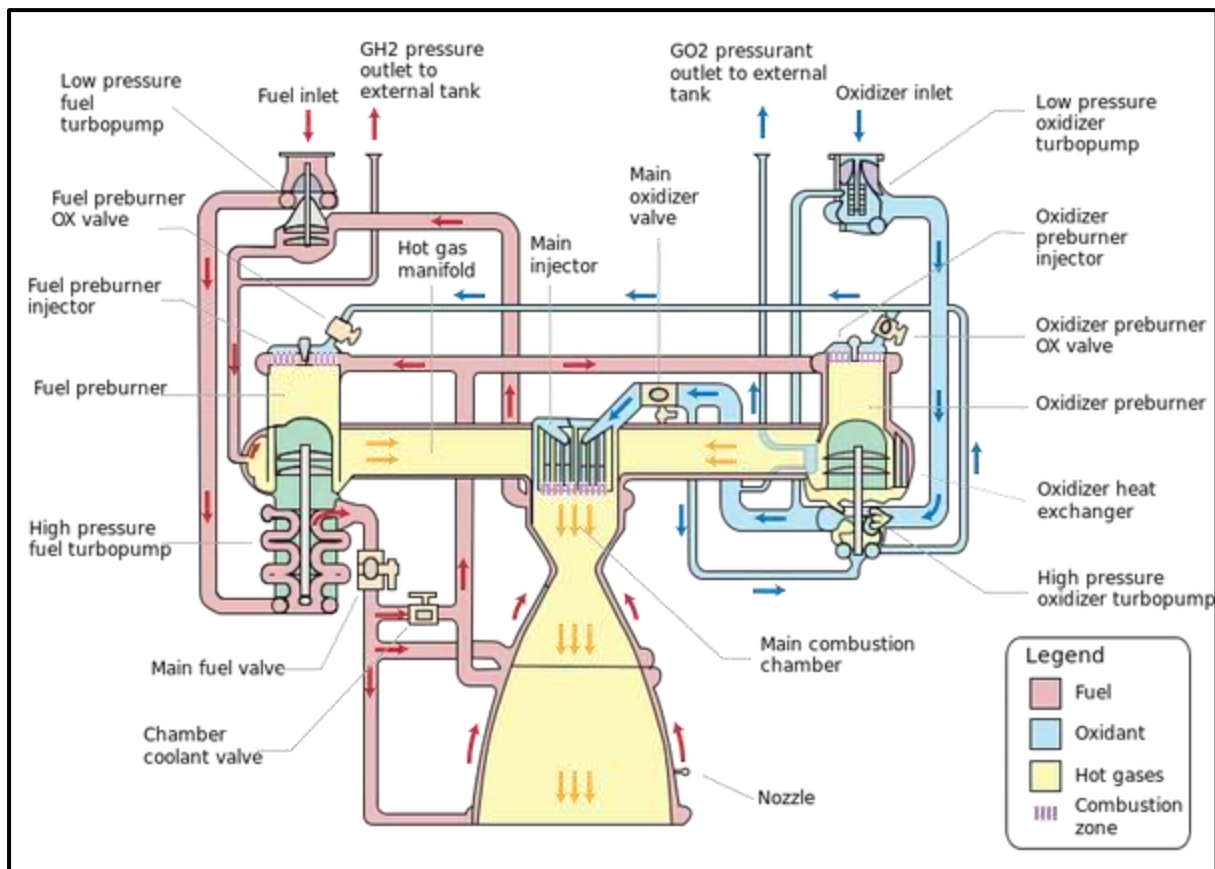
- Indian Space Research Organisation (ISRO), hopes to accomplish a remarkable feat with the 200th successful launch the Rohini RH200 sounding rocket.
- According to the Vikram Sarabhai Space Center, the 5-metre-tall RH-200 has successfully completed 198 consecutive successful flight.
- RH-200, a two-stage rocket capable climbing to heights of 70 km carrying scientific payloads, is capable of reaching heights of 70 km. Solid motors power the first and

second stages RH-200.

- The name '200' refers to the rocket's diameter in millimeters. RH-300 Mk-II, RH-560 Mk-III are other operational Rohini models.
- Sounding Rocket Programme
- Sounding rockets can be one- or two-stage solid propellant rockets that are used to probe the upper atmosphere and space.
- These platforms can also be used to quickly test and prove prototypes for new components or subsystems that will be used in satellites or launch vehicles.
- IISRO currently has three sounding rockets: RH 200, RH 300-MkII, and RH 560-MkII. They can carry 8 to 100kg payload and can reach altitudes of 80 to 475km.
- ISRO began launching indigenously-made sounding rockets in 1965. This experience was invaluable for the development of solid propellant technology.

Topic 28. WHAT IS A CRYOGENIC ENGINE?

Important for subject: Science & Technology



The President Droupadi Murmu will open Indian Aeronautics Ltd.'s Integrated Cryogenic

Engine Manufacturing Facility (ICMF) in the city on Tuesday.

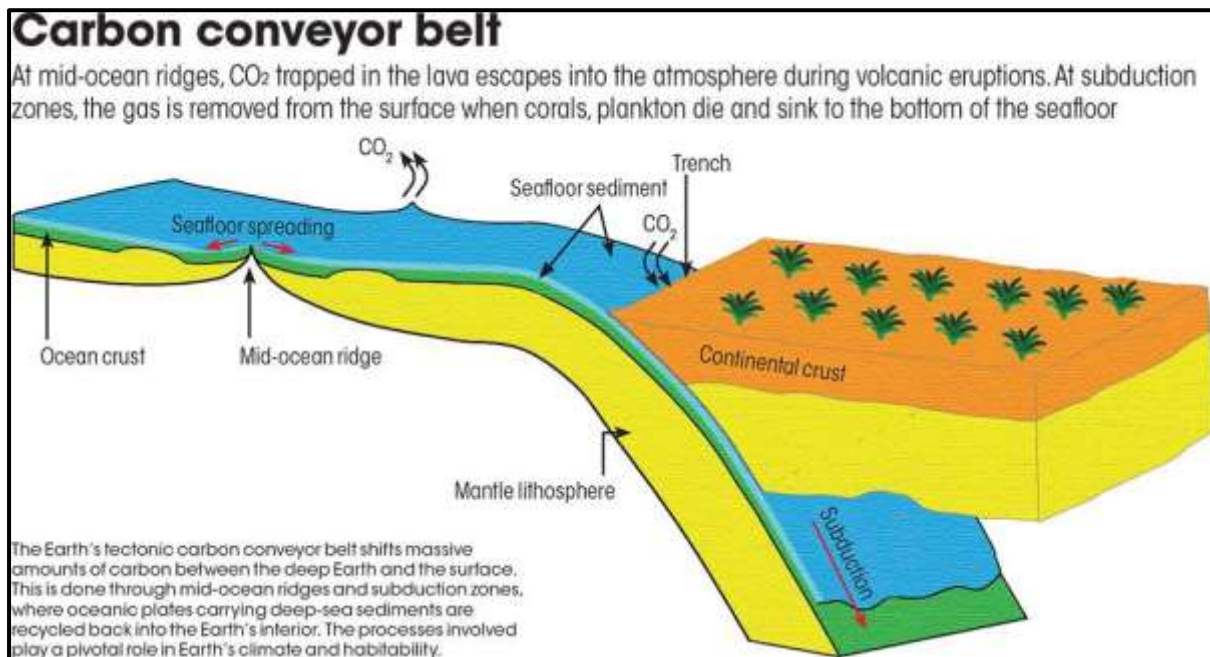
Are cryogenic engines really cryogenic?

- Cryogenic engines are generally extremely powerful and can carry liquid propellants that operate at extremely low temperatures.
- They are extremely efficient, and they provide more thrust for every kilogram of fuel consumed as compared to conventional liquid and solid propellant rocket stages.
- Cryogenic engines were an essential element of National Aeronautics and Space Administration (NASA)'s Apollo missions to the moon. They were also employed in an GSLV in Chandrayaan-2. Chandrayaan-2 mission.
- Six countries have developed an own cryogenic motor including the US French/European Space Agency, Russia, China, Japan and India.
- The cryogenic engine is typically made up the liquid oxygen (LOX) that liquefies at -183 degrees C and liquid hydrogen (LH2) which melts at -253 degrees C. LH2 acts as fuel, while LOX is the oxygeniser, which explosively reacts with hydrogen, creating thrust.
- The engine starts to ignite the liquids are brought into the combustion chamber through a the continuous pump of the booster.
- ISRO's cryo stage, dubbed the C25 was launched following the success of earlier versions designed for the previous launchers for GSLV.
- It was developed in collaboration with The Liquid Propulsion Systems Center, in collaboration with Vikram Sarabhai Space Centre, ISRO Propulsion Complex, and Satish Dhawan Space Centre.
- The C25's tanks hold more than 27,000 kilos of fuel. The tanks can fire for 720 seconds or more.
- At this point the engine produces an acceleration that is 73.55kN under vacuum.
- The impact of failure of a cryogenic engine
- Missions such as Gaganyaan or Chandrayaan-3 are scheduled to launch using GSLV Mk-III, a more sophisticated model of GSLV rocket specifically designed to transport heavier payloads in space.
- GSLV Mk-III too uses an indigenously-developed cryogenic engine in the upper stage, but, unlike the one in Mk-II, this is not a reverse-engineered Russian engine.

- The cryogenic engine that is used to power GSLV Mk-III, called CE20 is the product of more than three decades of research and development starting from scratch. It utilizes a different technique to use fuel.
- It's similar to designs that were used on the Ariane rockets, which were employed by ISRO in the past to launch its heavier satellites into space.

Topic 29. CHURN UNDER SEA: CAN INCREASE IN SEAFLOOR SPREADING SPEED UP GLOBAL WARMING

Important for subject: Geography



During the Miocene Climatic Optimum period (14-17 million years ago), temperatures rose (about 10degC more than today) and carbon dioxide was released.

- The (CO₂) levels reached 1,000 parts per million (PPM), compared to the current 419 PM. This led to the disappearance many species and glacial masses.
- It is vital to understand how these changes were triggered, especially as human activities already emit greenhouse gases into the atmosphere.
- Sea Floor Spreading and its relationship with Global climate change- The Mid-ocean Ridge system, which spews molten magma out of the Earth's interiors. This slowly moves away from the Ridge and cools down to make rocks.
- Because a new ocean floor is formed during seafloor spreading, the Earth then returns the same area to the deep mantle. This pushes the older seafloor towards subduction areas, where the heavier tectonic plates sink below the lighter ones into the Earth's

interiors.

- Scientists know for a long time that seafloor spreading rates have an impact on CO₂ levels.
- Plates that are more rapidly spreading have greater volcanic activity, which injects more CO₂ into water. Some of this CO₂ eventually ends up in the atmosphere.
- They also have an impact on sea levels.
- The seafloor's entire base rises when plates are spread quickly.
- However, as the crust material cools, it slows down and the sea level drops during slow motion.

The Major Findings

- Scientists have been able to map the spread rates of 18 major mid-ocean ridges using magnetic records from the seafloor. These records are available in their entirety for the past 19 million years.
- The rate of seafloor spread was 200mm per year 15 million years ago. Now, it averages 140mm per year. Spreading has slowed down by 35%
- However, not all ridges move the same way. Some sped up while others slow down. 15 of the 18 ridges slow down.
- The tectonic plates spread at a rate of approximately 210-220 mm per year, which is roughly equal to the rate of hair growth.
- Slow plates spread less than a tenth of their faster counterparts.
- These plates are found on the eastern Pacific Ridges. Their spread rates are almost 100 mm per year slower than 19 million years ago. This lowers the world's average.
- This could be due to the fact that the Pacific Ocean is shrinking while the Atlantic and Indian Oceans grow.
- Although the reason behind this slowdown is not known, it could be due to mantle circulation.
- This is the same as how water flows when it's boiled on a stove. It changes its spreading rate as circulation slows.
- Identifiable link to CO₂ levels
- Seafloor spreading rates can be used to determine how tectonic influences contribute to the global carbon budget.
- It is known that tectonic plates can recycle carbon. The atmosphere is exposed to CO₂

that has been trapped in lava during volcanic eruptions on the ocean ridges.

- Subduction zones are where the gas is removed from surface by plankton and corals that die, and then sink to the bottom.
- Their shells are made from calcium carbonate and combine with sediments to create limestone, which carries the trapped carbon into mantle.
- Higher CO₂ levels in the MCO period are associated with faster seafloor spreading.
- Magnetic records from the MCO period show that the total amount of new crust produced was 3.5 km per year. This is due to the fast-spreading plates.
- The new crust production rate has fallen to just above 2.5 km per year since then.
- The team analysed fossils of Foraminifera to determine the level of CO₂. This single-celled organism builds complex shells from seawater minerals.
- The MCO was characterized by a variation in CO₂ levels between 500 and 1,000 PPM.
- Although this does not prove that CO₂ was responsible for the rapid spread of the disease, there is a strong connection between them.
- It is believed that underwater volcanoes release approximately the same amount of CO₂ as the seafloor at the mid-ocean Ridge.
- Australian researchers discovered that atmospheric CO₂ levels rose above 1,000 PPM during the Cretaceous Period (145-66 Million Years Ago), when dinosaurs ruled the land. This resulted in higher annual temperatures of up to 10degC.
- According to the study, the CO₂ levels were 300 PPM at the time Earth entered the Cenozoic Era 66 million years ago. The seafloor was also slowing down.

Conclusion-

- Seafloor spreading due to an upwelling magma has caused episodes of global warming in geologic history. The spread rate of this phenomenon has slowed in the last 19million years, but could pick up momentum.

Topic 30. NEELAKURINJI

Important for subject: Geography

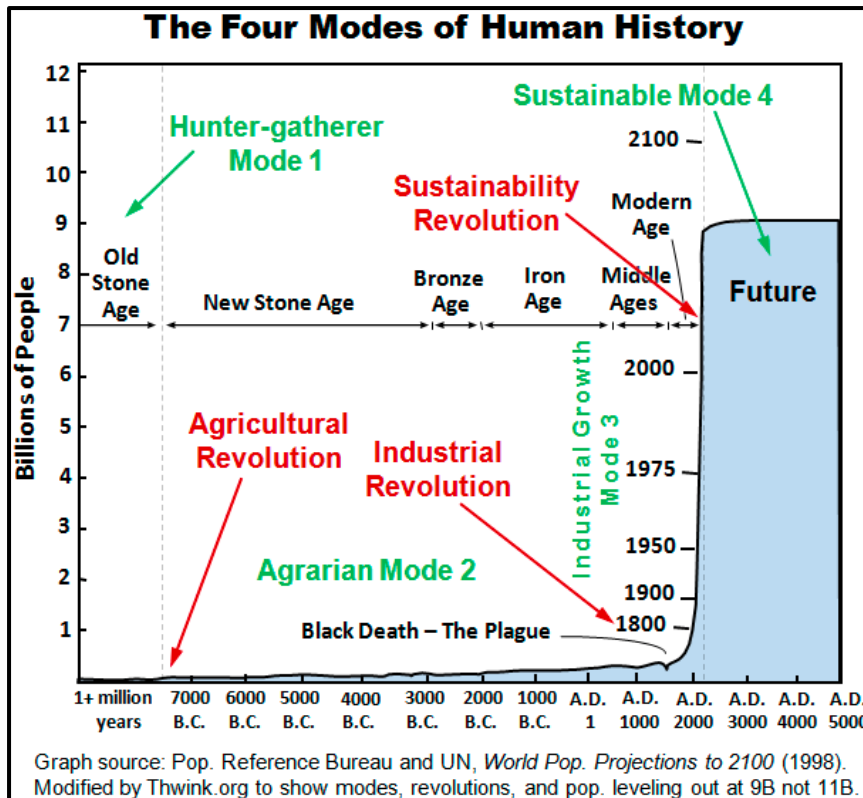


The mass blooming of the *Strobilanthes kunthiana*, known commonly as the neelakurinji, gave the Nilgiris (the blue mountains) its iconic name as the slopes were covered once in 12 years by the mass blooming of the shrub.

- Some tribals who settled Kodaikanal as the first settlers used the bloom to help them calculate their age. Each bloom added 12 years to their age.
- Due to changes in weather patterns, the blooming season has become more unpredictable over time.
- These flowers can be found at elevations between 1,300 and 2,400 metres. The peak flowering season is August through October
- Recent reports have reported that *Strobilanthes foliosa* blooms in Nilgiris.
- Invasive species are common and have begun to overtake the native *Strobilanthes* plant habitats.
- The habitat of *Strobilanthes* plants is being destroyed by *Cestrum aurantiacum* in the upper Nilgiris, but they are also under threat by *Lantana camara* in lower Nilgiris.

Topic 31. MALTHUSIAN TRAP

Important for subject: Geography



What exactly is Malthusian trap?

- It is believed that the Malthusian trap, also known as the Malthusian check is a reference to the idea that as increasing human population increases, there's an growing pressure on the earth's resources. This in turn serves as a control on the growth of population.
- It was named for English economics professor Thomas Malthus who elaborated on the idea in his 1798 publication "An Essay on the Principle of Population" that was widely incited Charles Darwin'.

Details:

- In his book Malthus asserted that, while an increase in the amount of food produced in a particular country could result in better living conditions for the population in general but the benefits are likely to be only temporary.
- This is due to the fact that, Malthus argued, increasing availability of food could make people more likely to have children since they can afford to feed them right now

which would result in an increase in the overall population, and a decrease in the per-capita income levels.

- In the words of Malthus the evidence showed an opposite relation between the living standards and human population as a rise in population leads to lower standards of living

Industrial revolution as well as Malthus theory:

- Pre modern Era Environmentalists of the present and social scientists believe that the growing human populations place unsustainable stress on the earth's resources.
- The per capita incomes of the countries was relatively low and steady for a long time until the dawn of the modern age.
- In the past in the past, when there was an increase in the production of food due to any reason, it caused per capita incomes to increase for a time so long as the population were steady.
- However populations of nation was growing rapidly, which meant that the per person income returned to its previous pattern.
- When food production declined, in the opposite direction there was famine, which resulted in the deaths of many people.
- The decrease in human population continued until per capita income of the country grew to levels that were subsistence.
- Whatever the case, resource limitations maintained a check on the human population.

Industrial era:

- The industrial revolution that took place between the late 18th, and early 19th centuries was viewed as an important moment that broke the relation between the population of humans and living standards.
- It saw the rise of human-made technology that ensured that humans could create greater output in the form of goods and services every ounce of earth's resources they tapped into.
- In other words, the productivity of humans was able to increase dramatically because of the growth of technology.

Critique of the Malthusian trap

- The industrial revolution has definitively disproved Malthus since the human population as well as living standard have grown with it since the date of the event.
- There could be no exact negative correlation between the growth of population and the standard of living for people.
- If humans are able to find ways to utilize the earth's resources more effectively the population of earth will increase without sacrificing their standards of living over the long run.
- Indeed, some believe that as the population of humans increases the likelihood of breakthrough inventions are increased exponentially because there are more minds of humans focused on solving the world's issues.

Topic 32. KEONJHAR

Important for subject: Geography



The district is home to a significant proportion of the iron ore reserves in the nation and is awash with money intended for welfare however, infants and women are struggling to obtain the basic necessities

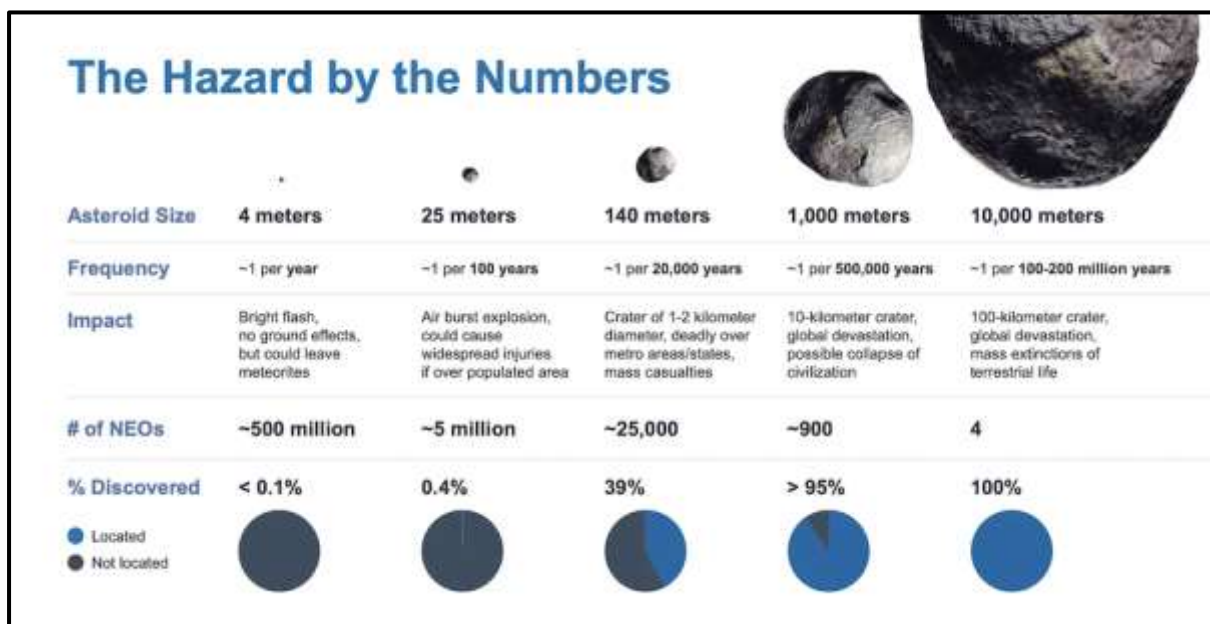
- Keonjhar is among the main mineral producing districts in Odisha.
- Iron ore Manganese ore Chromate, Quartzite, Bauxite, Gold, Pyrophyllite and Lime

Stone are the main minerals that are found in this District.

- Its Kalinga Iron Works (Barbil), Ferro Manganese Plant (Joda), Ipitata (Beleipada), Charge Crome (Brahmanipal) are the main names on the industry scene in Keonjhar.
- There are also metal and engineering -based industries (53 numbers) as well as chemical and related industries, including manufacturing of plastics (48 numbers) and agro - and marine-based industry (242 numbers) that operate in this District.

Topic 33. REJOINDER: ‘ONE CGIAR WON’T ALTER INTERNATIONAL GERmplasm COLLECTIONS’

International for subject: Agriculture



One CGIAR (Consortium of International Agricultural Research Centers), was created out of the recognition that the complex, interconnected global problems facing our food systems requires a coordinated and integrated response from the largest publicly funded agricultural research network.

- Governance policy and reform of One CGIAR
- These reforms will strengthen CGIAR's research centres, increasing their reach, impact, and capacity.
- They will also honor their constitutions and country hosting agreements and comply with their legal obligations in letter and spirit.
- CGIAR Centers hold germplasm collections in trust.
- They operate under the policy guidance provided by the International Plant Treaty

governing body.

- This is in accordance with the agreements 'Article 15' that each Center signed with the governing authority.
- All Centers are committed to meeting their Article 15 obligations.
- During the One CGIAR transition, both the Food and Agriculture Organization and Global Crop Diversity Trust were heavily involved.
- The FAO is an "active observer" seat on the CGIAR System Council. It has also been closely involved with the One CGIAR transition.
- CGIAR also worked closely with Global Crop Diversity Trust during the entire process, including the design and launch CGIAR Gene Bank Initiative.
- Major works under One CGIAR
- CGIAR's gene bank and breeding programs have distributed more than six million germplasm samples to date through more than 60 000 transfer agreements under the Plant Treaty system.
- This equates to more than 1,000 samples per day or 400,000 samples per year. It distributed germplasm samples in 110 countries, just in 2021.
- Its Genebanks Initiative and other newly established CGIAR Initiatives allow it to sustain and increase these efforts to preserve agrobiodiversity, and provide access to germplasm to thousands of users.
- Concern about the transition process
- The One CGIAR Transition Process will not affect in any way conservation, distribution, availability, and sustainable use international germplasm collections that are held in trust by CGIAR Centers.
- The transition process does not give private corporations more influence over CGIAR's work. Neither do the changes reduce the influence and role of host countries which will continue to play their roles on the Center Boards.
- Way Forward
- Our Centers and gene banks can expand their research and innovation and support national programs.
- They will also be able continue to distribute germplasm around the globe to aid in food security and agricultural development.

Topic 34. SWACHH VAYU SARVEKSHAN

Important for subject: Government Schemes

Swachh Vayu Sarvekshan- Ranking of Cities' released under National Clean Air Programme (NCAP).

- Under the direction of the Minister of Environment, Forest and climate Change The Ministry is planning to launch the Swachh Vayu Sarvekshan which promotes rankings of 131 cities across the country that are implementing City Action Plans prepared as part of the National Clean Air Programme (NCAP) to cut down on the amount of air pollution that is up to 40 percent by 2025-26.
- The goals that are the focus of Swachh Vayu Survekshan include:
- To raise awareness among all segments of society
- Inform the public about health risks to exposure. Comparing air quality in different cities/locations.
- To realize the vision to achieve the goal of NCAP "Clean Air for everyone"
- City categorisation:
- The 131 cities are classified in three groups according to the population.
- 47 cities fall into the first group with a population of greater than 10 lakh.
- 44 cities belong to the second category, with a the population of 3-10 lakh.
- The third group is comprised of cities with a population of below 3 lakh.
- What is the method of conducting the survey?
- City officials are expected to complete self-assessments according to the framework that is available by the PRANA on the web portal. The assessment is conducted every year.
- Cities must report on the implementation of measures and activities regarding solid waste management Road dust management, control of demolition and construction waste, and control of vehicle emissions and industrial pollutants.
- Survey features:
- The report stated that, based on self-assessment and the third-party assessment, the 3 top performing cities from each group will receive cash awards in the spirit of federalism that is competitive.
- It does not base its calculations in the measuring of air quality parameters that rank

the cities. It is based on actions that cities take to improve the quality of air in various domains.

- The measures taken by cities will result in improvement in the quality of the air.
- This provides an implementation tool for planning to improve the quality of air and the evaluation of cities on how they've aligned their activities in order to improve quality of the air.

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