Abode for Affordable Success

2ND WEEK MARCH 2023
CURRENT AFFAIRS

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General Studies I: World geography

MOON TIME ZONE

1. Context

The moon may get its own time Zone. The European Space Agency said that a universal timekeeping system for the moon is needed, but that many details remain to be worked out.

2. Why do we need a time zone for the moon?

The main objective of establishing a universal timekeeping system for the moon, the ESA said, is to streamline contact among the various countries and entities, public and private, that are coordinating trips to and around the moon.

3. Countries Planning Lunar Missions

- The discussion about how to do that is happening as things are starting to get busy on and above the lunar surface.
- The M1 lunar lander built by the Japanese company Ispace is set to arrive on the moon in April, when it will try to deploy a rover built by the United Arab Emirates, a robot built by Japan's space agency, JAXA; and other payloads.

- A six-legged cylindrical robot called the Nova-C lander was built by the Houston-based company Intuitive Machines and is expected to launch on SpaceX's Falcon 9 and land on the south pole of the moon in June.
- Additional uncrewed missions will land by the end of the year, according to Jack Burns, director of the Network for Exploration and Space Science at the University of Colorado, Boulder.
- Those missions, among other possible lunar landings, are happening as NASA prepares to send four astronauts into orbit around the moon next year.
- That mission will pave the way for the first crewed moon landing since Apollo 17 in December 1972, currently planned for 2025.
- The European Space Agency, meanwhile, is contributing to NASA's effort to build the Gateway lunar station, which will serve as a way station for future crews on their way to the lunar surface.
- Last year, China completed the construction of its own space station and previously hinted that Chinese astronauts would be on the moon by 2030.
- South Korea launched its own lunar spacecraft, Danuri, on a Space X Falcon rocket from Florida in August. It joined India's Chandrayaan-2 mission, as well as spacecraft from NASA and China, in its orbit of the moon.

4. Methods for establishing the Moon Time Zone

- A Universal timekeeping system for the moon is needed, but many details remain to be worked out.
- One of the questions that have yet to be settled was whether lunar time should be set on the moon or synchronized with Earth.
- Time on Earth is precisely tracked by atomic clocks, but synchronizing time on the moon is tricky because clocks run faster there, gaining around 56 microseconds, or millionths of a second, per day.
- Once a new lunar time zone is established, the methods used to create it will be useful for future space explorations.
- Astronauts could go to Mars in the next two or three decades and will face similar logistical hurdles that a Martian time zone could address.

5. Some important missions to Moon

Chandrayaan 1

Chandrayaan-1 was India's first lunar probe. It was launched by the Indian Space Research Organisation in October 2008 and operated until August 2009. The mission included a lunar orbiter and an impactor. It was launched from Satish Dhawan Space Centre, Sriharikota, by the PSLV C-11 on 22 October 2008. The spacecraft was orbiting around the Moon at a height of 100 km from the lunar surface for chemical, mineralogical, and photo-geologic mapping of the Moon. The spacecraft carries 11 scientific instruments built in India, the USA, the UK, Germany, Sweden, and Bulgaria.

Soyuz spacecraft

- The Soyuz (SAW-yooz) is a Russian spacecraft. Astronauts and cosmonauts travel to the International Space Station on the Soyuz.
- The Soyuz transports crews to the International Space Station and returns them to Earth after their missions.
- The Soyuz is like a lifeboat for the space station. At least one Soyuz is always docked at the space station. If there is an emergency, the station crew can use the Soyuz to return to Earth.
- The Soyuz is the only means of reaching the ISS since the U.S. retired the space shuttle in 2011.

Chang'e 4

- Chang'e 4 is the fourth mission in the country's lunar mission series which is being named after the Chinese moon goddess.
- The tasks of the Chang'e-4 probe include low-frequency radio astronomical observation, surveying the terrain and landforms, detecting the mineral composition, and measuring the neutron radiation and neutral atoms to study the environment on the far side of the moon.

Yutu-2

- It follows the BeiDou Navigation Satellite System China's homegrown Global Positioning System that started worldwide service last month.
- The rover has been programmed to launch ground penetration radar that would help map the moon's inner structures.
- It would also analyze soil and rock samples for minerals, apart from activating a radio telescope to search for possible signals from deep space.

LIGHTNING

1. Context

Soaring global temperatures could lead to more "hot lightning" strikes in many parts of the world, a new study has found. It added that this type of lightning is more likely to ignite wildfires than typical lightning.

2. What is lightning and how does it occur?

- Lightning is an electrical discharge that occurs when there is an imbalance between the storm clouds and the earth or even within the clouds.
- Scientists believe that for lightning to occur, positive and negative charges must separate within a cloud.
- This happens, according to the National Oceanic and Atmospheric Administration (NOAA), when the water droplets in the bottom part of the cloud are moved upwards, where the much colder atmosphere freezes them into small ice crystals.

- As these small ice crystals continue to go up, they gain more mass and eventually become so heavy that they start to fall down to earth.
- This causes a system in which ice crystals going down collides with the water vapors coming up, leading to the accumulation of positive charges on the top of the cloud and negative changes gathering at the base, while the atmosphere between them in the cloud acts as an insulator.
- When the positive and negative charges grow large enough, their strength overpowers the insulating properties of the properties.
- As a result, the two kinds of changes meet with each other and produce lightning.
- Although most of the lightning takes place within the clouds, sometimes it is directed towards Earth also. With the base of the cloud becoming negatively charged, positive charges start accumulating on tall objects, like trees, poles, and buildings.

3. Why is it a matter of concern?

- Data from the National Crime Records Bureau show that since 2005, lightning has been responsible for at least 2,000 fatalities annually.
- Rural areas account for more than 90% of lightning-related fatalities,
- It is not considered a natural calamity, thus unlike in the case of floods or earthquakes, the afflicted people are not entitled to government compensation.

4. Where are the lightning hotspots around the world?

- It has been discovered by scientists at the Smithsonian Tropical Research Institute (STRI) in Panama that lightning strikes the tropics more than 100 million times a year.
- Asia, South America, North America, Australia, and Africa are the other continents having the highest concentration of lightning hotspots.
- According to experts, lightning strikes are expected to rise by 25-50% as a result of climate change.

5. Findings of the latest study

- The researchers analyzed 5,858 selected lightning-ignited fires based on satellite images of US wildfires between 1992 and 2018 and found that approximately 90 percent of them might have been started by "hot lightning" strikes.
- Also known as long continuing current (LOC), this type of lightning strike can last from around 40 milliseconds to nearly a third of a second.

6. Why Hot lighting has more potential of triggering a wildfire than typical lightning?

- Lightning with continuing currents can transport more energy from cloud to ground than typical lightning. When lightning with continuing currents attaches to ground or vegetation, they produce more Joule heating and higher temperature than typical lightning, increasing the probability of ignition.
- With the help of computer simulations, the researchers also looked at the frequency of "hot lightning" strikes and observed that as the atmosphere warms, there might be an increase of 41 percent in the incidents of LCC strikes by 2090.

- This means that the rate of such lightning flashes could jump from three strikes per second globally to four strikes per second. Meanwhile, the frequency of all cloud-to-ground strikes might increase to nearly eight flashes per second, a 28 percent jump.
- According to the study, the areas that might witness a significant increase in wildfires triggered by the LCC strikes are Southeast Asia, South America, Africa, Australia, North, America, and Europe.
- The researchers predicted this after accounting for changes in precipitation, humidity, and temperature.
- However, many northern polar regions might see a decrease in wildfires as rainfall is projected to increase while "hot lightning " rates remain constant.

7. Government initiatives to tackle this problem

- Lightning Alert System provides a location-specific forecast of thunder, lightning, strong winds, high winds, and hailstorms occurrences for up to 48 hours.
- The Common Alert Protocol (CAP) system has been released by the National Disaster Management Authority (NDMA) to alert citizens to imminent thunderstorms and lightning.
- From the INSAT-3DR satellite, which uploads data every 15 minutes, ISRO provides information about convective clouds.
- A GPS notification from the Damini App, which was created by the Indian Institute of Tropical Meteorology and Earth System Science organization, alerts users when lightning is nearby and is between 20 to 40 kilometers away.

8. National Oceanic and Atmospheric Administration (NOAA)

The National Oceanic and Atmospheric Administration is an American Scientific and regulatory agency within the United States Department of Commerce that forecasts weather monitors oceanic and atmospheric conditions, chart the seas, conducts deep sea exploration, and manages fishing and protection of marine mammals and endangered species.
NOAA provides services to its customers and information pertaining to the state of the oceans and the atmosphere, such as weather warnings and forecasts via the National Weather Service.

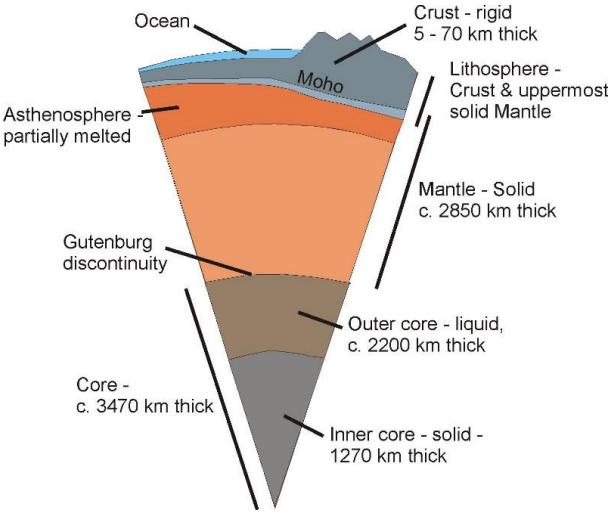
NOAA’s five fundamental activities are

- Monitoring and observing Earth systems with instruments and data collection networks.
- Understanding and describing Earth systems through research and analysis of data.
- Assessing and predicting the changes in these systems over time.
- Engaging, advising, and informing the public and partner organizations with relevant information.

BOWELS OF EARTH

1. Context

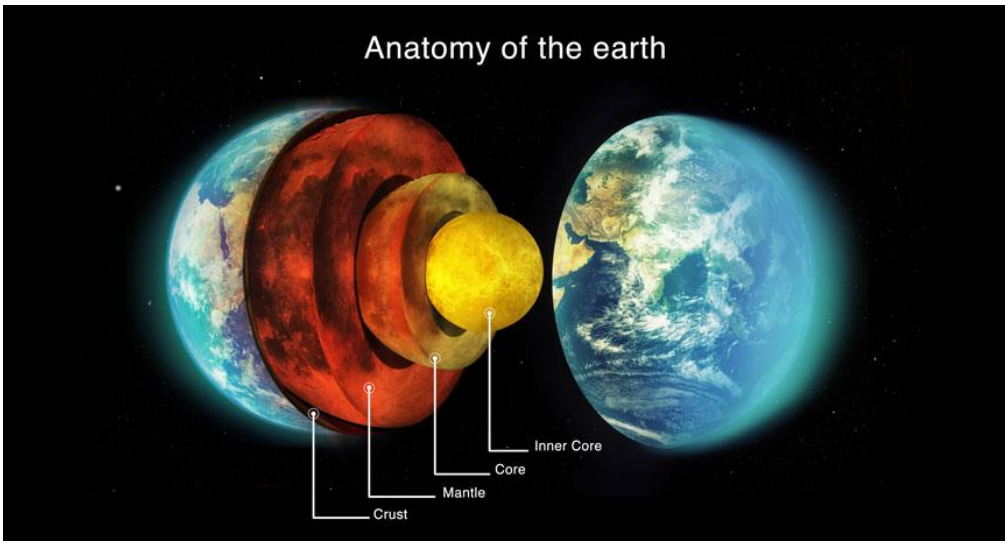
Scientists have excavated a new secret from the Earth's inner world. The researchers, in a new study, have confirmed the existence of a fifth new layer.



2.Layers of the earth

Starting at the center, Earth is composed of four distinct layers. They are, from deepest to shallowest, the inner core, the outer core, the mantle and the crust. Except for the crust, no one has ever explored these layers in person

The core is the centre of the earth and is made up of two parts: the liquid outer core and solid inner core. The outer core is made of nickel, iron and molten rock. Temperatures here can reach up to 50,000 C



2.1.Inner Core

This solid metal ball has a radius of 1,220 kilometers (758 miles), or about three-quarters that of the moon

It's located some 6,400 to 5,180 kilometers (4,000 to 3,220 miles) beneath Earth's surface

Extremely dense, it's made mostly of iron and nickel. The inner core spins a bit faster than the rest of the planet

2.2.Outer Core

This part of the core is also made from iron and nickel, just in liquid form. It sits some 5,180 to 2,880 kilometers (3,220 to 1,790 miles) below the surface.

Heated largely by the radioactive decay of the elements uranium and thorium, this liquid churns in huge, turbulent currents. That motion generates electrical currents

2.3.The Crust

This is the outside layer of the earth and is made of solid rock, mostly basalt and granite. There are two types of crust; oceanic and continental. Oceanic crust is denser and thinner and mainly composed of basalt. Continental crust is less dense, thicker, and mainly composed of granite

2.4.Mantle

The mantle lies below the crust and is up to 2900 km thick. It consists of hot, dense, iron and magnesium-rich solid rock. The crust and the upper part of the mantle make up the lithosphere, which is broken into plates, both large and small

3.Fifth Layer of the earth

The four known layers of the Earth include the crust, mantle, outer liquid and inner solid core. The fifth layer the innermost inner core lies at the Earth's centre, within the inner core

The fifth layer is made of iron and nickel, the same materials that comprise the rest of the inner core.

The difference between the two parts of the inner core could stem from how iron atoms are arranged to form a solid

The inner core as a whole was liquid in the early years of the Earth's existence, turning into a solid as the Earth cooled

Scientists rely on seismic waves — shockwaves generated during an earthquake — to 'see' the Earth's interiors

These waves behave differently as they pass through diverse materials. For example, they travel slower when they pass through hot materials.

This stems from the fact that waves from large earthquakes following a few set paths have been studied repeatedly, leaving the rest of the inner core unexplored.

MACQUARIE ISLAND

1.Background

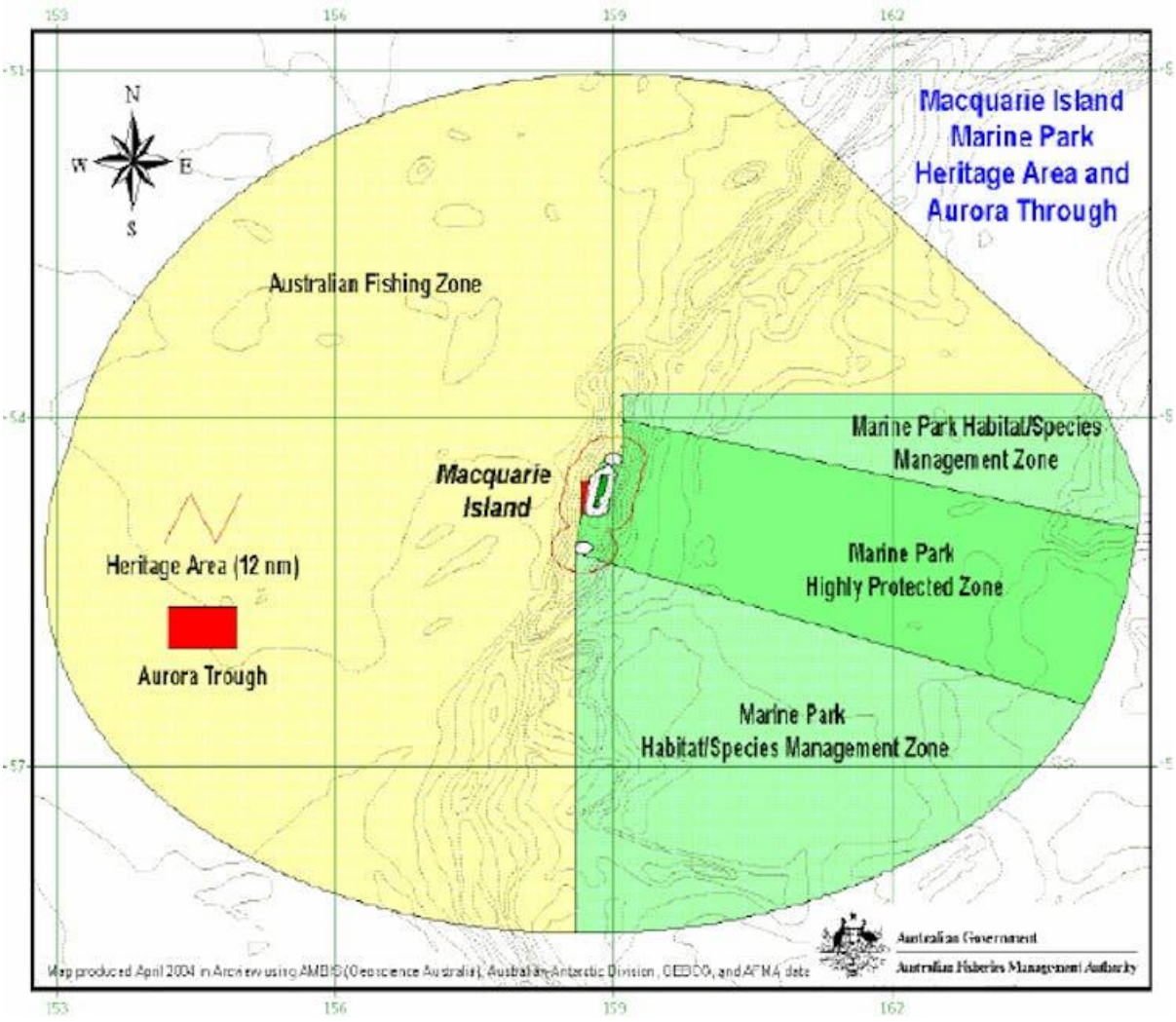
Macquarie Island, around 1,500km southeast of Tasmania, is more than just a remote rocky outcrop. In fact, it's the only piece of land on the planet formed completely from ocean floor, which rises above the waves to form peaks that teem with penguins and other bird species, some of them found nowhere else on Earth

These are just some of the reasons this unique island and the seas surrounding it have globally significant conservation values.

2.Protecting the Island

- Macquarie Island and its surrounding seas (to a distance of 5.5km) are already protected as a Tasmanian reserve and the area (this time including seas to a distance of 22km) is also a World Heritage Area
- A Commonwealth marine park also covers most of the southeast quadrant of the island's "**economic exclusion zone**", including a sanctuary zone and two seafloor management zones
- The federal government's proposed expansion of the marine park would cover the island's entire economic exclusion zone, increasing the area of Australia's marine

sanctuaries by more than 388,000 square kilometres, an increase larger than the area of Germany



3. Uniqueness of Macquarie Island

- Macquarie Island is the exposed crest of the 1,600km-long undersea Macquarie Ridge, which makes Macquarie Island the only piece of land in the world formed entirely of oceanic crust
- Macquarie Ridge is one of only three such ridges that impede the eastward flow of a current called the Antarctic Circumpolar Circulation, resulting in distinct differences between the west and east sides of the ridge, which are used in different ways by different species
- The oceanography is further divided north to south by two major ocean fronts, the Sub-Antarctic Front and the Polar Front, creating three distinct bodies of water

- They are closer here than anywhere else in the Southern Ocean and as they interact with the Macquarie Ridge create at least six different large-scale oceanographic habitats
- This creates an outstanding spectacle of wild, natural beauty and a diverse set of habitats supporting vast congregations of wildlife, including penguins and seals
- Fifty-seven seabird species, including four species of penguins and four species of albatross, have been recorded on Macquarie Island and 25 of these species have been observed breeding there. The royal penguin and the Macquarie Island imperial shag live nowhere else on Earth
- The ridge includes a series of undersea mountains that act as “stepping stones” linking subantarctic and polar animals on the sea floor, such as brittlestars
- Direct human impacts in the area are predominantly due to fishing and marine debris, although climate change is an ever-present threat too
- The fishery targets the deepwater Patagonian toothfish using bottom longlines, mostly in the central zone of the Macquarie Ridge
- This fishery is generally well regarded for its best-practice fishing methods and commitment to positive environmental outcomes and this fishing activity would continue under the new plans
- But if new fisheries were allowed to develop targeting midwater species, or new industries such as seabed mining were permitted, these could directly impact the seabirds, marine mammals and other species that live in these areas
- Restrictions on potential future fisheries would be determined by the distribution of “sanctuary zones” precluding fishing and “habitat/species zones”, which could accommodate sustainable fishing. Mining would be precluded under either category of protection

4.Way forward

The government's proposal signals a clear priority for protection over development in this area. A period of public consultation on the proposal will commence in March
Any future development of the marine park would need to be orderly and careful, including prior consideration of environmental impacts
Any changes to the current fishery management arrangements should ensure that the changes maintain or enhance conditions for a long-term sustainable fishery

General Studies I: Modern Indian History

1857 REVOLT

1. Context

The Delhi city once known for its resplendent culture of mushairas and poets would be reduced to one strewn with bodies of the dead. From a royal capital, its status was relegated to that of a provincial town. The city recovered itself only after 1911 and more so after Independence.

2. The 1857 Revolt

- It was the first expression of organized resistance against the British East India Company
- It began as a revolt of the sepoys of the British East India Company's army but eventually secured the participation of the masses.
- The revolt is known by several names: the Sepoy Mutiny (by British Historians), the Indian Mutiny, the Great Rebellion (by Indian Historians), the Revolt of 1857, the Indian Insurrection, and the First War of Independence (by Vinayak Damodar Savarkar).

3. Causes of the revolt

3.1 Political causes

- British policy of expansion: The political causes of the revolt were the British policy of expansion through the Doctrine of Lapse and direct annexation.
- A large number of Indian rulers and chiefs were dislodged, thus arousing fear in the minds of other ruling families who apprehended a similar fate.
- Rani Lakshmi Bai’s adopted son was not permitted to sit on the throne of Jhansi.
- Satara, Nagpur, and Jhansi were annexed under the Doctrine of Lapse.
- Jaitpur, Sambalpur, and Udaipur were also annexed.
- The annexation of Awadh by Lord Dalhousie on the pretext of maladministration left thousands of nobles, officials, retainers, and soldiers jobless. This measure converted Awadh, a loyal state, into a hotbed of discontent and intrigue.

3.2 Economic causes

- The East India Company's colonial practices shattered Indian society's conventional economic foundation.
- Due to severe taxes, peasants were forced to take out loans from moneylenders/traders at exorbitant interest rates, with the latter frequently evicting the former from their property for non-payment of debt dues.
- While the issue of landless peasants and rural indebtedness has plagued Indian society to this day, these moneylenders and businessmen emerged as the new landlords.
- The zamindari system had been in place for a long time and had to be dismantled.
- The artists and handicrafts people suffered during the British administration as well.

3.3Administrative Causes

- Corruption was rampant in the Company's administration, particularly among the police, minor officials, and subordinate courts, which was a major source of dissatisfaction.
- Many historians believe that the current corruption levels in India result from the Company's control.
- Furthermore, the nature of British rule gave it a distant and alien appearance in the view of Indians: a form of absentee sovereignty.

3.4 Socio-religious causes

- The British administration's attitude toward the native Indian population had racial overtones and a superiority mentality.
- Indians viewed the activity of Christain missionaries in India who flew the British flag with distrust.
- A considerable segment of the populace saw initiatives at socio-religious change, such as the elimination of sati, support for window marriage, and women's education, as outsiders interfering in the social and religious spheres of Indian culture.
- These fears were exacerbated by the government's decision to tax mosque and temple lands and the passage of laws like the Religious Disabilities Act of 1856, which altered Hindu customs by declaring, for example, that a change of religion did not prevent a son from inheriting his 'heathen father's property.

4. Siege of Delhi

- The hard-fought recapture of Delhi by the British army was a decisive moment in the suppression of the 1857-58 Indian Mutiny against British rule. It extinguished Indian dreams of recreating the rule of the Mughal Empire. The rebellion lost its cohesion, allowing the British to defeat any remaining isolated pockets of resistance.
- After the capture of Delhi by rebels in May, the British were unable to launch a counterattack because their army was dispersed over vast distances. It took quite some time for the British to assemble an army, but in June, two columns were combined with a force of Ghurkas.
- The makeshift force managed to occupy a ridge overlooking the city but was not large enough to launch an assault, marking the beginning of the siege on June 8.
- Inside the city were more than 30,000 mutineers loyal to Bahadur Shah, who was holding court as the Mughal emperor.
- A large number of mutineers meant that the British force felt as though they were the ones under siege, and as the weeks wore on, the British began to suffer from outbreaks of cholera and dysentery.
- However, reinforcements slowly arrived from Punjab, including a siege train of thirty-two guns and 2,000 more men under the command of Brigadier General John Nicholson.
- By early September, the British had assembled a force of some 9,000, which consisted of 3,000 regular troops and 6,000 Sikhs, Punjabis, and Ghurkas.
- The siege guns began firing on September 8, and by September 14, had made sufficiently large breaches in the walls to launch an attack.
- The assault was met with stiff resistance but by September 21, after a week of savage street-to-street fighting, Delhi was back under British control. Bahadur Shah was arrested and died in exile in Rangoon in 1862. He was the last of the Mughal Emperors.

5. An altered Landscape and culture in the city

- As the residents were being driven out or killed, the physical form of the city too was altered by the British. The original plan was to demolish the entire city including the Red Fort and Jama Masjid. But later the governor-general decided on pulling down only the built-up defenses and edifices close to the fort.
- Historical buildings and places of worship were decided to be kept intact. The British accommodated their troops inside the fort, while all houses and other buildings in the vicinity around a radius of 440 yards were completely leveled to the ground.
- During the excavations of the Parade Ground in 1921-23, beautiful houses built of marble and other stones were discovered beneath the ground.
- The Jama Masjid, Fatehpuri Masjid, and Kalan Masjid were also occupied by British troops for a while before being restored to Muslims in the 1860s and 70s. The

Fatehpuri Masjid was sold to Lala Chunna Mal, a wealthy textile merchant who won the favor of the British after the revolt.

- No longer was Delhi a royal capital. Its status had been reduced to that of a provincial town, part of the Punjab province. Between 1857 and 1861, Delhi was managed by the British army. When returned to the civilians, the administrative vacuum left by the army was filled by the setting up of a municipality, a Jama Masjid Committee, and a Delhi Society.
- Historian Narayani Gupta in her book, Delhi between two empires, 1803-1901: Society, government and urban growth (1981) writes that the British officials used the municipality to encourage their loyalists.
- The British rewarded their loyalists with wealth, land, titles, and positions of honor. "As soon as any of them died (in some cases even in their lifetime) their heirs were granted marks of recognition. Hence the phenomenon of teenagers becoming members of the municipality and being noticed in the gazetteer lists," writes Gupta. The majority of these beneficiaries were Jain and Hindu bankers and mercantile families.

6. The post-Revolt situation in Delhi

- The post-revolt decades of the 1860s and 70s were also the time when much of the public works in Delhi were established by the British.
- The first public works stemmed as much from considerations of military exigency as commercial and civil administrative needs writes Gupta.
- The railway line, for instance, was built through the city rather than outside because it made for greater security in the case of another uprising.
- New roads were built through the most densely populated parts of the city, much to the distress of the local inhabitants.
- In 1865, a general hospital was established in Chandni Chowk to replace the dispensary that existed there before 1857, and in 1867 the Sadar Bazar was inaugurated to formalize the shops that had sprung up to cater to the needs of the army.

7. Objectives of British

- The primary objective of the British in the period after 1857 was to wipe out the memory of the Mughals from Delhi.
- Thereafter begins a conscious commemoration of British sites of valor.
- Perhaps the most striking example of this was the four-tiered gothic-style monument, the Mutiny Memorial built by the British government on the Ridge where it continues to stand today.
- It listed out with statistics those who were killed in the revolt. It was only 25 years after the Independence of India that the government renamed this monument as Ajitgarh (place of the unvanquished) and erected a plaque, stating that the 'enemy' mentioned on the memorial were "immoral martyrs of Indian freedom."

General Studies I: Indian Heritage & Culture

CALCUTTA TRAMS

1.Context

Kolkata's **iconic tram service celebrated 150 years** since the first tram was flagged off. The celebration saw tram enthusiasts from as far away as Germany and Australia come to the city for a historic "Tramjatra", organised by the West Bengal Transport Department

2.Background

The first trams, drawn by horses, took to Calcutta streets on February 24, 1873. Today, Kolkata remains the only city where trams are still plying. However, once upon a time, in the heyday of trams, they were a popular mode of urban transport that could be found across India, in big metropolises such as Delhi, Bombay, and Madras, as well as smaller towns such as Nasik, Patna and Bhavnagar

3.Horse-drawn Trams

- The second half of the 19th century saw rapid urban development in India, especially in the three Presidency cities of Calcutta, Bombay and Madras
- It is in this environment that the idea of tramcars emerged
- While a licence for horse drawn trams was granted in Bombay in 1865, due to multiple reasons, the project fell through
- Instead, the first trams entered service in the then British capital of Calcutta in 1873
- The horse-drawn trams plied on a 3.8 km route between Sealdah and Armenian Ghat Street
- However, by the end of the year, the service was discontinued as the venture was not economically viable
- In 1874, the first horse-drawn trams emerged in Mumbai, plying on two routes – Colaba to Pydhonie via Crawford Market, and Bori Bunder to Pydhonie
- Nasik would be the third city in India which saw trams -a four-horse-driven tram (with two cabins) that would travel a distance of around 8 km, from the present day Old

Municipal Corporation building located on the Main Road to the Nashik Road railway station.

- Horse-drawn trams also debuted in Patna in 1886, with tracks stretching between Patna City (Old Patna) and Bankipore, 3 km away
- These initial tram systems were little more than horse taxis being driven on fixed lines
- They were slow and required an immense number of horses to be viable, making them difficult to succeed economically

4.Locomotives

- In 1880, trams re-emerged in Calcutta, when Lord Ripon inaugurated a new, longer, metre-gauge route between Sealdah and Armenian Ghat Street via Bowbazar Street, Dalhousie Square and Strand Road
- Two years later, The Calcutta Tramway Company would experiment with steam locomotives (instead of horses) to pull trams
- However, locomotives were never universally adopted for tram systems
- This was primarily because older locomotives were notoriously unreliable and often very polluting, drawing opposition from citizens
- Thus, by the end of the 19th century, The Calcutta Tramway Company would boast of seven locomotives and over 1000 horses, with both being used to pull trams
- The Cochin State Forest Tramway began operations in 1907, transporting teak and rosewood from the forests of Palakkad to the town of Chalakudy in Thrissur District
- At the time, this was the longest tram route in India, stretching nearly 80 km and the only one not geared towards urban transport
- In 1926, under the reign of Colonel Maharaja Raol Sir Shri Krishna Kumarsinhji Bhavsinhji, locomotive-driven tramways would be introduced in the Princely State of Bhavnagar

5.Electric Trams

- In 1895, Madras (present-day Chennai) saw India's first electric tramways enter service with seven cars
- This was a revolutionary new mode of transport, connecting the city's docks to its inland areas
- Unlike steam locomotives, these were far cleaner and less noisy, and thus immediately became a preferred option
- By 1902, Calcutta saw its first electric tramcars, plying between Esplanade and Kidderpore, and Esplanade and Kalighat
- Bombay would see electrification too, in 1907, under the newly formed Bombay Electric Supply and Tramway Company (BEST).
- Cawnpore (present-day Kanpur) saw a 6.4-km track between the railway station and Sirsiya Ghat, which became operational in 1907
- Delhi saw its first trams a year later, in the area now called Old Delhi
- In their heyday, trams could be seen in Jama Masjid, Chandni Chowk, Chawri Bazaar, Katra Badiyan, Lal Kuan, and Fatehpuri as well as Sabzi Mandi, Sadar Bazar, Paharganj, Ajmeri Gate, Bara Hindu Rao and Tis Hazari

6.Decline of Trams culture

- By the 1960s, tramways, which were once seen as a revolutionary development in urban transport, had all but vanished in India
- Today, Kolkata remains the last city which still operates trams, though these old colonial relics are perpetually at risk of being discontinued.
- Trams saw their demise due to a variety of reasons, from the emergence of better alternatives to issues with economic viability.
- Patna would be the first city to discontinue tram service in 1903, on account of low ridership.
- Nasik shut down its tramways in 1933, in the aftermath of successive years of famine and plague
- Cawnpore shut its trams down in the same year after running into insurmountable losses. Madras's tram company would go bankrupt in 1950, operating its last tram in 1953
- In Bombay, as the suburban railways extensively connected the city to its suburbs and buses took to the streets, trams quickly became obsolete
- In fact, as early as 1926, BEST actually launched its own bus service. Trams would chug on in the city till 1964
- Delhi would see trams being discontinued on account of urban congestion in 1963

7.Way forward

However, recently, trams have made their way back into public consciousness, if not in India, abroad

Melbourne operates the largest tram network in the world and plans to continue upgrading its system

One of the reasons behind this is that trams are seen as among the most sustainable modes of urban transport available

General Studies II: International Relations

INDIA-AUSTRALIA RELATIONSHIP

1.Context

After a visit to the cricket stadium in Ahmedabad **with Prime Minister Narendra Modi on Thursday**, Australian Prime Minister Anthony Albanese tweeted about the fierce but friendly sporting rivalry between the two nations.

2.Historical Background

The India-Australia bilateral relationship has been underpinned by the shared values of pluralistic, Westminster-style democracies, Commonwealth traditions, expanding economic engagement, and increasing high-level interaction

Several common traits, including strong, vibrant, secular, and multicultural democracies, a free press, an independent judicial system, and English language, serve as the foundation for closer co-operation and multifaceted interaction between the two countries
The end of the Cold War and beginning of India's economic reforms in 1991 provided the impetus for the development of closer ties between the two nations.
The **ever-increasing numbers of Indian students** travelling to Australia for higher education, and the growing tourism and sporting links, have played a significant role in strengthening bilateral relations
With the passage of time, ties evolved in the direction of a strategic relationship, alongside the existing economic engagement
In recent years, the relationship has charted a new trajectory of transformational growth
With greater convergence of views on issues such as international terrorism, and a shared commitment to a rules-based order in the Indo-Pacific region, the two democracies have taken their cooperation to plurilateral formats, including the Quad (with the United States and Japan).

3. Strategic ties

In September 2014, **Australia's Prime Minister Tony Abbott visited India**, and in November that year, Modi became the first Indian Prime Minister to make an official visit to Australia after Rajiv Gandhi in 1986
He also became the first Indian PM to address a joint sitting of the Parliament of Australia
At the India-Australia Leaders' Virtual Summit in June 2020, Modi and Prime Minister Scott Morrison elevated the bilateral relationship from the Strategic Partnership concluded in 2009 to a Comprehensive Strategic Partnership (CSP)
At the 2nd India-Australia Virtual Summit in March 2022, several key announcements were made, including on a Letter of Intent on Migration and Mobility Partnership Arrangement to foster the exchange of skills, and a Letter of Arrangement for Educational Qualifications Recognition to facilitate the mobility of students and professionals
There has been a series of high-level engagements and exchange of ministerial visits in 2022 and in 2023

4. Cooperation between two Countries

4.1. Cooperation

The Economic Cooperation Trade Agreement (ECTA): the first free trade agreement signed by India with a developed country in a decade entered into force in December 2022, and has resulted in an immediate reduction of duty to zero on 96% of Indian exports to Australia in value (that is 98% of the tariff lines) and zero duty on 85% of Australia's exports (in value) to India
Bilateral trade was US$ 27.5 billion in 2021; with ECTA, there is potential for it to reach around US$ 50 billion in five years

4.2.People to People ties

India is one of the top sources of skilled immigrants to Australia
As per the 2021 Census, around 9.76 lakh people in Australia reported their ancestry as Indian origin, making them the second largest group of overseas-born residents in Australia
To celebrate India@75, the Australian government illuminated more than 40 buildings across the country, and Prime Minister Albanese issued a personal video message

4.3. Education

The Mechanism for Mutual Recognition of Educational Qualifications (MREQ) was signed on March 2 this year
This will facilitate mobility of students between India and Australia
Deakin University and University of Wollongong are planning to open campuses in India
More than 1 lakh Indian students are pursuing higher education degrees in Australian universities, making Indian students the second largest cohort of foreign students in Australia

4.4. Defence Cooperation

The 2+2 Ministerial Dialogue was held in September 2021, and the Deputy Prime Minister and Defence Minister of Australia visited in June 2022.
The Mutual Logistics Support Agreement (MLSA) was concluded during the Virtual Summit in June 2020, and the two militaries held several joint exercises in 2022
Australia will host military operations with India, Japan, and the US in the "Malabar" exercises off the coast of Perth in August, and has invited India to join the Talisman Sabre exercises later this year

4.5. Clean Energy

The countries signed a Letter of Intent on New and Renewable Energy in February 2022 which provides for cooperation towards bringing down the cost of renewable energy technologies, especially ultra low-cost solar and clean hydrogen
During the Virtual Summit in March 2022, India announced matching funds of AUD 10 million for Pacific Island Countries under Infrastructure for Resilient Island States (IRIS) and of AUD 10 million for Pacific Island Countries under International Solar Alliance (ISA)

5.China Factor

Ties between Australia and China were strained after Canberra in 2018 banned Chinese telecom firm Huawei from the 5G network
Later, it called for an inquiry into the origins of Covid-19, and slammed China's human rights record in Xinjiang and Hong Kong
China responded by imposing trade barriers on Australian exports, and by cutting off all ministerial contact
India has been facing an aggressive Chinese military along the border. New Delhi and Canberra have been assessing the Chinese challenge since 2013

6.What is Economic Cooperation Trade Agreement

- It is the first **Free Trade Agreement (FTA)** that India has signed with a major developed country in over a decade.
- The **Agreement encompasses cooperation across the entire gamut of bilateral economic and commercial relations** between the two friendly countries, and covers areas like:
    - Trade in Goods, Rules of Origin
    - Trade in Services
    - Technical Barriers to Trade (TBT)
    - Sanitary and Phytosanitary (SPS) measures
    - Dispute Settlement, Movement of Natural Persons
    - Telecom, Customs Procedures
    - Pharmaceutical products, and Cooperation in other Areas

- The India-Australia Economic and Cooperation Trade Agreement (Ind-Aus ECTA), which is expected to double trade between the two countries to $50 billion, came into effect.
- The Ind-Aus ECTA provides an institutional mechanism to encourage and improve trade between the two countries
- It covers almost all the tariff lines dealt by India and Australia
- India will benefit from preferential market access provided by Australia on 100% of its tariff lines, including all the labor-intensive sectors of export interest to India, such as Gems and Jewellery, Textiles, leather, footwear, furniture among other
- On the other hand, India will be offering preferential access to Australia on over 70% of its tariff lines, including lines of export interest to Australia, which are primarily raw materials and intermediaries such as coal, mineral ores and wines
- Products like agricultural products and the dairy sector - which were very sensitive for India and without which Australia has never done an agreement before - have been protected
- It is estimated that an additional 10 lakh jobs would be created in India under ECTA

IRANS LITHIUM DEPOSITS

1. Context

Iranian officials claimed to have found a deposit containing 8.5 million metric tons of lithium ore in the country's Hamedan Province. Lithium is a crucial raw material for the production of batteries, used in all kinds of electronic devices, from mobile phones to EVs.

2. Iran's first Lithium Findings

- A senior official in the Iranian Ministry of Industry, Mine, and Trade (MIMT) said that a deposit located in the western province of Hamedan contains some 8.5 million metric tons of lithium ore.
- This is Iran’s first lithium find. If true, this discovery would be a major boost for Iran, whose economy has suffered under US sanctions and embargoes for decades.
- Given lithium’s salience in making batteries, any transition away from fossil fuels is expected to heavily rely on lithium.
- However, this discovery will not immediately be beneficial to Iran It will take about four years to prepare the lithium mines discovered in Qahavand Plain, Hamadan, for operation, with the deposits stretching across a five-six square kilometer area.

3. Largest identified lithium resources

- According to the US Geological Survey, the world's largest identified lithium resources (not counting Iran) are as follows Bolivia, 21 million tons; Argentina, 20 million tons; Chile, 11 million tons; Australia, 7.9 million tons; China, 6.8 million tons.
- India recently established inferred lithium resources of 5.9 million tons in the Reasi district of Jammu and Kashmir.

4. Importance of Lithium in Today's World

- Lithium is ubiquitous in modern life, found in all kinds of electronic devices, from mobile phones to EVs- basically, anything that requires a rechargeable battery.
- A battery is made up of an anode, cathode, separator, electrolyte, and two current collectors (Positive and Negative).
- Lithium-ion batteries use aqueous electrolyte solutions, where ions transfer to and fro between the anode (negative electrode generally made of graphite) and cathode (positive electrode made of lithium), triggering the recharge and discharge of electrons.
- Even promising alternatives to lithium-ion batteries, such as Quantum Scape Corp's solid-state lithium-metal battery, continue to use lithium.
- This is primarily due to Lithium's low weight as compared to other metals (Such as nickel, used in traditional batteries) as well as its superior electrochemical potential.
- Lithium has become especially valuable in the context of increasing climate concerns with the internal combustion engine and the rise of electric vehicles (EV) as an alternative.
- Currently, all EVs use lithium in their battery packs with demand set to rise exponentially over the coming decades.
- A 2020 World Bank report on clean energy transition estimates that the production of minerals, such as graphite, lithium, and cobalt, could increase by nearly 500 percent by 2050, to meet the growing demand for clean energy technologies.

5. US Sanctions on Iran

- The first sanctions were imposed by the US in 1979 when 52 American diplomats and citizens were held hostage for 444 days after some radical students stormed the US embassy in Tehran.
- While sanctions were lifted in 1981, they were reimposed in 1987 in response to Iran's actions to support international terrorism.
- Since then, the country has faced various sanctions from the US, the European Union, and the UN, with their severity fluctuating depending on the international political Climate.
- These sanctions, used to try and influence Iran's domestic policies such as its controversial uranium enrichment program, have over the years taken a toll on the Iranian economy and its people.
- They have hampered Iran's ability to participate in the global economy, leaving the country with perennial shortages in all sorts of sectors from food and consumer goods to technology.

6. Challenges lie ahead

- According to the United Nations Framework for classification for Reserves and Resources of Solid Fuels and Mineral Commodities (UNFC 1997), resources are categorized using the three essential criteria affecting their recoverability:

- Economic and Commercial viability (E)
- Field Project status and feasibility (F)
- Geological Knowledge (G)

- India's recent discovery was classified as G4 implying that they are a product of a reconnaissance study, rather than more advanced feasibility and commercial viability studies.
- According to the UNFC, "Reconnaissance study identifies areas of enhanced mineral potential on a regional scale based primarily on results of regional geological studies, regional geological mapping, airborne and indirect methods, preliminary field inspection, as well as geological inference and extrapolation. The objective is to identify mineralized areas worthy of further investigation towards deposit identification".
- It is likely that Iran's discovery is also at this stage of categorization.
- If that is the case, more work is required to establish the commercial viability of the reserve and also a setup where the mining can be carried out.
- Especially in the context of the economic embargoes Iran faces, this will be a challenge.

HIGH SEAS

1. Context

The UN member states agreed on a historic treaty for protecting marine life in international waters that lie outside the jurisdiction of any country. The ‘breakthrough’ followed talks led by the UN during the Intergovernmental Conference (IGC) on Marine Biodiversity of Areas Beyond National Jurisdiction (BBNJ) where negotiations were underway for the past two weeks. The treaty is yet to be formally adopted as members are yet to ratify it.

2. What is High Seas Treaty?

- Since 2017, an Inter-Governmental Conference established by the United Nations General Assembly has been negotiating an agreement under UNCLOS that would allow for more effective management and protection of the high seas.
- This internationally legally binding instrument is often referred to as the Biodiversity in Areas Beyond National Jurisdiction Treaty, or "BBNJ treaty".
- This treaty focuses on four main areas namely Conservation and sustainable use of marine biological diversity in ABNJ including marine genetic resources, Area-based management tools, including marine protected areas, Environmental-impact assessments, and Capacity building and the transfer of marine technology.
- The draft agreement of the High Seas Treaty recognizes the need to address biodiversity loss and the degradation of ecosystems of the ocean. It places 30% of the world's oceans into protected areas, puts more money into marine conservation, and covers access to and use of marine genetic resources as per the United Nations.
- An important negotiating point, and source of tension during the talks, was developing countries' access to benefits reaped from the commercialization of resources

(especially genetic resources) extracted from the ocean. The treaty has agreed to set up an access and benefit-sharing committee to frame guidelines.

3. What are the High Seas?

- Parts of the sea that are not included in the territorial waters or the internal waters of a country is known as the High seas, according to the 1958 Geneva Convention on the High Seas.
- No country is responsible for the management and protection of resources on the high seas.
- The high seas are some of the most biologically productive in the world teeming with plankton and home to ocean giants like predatory fish, whales, and sharks.
- The seabed sequesters tremendous amounts of carbon and the ocean volume traps heat, slowing the effects of climate change on land and in the atmosphere dramatically.
- High seas begin at the borders of the country's EEZ, which extends up to 370km from the coastlines.
- However, up until today, just 1% of these high seas waters have been adequately safeguarded.

4. Significance of High Seas

- The high seas account for more than 60% of the world's ocean area and cover about half of the Earth's surface, which makes them a hub of marine life.
- They are home to around 2.7 lakh known species, many of which are yet to be discovered. The high seas are fundamental to human survival and wellbeing.
- These oceans absorb heat from the atmosphere, are affected by phenomena like El Nino, and are also undergoing acidification all of which endanger marine flora and fauna.
- Several thousand marine species are at risk of extinction by 2100 if current warming and acidification trends continue.
- Anthropogenic pressures on the high seas include seabed mining, noise pollution, chemical spills, and fires, disposal of untreated waste (including antibiotics), overfishing, the introduction of invasive species, and coastal pollution.
- Despite the alarming situation, the high seas remain one of the least protected areas, with only about 1% of them under protection.

5. About BBJN

- The BBJN(Biodiversity of Areas Beyond National Jurisdiction) Treaty also known as the "Treaty of the High Seas", is an international agreement on the conservation and sustainable use of marine biological diversity of areas beyond national jurisdiction, currently under negotiation at the United Nations.
- This new instrument is being developed within the framework of the UNCLOS, the main international agreement governing human activities at sea.

- It will achieve a more holistic management of high seas activities, which should better balance the conservation and sustainable use of marine resources.
- BBJN encompasses the high seas, beyond the exclusive economic zones or national waters of countries.

INTERNATIONAL WOMEN'S DAY 2023

1.Context

International Women's Day 2023 (IWD) will be commemorated on March 8 under the theme "DigitALL: Innovation and technology for gender equality"
The United Nations has highlighted the need for inclusive technology and digital education
It plans to have discussions on the role of all stakeholders in improving access to digital tools

2.Women representation in STEM fields

- STEM is **an approach to learning and development that integrates the areas of science, technology, engineering and mathematics**. Through STEM, students develop key skills including: problem solving. creativity. critical analysis.
- Across the world, there has been a marked absence of women in the professional realm of STEM subjects – including the IT sector, environment and climate, medical sciences, etc
- This underrepresentation is of note because developments in STEM fields, particularly in technology, are increasingly shaping all aspects of modern life – from chatbots like ChatGPT that are expected to replace workers in various settings to the ubiquity of social media which shapes identities and public discourse
- Furthermore, from a career perspective, these fields are generally lucrative for workers
- A typical STEM worker earns two-thirds more than those employed in other fields, according to Pew Research Center
- Therefore, the underrepresentation of women in STEM impacts the overall gender pay gap as well – women are typically overrepresented in lower-paying jobs and underrepresented in higher-paying jobs such as in STEM fields

3.Gender gap in STEM

- Globally, 18 per cent of girls in higher-level education are pursuing STEM studies, compared with 35 per cent of boys
- Even within the STEM fields, there lies a gender divide, with similar numbers of boys and girls pursuing natural sciences while far more boys looked to engineering, manufacturing and construction
- In India, the enrolment of girls in engineering programmes is significantly lower when compared to their male counterparts
- Overall in UG, PG, MPhil and PhD engineering programmes, the total enrolment is 36,86,291 where 71 per cent of enrolled students were males and 29 per cent were

females, according to data from the All India Survey of Higher Education for 2020-2021

- But of all students enrolled in science courses at undergraduate, post-graduate, MPhil and PhD levels, women at 53 per cent of enrolment outnumbered men and some increases have been witnessed of late
- These gains, though, don't necessarily mean there will also be an increase in employment, because of multiple factors

4. Reasons for existing 'Gap'

- Multiple factors determine how women choose to work and the options available to them
- These include the presence of existing resources such as mentors and programmes offering scholarships, as well as, on a broader level, general societal attitudes on women's education that do not encourage families to invest in it as much as they do for boys
- The UNICEF points to gender bias in curricula. For instance, in India, more than 50 per cent of illustrations in math and science textbooks in primary show boys and only 6 per cent show girls
- In the UK, over a quarter of girls say they have been put off a career in tech as it is too male-dominated and only 22 per cent can name a famous female working in the field
- In the US, 26 per cent of tech startups have at least one female founder, and in Europe, only 21 per cent of tech founders are female

General Studies II: Governance

AADHAAR AND PAN

1. Context

The Central Board of Direct Taxes (CBDT) has asked all taxpayers to link their permanent account number (PAN) with their Aadhaar by March 31, 2023. Any non-compliance will mean that the PAN will become inoperative from April 1, 2023. Capital markets regulators securities and the Exchange Board of India (SEBI) also directed investors to link their PAN with their Aadhaar by this month's end to continue doing securities market transactions.

2. The rationale behind linking PAN with Aadhaar

- The Income-tax Department announced linking PAN with Aadhaar after it came across instances where multiple permanent account numbers (PANs) were allotted to one person, or where one PAN was allotted to more than one person.
- To have a robust way of de-duplication of the PAN database, it was made mandatory for a taxpayer who is eligible to obtain Aadhaar, to quote his Aadhaar in the application form for PAN and return of income.

3. Who needs to link PAN with Aadhaar?

As per a circular issued by CBDT in March 2022, the Income-tax act makes it mandatory for every person who has been allotted a PAN as on July 1, 2017, to intimate his/her Aadhaar number so that Aadhaar and PAN can be linked. This is required to be done on or before March 31, 2023, failing which the PAN shall become inoperative.

4. Who is not required to link PAN with Aadhaar?

There are a few categories of individuals for whom this linkage is not compulsory.

- Any person of age 80 years and above;
- A non-resident as per the Income-tax Act;
- A person who is not a citizen of India.

5. What happens if PAN is not linked with Aadhaar?

CBDT has said that in case a person fails to link his or her PAN with Aadhaar, the PAN will become inoperative. In such a case, the person will not be able to furnish, intimate, or quote his/her PAN, and shall be liable to all the consequences under the Income-tax Act for such failure. Some of the major implications of non-compliance are:

- The person shall not be able to file the income tax return using the inoperative PAN.
- Pending returns will not be processed.
- Pending refunds cannot be issued to inoperative PANs.
- Pending proceedings as in the case of defective returns cannot be completed once the PAN is inoperative.

6. SEBI made it mandatory for investors to link their PAN with their Aadhaar

- Since PAN is the key identification number and part of KYC requirements for all transactions in the securities market, all SEBI-registered entities and Market Infrastructure Institutions (MIIs) are required to ensure valid KYC for all participants.
- All existing investors are required to ensure the linking of their PAN with their Aadhaar before March 31, 2023, for continual and smooth transactions in the securities market and to avoid consequences of non-compliance with the March 30, 2022, CBDT circular, as such accounts would be considered the non-KYC complaint, and there could be restrictions on securities on securities and other transactions until the PAN and Aadhaar are linked.
- Besides the consequences, the person may find difficulties in doing other financial transactions such as with banks, as PAN is an important KYC criterion for these transactions.

7. About Aadhaar

- The Aadhaar card is a 12-digit unique number issued by the Unique Identification Authority of India (UIDAI).

- It contains biometric information, such as fingerprints and iris scans, along with demographic information, including individuals' addresses and date of birth.
- The Aadhaar card serves as proof of identity and is valid anywhere in India for identification purposes. Having an Aadhaar card is compulsory while applying for a new PAN card or filing Income tax returns.

Source: Bank Bazar

8. Eligibility criteria for an Aadhaar card?

- Any Indian resident irrespective of his/her gender and age can enroll for an Aadhaar card.
- As per the Aadhaar Act 2016, Indian citizens need to reside in the country for 182 days or more in the year preceding the date of enrolment.

- Non-resident Indians (NRIs) and Overseas Citizens of India (OCI) are not eligible for an Aadhaar card. If NRIs and foreigners satisfy the minimum duration of stay as per the aforementioned Act, they can apply for an Aadhaar card.
- Minors, too, can apply for an Aadhaar card. Children under the age of 5 will get the Blue Colour Aadhaar, which needs to get updated after they become 5 years old.

9. What is Masked Aadhaar?

- Masked Aadhaar is similar to a regular Aadhaar with the difference that the Aadhaar number is partially hidden.
- Only the last four digits of the Aadhaar number are visible and the rest are crossed.
- It basically means replacing the first eight digits with some characters like 'xxxx-xxxx' while only the last four digits of the original number are visible.
- Other details on the Aadhaar card remain the same such as the name, date of birth, gender, address, and QR code.
- One can download an Aadhaar card easily online.

10. About PAN Card

- PAN Card is a permanent Account Number that consists of 10-digit alphanumeric characters and is assigned to all taxpayers in India. It is issued under the Indian Income Tax Act, 1961 by the Indian Income Tax Department under the supervision of the Central Board for Direct Taxes (CBDT).
- Basically, a PAN card is an electronic system in which all the tax-related information of a person or company is recorded against a single PAN number.
- For major financial transactions, a PAN card is mandatory like opening a bank account, selling or purchase of assets, etc. That is why a PAN card provides the details of the account holder in a unique way.
- Out of these 10 digits of PAN card: the first five figures represent alphabets, the next four digits are numbers and the last number is again an alphabet. All these digits have some meaning and reveal the information of the account holder.

NATIONAL ASSESSMENT AND ACCREDITATION COUNCIL (NAAC)

1.Context

NAAC released a statement addressing the allegations, saying, “As per the mandate of NAAC, the entire process of accreditation and assessment is robust, transparent, ICT-driven and automated

2.Process of Accreditation

- The current approach has been described as “input-based”. In other words, NAAC relies heavily on self-assessment reports of applicant institutions.

- The first step has an applicant institution submitting a self-study report of information related to quantitative and qualitative metrics. The data is then validated by NAAC expert teams, followed by peer team visits to the institutions. This last step has sparked controversy.
- NAAC released the improved grading, terming the allegations as "**false**". Interestingly, the controversy has surfaced at a time when the council is considering reducing the role of the peer team visits in the overall scheme of things.
- "The process of Peer Team Visits adds substantial effort on the part of both NAAC and the HEIs. Hence, we recommend that the role of Peer Team visits be facilitatory and not have a significant weightage in assessment and accreditation.

2. Functions of NAAC

- The NAAC, set up in 1994, is entrusted with assessing the quality of India's higher educational institutions.
- Following a multi-layered assessment process, it awards grades to colleges and universities
- Its parameters include curriculum, faculty, infrastructure, research and financial well-being
- The grades issued by NAAC range from A++ to C. If an institution is graded D, it means it is not accredited
- The first step involves an institute approaching the NAAC for assessment
- Once the NAAC sets the process in motion, the applicant has to submit a self-study report (SSR) containing information related to quantitative and qualitative metrics
- The data is then validated by expert teams of the NAAC, followed by spot visits by peer teams comprising assessors drawn from universities across India

3.Importance of Mandatory Accreditation

- While the UGC has over the years issued many circulars directing institutes to mandatorily undergo NAAC's assessment, the process still remains largely voluntary
- The National Education Policy (2020) has set an ambitious target of getting all higher educational institutes to obtain the highest level of accreditation over the next 15 years
- However, according to information shared by the Centre in Lok Sabha in February 2023, out of the 1,113 universities and 43,796 colleges in the All India Survey on Higher Education Report 2020-21, only 418 universities and 9,062 colleges were NAAC-accredited as on January 31, 2023
- According to current and former officials of the NAAC, the fear of obtaining poor grades holds institutes back from applying
- In 2019, the UGC had launched a scheme named 'Paramarsh' to address the issue. Under the scheme, some of the best performing institutes were identified to serve as mentors to at least five institutes aspiring to get accredited
- Currently, only institutes that are at least six years old, or from where at least two batches of students have graduated, can apply. The accreditation is valid for five years

BRU REFUGEES AGREEMENT

1. Context

Twenty-three years after ethnic clashes in Mizoram forced 37 000 people out of the Bru (or Reang) community to flee their homes to neighbouring Tripura, an agreement has been signed to allow them to remain permanently in the latter state.
The agreement among the Bru leaders and the government of India, Tripura, and Mizoram signed in New Delhi, gives the Bru the choice of living in either state.
In several ways, the agreement has redefined how internal displacement is treated in India.

2. About Bru Agreement

- All Bru Currently, living in temporary relief camps in Tripura will be settled in the state if they want to stay on.
- The Bru who returned to Mizoram in the eight phases of repatriation since 2009, cannot, however, come back to Tripura.
- To ascertain the numbers of those who will be settled, a fresh survey and physical verification of Bru families living in relief camps will be carried out.
- The Centre will implement a special development project for the resettled Bru; this will be in addition to the Rs 600 crores fund announced for the process, including benefits for the migrants.
- Each resettled family will get 0.03 acre (1.5 ganda) of land for building a home, Rs 1.5 lakh as housing assistance and Rs 4 lakh as a one-time cash benefit for sustenance.
- They will also receive a monthly allowance of Rs 5, 000 and free rations for two years from the date of resettlement.
- All cash assistance will be through Direct Benefit Transfer (DBT) and the state government will expedite the opening of bank accounts and the issuance of Aadhaar, permanent residence certificates, ST certificates and voter identity cards to the beneficiaries.

3. Bru's resettlement

- Physical verification to identify beneficiaries will be carried out within 15 days of the signing of the deal.
- The land for resettlement will be identified within 60 days and the land for allotment will be identified within 150 days.
- The beneficiaries will get housing assistance, but the state government will build their homes and hand over possession.
- They will be moved to resettlement locations in four clusters, paving the way for the closure of the temporary camps within 180 days of the signing of the agreement.
- All dwelling houses will be constructed and payments completed within 270 days.
- Revenue experts reckon 162 acres will be required. Tripura CM said that the effort will be to choose khash or government land, but since Tripura is a small state (only 10, 491 sq km), his government would explore the possibility of diverting forest lands, even reserve forest areas if necessary to grant the new entitlements.

4. Conditions of migrants now

- The Bru or Reang are a community indigenous to Northeast India, living mostly in Tripura, Mizoram and Assam.
- In Tripura, they are recognised as a **Particularly Vulnerable Tribal Group** (PVTG).
- Over two decades ago, they were targeted by the **Young Mizo Association** (YMA), **Mizo Zirwlai Pawl** (MZP) and a few ethnic social organisations of Mizoram demanded that the Bru be excluded from electoral rolls in the state.
- In October 1997, following ethnic clashes nearly, 37, 000 Bru fled Mizoram's Mamit, Kolasib and Lunglei districts to Tripura, where they were sheltered in relief camps.
- Since then, over 5, 000 have returned to Mizoram in nine phases of repatriation, while 32, 000 people from 5400 families still live in six relief camps in North Tripura.

Under a relief package announced by the Centre a daily ration of 600 g of rice was provided to every adult Bru migrant and 300 g to every minor; Some salt too was given to each family; Every adult received a daily cash dole of Rs 5; Every minor is Rs 2.50.

- Meagre allocations were made from time to time for essentials such as soap, slippers and mosquito nets.
- Most migrants sold a part of their rice and used the money to buy supplies, including medicines.
- They depended on the wild for vegetables and some of them have been practising slash and burn (jhum) cultivation in the forests.
- They live in makeshift bamboo thatched huts, without a permanent power supply and safe drinking water, and with no access to proper healthcare services or schools.

5. Agreement between the government and Bru's

- In June 2018, Bru leaders signed an agreement in Delhi with the Centre and the two state governments, providing for repatriation to Mizoram.
- Most residents of the camps, however, rejected the **"insufficient"** terms of the agreement.
- Only 328 families returned to Mizoram, rendering the process redundant.
- The camp residents said the package did not guarantee their safety in Mizoram and that they feared a repeat of the violence that had forced them to flee.
- The Bru were originally from Tripura and had migrated to Mizoram after their homes were flooded due to the commissioning of the Dumboor hydroelectric power project in South Tripura in 1976, he claimed.
- Successive state and central governments had thus far stressed only peacefully repatriating the Bru, even though the enduring fear of ethnic violence remained a fundamental roadblock.
- The two other "**durable solutions**" for refugees and displaced persons suggested by the UN Refugee Agency local integration or assimilation and resettlement were never explored.

- Apart from their own Kaubru tongue, the Bru speak both Kokborok and Bangal, the two most widely spoken languages of the tribal and non-tribal communities of Tripura and have an easy connection with the state.
- Their long stay in Tripura albeit in exile and terrible conditions has also acquainted them very well with the state's socio-political ecology.

ONE NATION ONE CHALLAN

1.Context

The Gujarat government recently told the High Court, which was hearing a public interest litigation seeking the setting up of virtual traffic courts in the state, that it was already in the process of doing so under the 'One Nation One Challan' initiative

2.About One Nation, One challan

- One Nation, One Challan is an initiative of the Ministry of Road Transport and Highways to bring all related agencies, such as the traffic police and the Regional Transport Office (RTO), on one platform, to enable seamless collection of challans as well as data transfer
- The integrated system involves detection of traffic violations through the CCTV network and getting the registration number of the erring vehicle from applications like VAHAN (detecting the vehicle's ownership details) and SARATHI (compilation of driving licenses)
- An e-challan is then generated with the relevant penalty amount, and sent to the mobile number linked with the vehicle

3.Integration

- So far, if police had to penalise someone from a different state using the CCTV network, we were unable to find details of the vehicle ownership, as the database was not integrated
- Integration of all the states' RTO data and traffic police data with the support of National Informatics Centre (NIC) servers
- If someone coming from Chhattisgarh is captured violating traffic regulations on CCTV, the vehicle's registration number and its related data can be accessed by the Ahmedabad police, and the challan will be sent directly to the mobile number mentioned at the time of the vehicle's registration

- Also, e-challans so far are delivered through mobile phone SMSes, or through post when the phone number is not available

4.Virtual traffic courts

- If someone doesn't pay the challan amount within 90 days, the challan will be automatically forwarded to a virtual court and proceedings will be initiated
- Summons will be sent on the mobile phone of the offender. If the fine is still not paid, further legal proceedings will follow
- Virtual courts are aimed at eliminating the presence of litigants in the court
- An accused can search their case on the **virtual court's website**. Upon successful payment of fine, the case will be shown as disposed of
- For now, one court is in the process of being designated as a virtual court for the whole of Gujarat court number 16 of Ahmedabad city sessions court, which will deal dedicatedly with the 'One Nation, One Challan' cases
- In a petition before the Gujarat HC, it has been pointed out that in Surat city alone, over 49 lakh e-challans had been issued from April 2013 to August 2020
- Accumulating a fine of Rs 136 crore, of which Rs 122 crore is yet to be recovered

General Studies III: Science & Technology

MEASLES AND RUBELLA

1.Context

As the new year dawned, so did a crucial target for India. India had set a target to eliminate measles and rubella (MR) by 2023, having missed the earlier deadline of 2020, due to a variety of reasons, exacerbated by disruptions due to the pandemic

2.Measles and Rubella

2.1.Measles

The measles virus is one of the world's most contagious human viruses that kills more than 1,00,000 children every year globally, and rubella is a leading vaccine-preventable cause of birth defects, according to the World Health Organization (WHO)

Measles is caused by a single-stranded, enveloped RNA virus with 1 serotype

It is classified as a member of the genus Morbillivirus in the Paramyxoviridae family.

Humans are the only natural hosts of measles virus.

Over the past two decades, the measles vaccine is estimated to have averted more than 30 million deaths globally, as per the WHO's statistics.

2.2.Rubella

Rubella is a contagious disease caused by a virus

Rubella can cause a miscarriage or serious birth defects in a developing baby if a woman is infected while she is pregnant

A rubella infection is mild for most people, but can cause death or birth defects in an unborn baby

The rubella vaccine is available in combined vaccines that also contain vaccines against other serious and potentially fatal diseases

3.Global Scenario of Measles and Rubella

The measles virus is one of the **world's most contagious human viruses** that kills more than 1,00,000 children every year globally, and **rubella is a leading vaccine-preventable cause of birth defects,** according to the **World Health Organization (WHO)**

During 2010–2013, India conducted a **phased measles catch-up immunisation f**or children aged 9 months–10 years in 14 States, vaccinating approximately 119 million children

Mission Indradhanush was launched in 2014 to ramp up vaccinating the unvaccinated populationDuring 2017–2021, India adopted **a national strategic plan for measles and rubella** elimination, and introduced **rubella-containing vaccine (RCV)** into the routine immunisation programme

As of December 2021, **five countries have been verified and have sustained measles elimination -** Bhutan, DPR Korea, Maldives, Sri Lanka, Timor-Leste. In addition, Maldives and Sri Lanka have sustained their rubella elimination status in 2022

4. Vaccination

The MMR vaccine is a vaccine against measles, mumps, and rubella, abbreviated as MMR

The first dose is generally given to children around 9 months to 15 months of age, with a second dose at 15 months to 6 years of age, with at least four weeks between the doses

MMR vaccine can prevent **measles**, **mumps**, and **rubella.**

- **MEASLES (M)** causes fever, cough, runny nose, and red, watery eyes, commonly followed by a rash that covers the whole body. It can lead to seizures (often associated with fever), ear infections, diarrhea, and pneumonia. Rarely, measles can cause brain damage or death.
- **MUMPS (M)** causes fever, headache, muscle aches, tiredness, loss of appetite, and swollen and tender salivary glands under the ears. It can lead to deafness, swelling of the brain and/or spinal cord covering, painful swelling of the testicles or ovaries, and, very rarely, death.
- **RUBELLA (R)** causes fever, sore throat, rash, headache, and eye irritation. It can cause arthritis in up to half of teenage and adult women. If a person gets rubella while they are pregnant, they could have a miscarriage or the baby could be born with serious birth defects.

CONTROLLED RE-ENTRY OF SATELLITE

1. Context

The Indian Space Research Organisation brought down a satellite in a controlled manner after its end of life, for the first time earlier this week. The weather satellite Megha

Tropiques -1, which was developed as a joint mission by Indian and French space agencies, entered the atmosphere after the final two maneuvers and burnt up over the Pacific Ocean.

2. About Megha Tropiques

- Megha- Tropiques is an Indo-French Joint Satellite Mission that studies the water cycle and energy exchanges in the tropics.
- Its objective is to comprehend the life cycle of convective systems that influence tropical weather and climate, as well as their role in the associated energy and moisture budget of the tropical atmosphere.
- It provides scientific data on the contribution of the water cycle to the tropical atmosphere, including information on condensed water in clouds, water vapor in the atmosphere, precipitation, and evaporation.

Image Source: The Indian Express

3. What is the Re-entry of satellite?

- Due to the increasing number of objects in space (Space debris), the international aerospace community has adopted guidelines and assessment procedures to reduce the number of non-operational spacecraft and spent rocket upper stages orbiting the Earth.
- One method of post-mission disposal is to allow the re-entry of these spacecraft, either from natural orbital decay (uncontrolled) or controlled entry.

4. How was the satellite brought down?

- The Megha Tropiques satellite was launched aboard a PSLV by the space agency in 2011. And, although the planned mission life of the satellite was only three years, it continued providing data on the water cycle and energy exchanges in the tropics for nearly a decade.
- With over 120kgs of fuel remaining in the satellite even after being decommissioned, the space agency determined that there was enough to attempt a controlled re-entry,

where a series of 20 maneuvers over eight months lowered the orbit of the satellite such that it re-entered the dense atmosphere and burned up.

- This was the first time that the space agency attempted such a maneuver to clear out space debris despite the satellite not being built to do so.
- The re-entry was not really planned as part of the mission; there was fuel left so Isro attempted it. Usually, satellites are left in their orbit and because of the gravitational pull of the earth, they come down to the atmosphere over years and years.
- When the satellites re-enter the atmosphere, the friction causes them to heat up to extremely high temperatures of thousands of degrees Celsius.
- Without a heat shield, 99% of a satellite gets burnt up whether in a controlled re-entry or an uncontrolled one.

5. Why did ISRO attempt a controlled Re-entry?

- Other than extra fuel conveniently remaining in the satellite after the mission life ended, ISRO attempted the controlled re-entry to demonstrate and understand the process of doing so.
- With several space-fairing nations and private entities launching satellites, mostly in low earth orbits, it has become imperative to keep space clean.
- There are thousands of objects flying around in these orbits; not just old satellites and their parts but also the last stages of the rockets that take them there.
- Moving at extremely high speeds even the smallest debris can destroy active satellites.
- In fact, the space agency set up a department last year to monitor space debris and mitigate the risks posed.
- The space agency was also following the guidelines of the UN and the Inter-Agency Space Debris Coordination Committee (IADC) that say satellites should be deorbited after mission life either through controlled entry over a safe impact zone as was attempted by ISRO with Megh Tropiques-1 or by bringing it down to reduce the orbital lifetime to less than 25 years.

6. Space Debris

- Space Debris encompasses both natural meteoroid and artificial (human-made) orbital debris. Meteoroids are in orbit about the sun, while most artificial debris is in orbit about the Earth (hence the term "orbital" debris).
- Orbital debris is any human-made object in orbit about the Earth that no longer serves a useful function. Such debris includes nonfunctional spacecraft, abandoned launch vehicle stages, mission-related debris, and fragmentation debris.

7. What happens to satellites usually?

- A controlled re-entry like the one attempted by ISRO earlier this week is possible only for satellites in the low-earth orbit at about 1,000 km over the surface of the earth.
- These maneuvers, however, are not usually attempted because fuel reserves have to be maintained in the satellite after mission life is over.

8. What happens to satellites in these higher orbits?

- They are usually moved to what is known as graveyard orbit. Instead of bringing them down, they are shot upwards at the end of life.
- These orbits are like parking lots in space where all old satellites are put in.
- Sometimes a satellite might escape to deep space as well. A satellite escapes to deep space when its velocity increases enough to get away from the gravitational pull of the earth.

9. Threats due to Debris formation

- Even tiny paint flecks can damage a spacecraft when traveling at these velocities. In fact, millimeter-sized orbital debris represents the highest mission-ending risk to most robotic spacecraft operating in low earth orbit.
- In 1996, a French satellite was hit and damaged by debris from a French rocket that had exploded a decade earlier.
- In the year 2009, a defunct Russian Spacecraft collided with and destroyed a functioning U.S. Iridium commercial spacecraft.
- The collision added more than 2,300 pieces of large, trackable debris and many more smaller debris to the inventory of space junk.
- China's 2007 anti-satellite test, which used a missile to destroy an old weather satellite, added more than 3,500 pieces of large, trackable debris and much more smaller debris to the debris problem.

GENE EDITING EMBRYOS

1. Context

A Chinese scientist stirred up a hornet's nest by announcing the birth of gene-edited twins in 2018. A new study warns of the consequences of deploying a technology that is still less understood.

Deleting harmful disease-causing mutations by gene editing could be counterproductive. It could create more problems than it solves

2.Important Observations

- CRISPR can target and edit DNA at precise locations. CRISPR to make the embryos resistant to the human immunodeficiency virus
- Gene editing can be divided into two classes. One involves changing genes in human cells. This method does not alter reproductive cells, such as sperms or eggs. It can be used to treat diseases caused by mutations.
- The second method alters the genome of human embryos. These altered genes can be passed on to future descendants, raising ethical concerns
- The break sites are repaired by human embryos. They do so by copying genetic information from the normal copy of the gene onto the altered strand of the DNA
- CRISPR could lead to extensive gene copying from one parent to the other

- Humans possess two versions of a particular gene received from each parent
- If a child gets a recessive disease-causing gene from one parent and a dominant healthy version of the same gene from the other, they could still be protected.
- The extensive copying of genetic information from one parent to another due to CRISPR could give rise to two mutant copies of the disease-causing gene in the embryo.This significantly increased the risk of diseases

3.Misdiagnosis

The gene-edited embryo should be tested before it is transferred into the uterus. Scientists do this by collecting a small sample from a few or even a single cell
It is then multiplied millions of times using whole genome amplification
Whole genome amplification is a technology that helps increase the amount of DNA samples
The researchers proposed an alternative method that uses stem cells from gene-edited embryos
Stem cells can develop into any functional cells, such as skin cells, muscle cells, liver cells or brain cells
As these stem cells grow indefinitely, they can provide ample DNA material for testing

H3N2

1. Context

According to ICMR, the recent uptick in the cases of intense cough lasting for over a week coupled with fever, in several parts of India, can be linked to the Influenza A subtype H3N2 virus. India has recorded the deaths of two people, one each in Karnataka and Haryana, due to the Influenza A subtype H3N2 virus.

2. H3N2 Virus

- Influenza viruses, which cause the infectious disease known as flu, are of four different types: A, B, C, and D.
- Influenza A is further classified into different subtypes and one of them is H3N2.
- According to the United States Centers for Disease Control and Prevention (CDC), H3N2 caused the 1968 flu pandemic that led to the death of around one million people globally and about 100,000 in the US.
- A 2020 study, published in the journal Nature Communications, found that the strains of the virus have dramatically evolved in the past five decades as people born in the late 1960s and 1970s got infected by it as children.

3. Symptoms of H3N2

- Its symptoms are similar to that of any other flu.

- They include cough, fever, body ache and headache, sore throat, a runny or stuffy nose, and extreme fatigue.
- Nausea, vomiting, and diarrhoea have been seen in very few cases.
- According to the Indian Medical Association (IMA), an infection caused by H2N2 generally lasts for five to seven days and the fever starts going away after three days.
- However, the coughing can persist for up to three weeks.

4. Which age group is more vulnerable to this virus?

- As per the IMA, this virus usually preys on individuals below the age of 15 years or above 50 years of age.
- Children and those with co-morbidities like asthma, diabetes, heart disease, weakened immune systems, and neurological or neurodevelopmental conditions are at a higher risk.

5. Preventive Measures

- Self-hygiene is the best way to thwart the spread of H3N2.
- Washing hands before eating or touching your face, nose, or mouth, carrying pocket sanitizer, and avoiding people already infected with the virus or any other seasonal flu are some of the steps one can take to make sure they don't fall sick due to the H3N2 infection.
- Moreover, a healthy diet that includes plenty of fruits and vegetables can also play a significant role in improving immunity.
- Drinking a lot of fluids, and eating home-cooked, low-spice, and low-fat food can also help.

CANCER VACCINES

1. Context

The United States Food and Drug Administration (FDA) granted breakthrough therapy designation to Moderna and Merck's skin cancer vaccine. This allows expedited development and review of drugs intended to treat serious conditions. A new type of cancer vaccine is being developed using technology similar to that used for Covid Vaccines. Decades before COVID vaccines, scientists had been working on messenger ribonucleic acid (mRNA) vaccines targeting cancer.

2. How do they work?

- Traditionally, vaccines inject part or all of a weakened virus (or other pathogens) into the body to provoke an immune response.

- mRNA works by injecting only the genetic instructions and allowing the body's cells to make part of the cancer protein (Antigen) itself. This trains the immune system to develop antibodies against the protein.
- When these same proteins are present on an invading tumour cell, the immune system stimulates an immune response against it.
- While COVID mRNA vaccines respond to one antigen- the spike protein on the outside of coronavirus- cancer vaccines act on several antigens present on the tumour surface.
- The mRNA cancer vaccines train the patient's immune system to fight their cancer.
- Most trials are manufacturing vaccines for individual patients based on the specific antigens present in their tumours. It takes around two months to produce a vaccine.

3. How these vaccines are made?

- To make these vaccines, a sample of the patient's tumour and healthy tissue is taken.
- These samples are DNA-Sequenced to compare differences between the DNA in the cancerous cells and the healthy cells.
- Scientists identify problem mutations driving the disease. These can then be used as antigen targets in the mRNA vaccine.
- Bespoke approaches allow scientists to target a wider range of cancer antigens. Targeting multiple antigens decreased the odds that cancer cells will mutate and become resistant to vaccines because the immune system attacks on multiple fronts.
- Personalised medicines are extremely expensive because they are bespoke products.
- Manufacturing costs for bespoke treatments remain high.
- However, with rapidly falling costs of different aspects such as genome sequencing (Some companies are now offering genome sequencing for just US$100), sequencing the entire genome is becoming more viable.
- As large-scale manufacturing increases in future for off-the-shelf vaccines, there will be resource efficiencies that reduce cost.

4. What are the vaccines that are in development?

- In December 2022, Moderna and Merck (known outside the United States and Canada as MSD) published the results of its early phase (2b) clinical trial.
- The trial was investigating a combination therapy of an mRNA vaccine and immunotherapy (a drug that stimulates an immune response) in advanced-stage melanoma patients.
- After one year of treatment in 157 patients, they found the combination reduced the risk of cancer recurrence or death by 44%.
- Now, Moderna and Merck plan to follow up their initial trial with a phase 3 trial for advanced melanoma in 2023. Phase 3 trials test for safety and efficacy in larger groups of patients.
- BioNTech has several mRNA cancer candidates in the works, including for advanced melanoma, ovarian cancer and non-small cell lung cancer.
- A third company called CureVac is also developing mRNA vaccines targeting a range of cancers including ovarian, colorectal, head and neck, lung and pancreatic.

5. When will they become available?

- Moderna and Merck's mRNA cancer vaccine was fast-tracked for review by the US FDA in February 2023.
- Australia's Therapeutic Goods Administration has not approved the use of mRNAs for use either alone or with other cancer treatments yet.
- In January 2023, the United Kingdom's National Health Service partnered with BioNTech to fast-track the development of mRNA cancer vaccines over the next seven years. Eligible UK cancer patients will get early access to clinical trials from late 2023 onwards.
- In Australia, BioNTech is establishing its Asia-Pacific mRNA clinical research and development centre in Melbourne, in partnership with the Victorian Government. This would develop mRNA vaccines for research and clinical trials, including personalised cancer treatments.
- Moderna will develop Australia's first large-scale mRNA vaccine facility at Monash University by 2024, in partnership with the state and federal government. This will give Australians priority access to mRNA vaccines made locally.

6. What technology is used for?

- Aside from cancer, there is huge potential to use mRNA technologies across many gene therapies.
- There are studies underway testing mRNA vaccines for various diseases such as evolving COVID strains, seasonal influenza, malaria, HIV, cystic fibrosis and even allergies, giving new hope for many previously incurable diseases.

HUBBLE TELESCOPE

1. Context

The Hubble Space Telescope, known for recording awe-inspiring images of the cosmos while advancing the field of astronomy, is under threat. Private companies are launching thousands of satellites that are photobombing the telescope producing long bright streaks and curves of light that can be impossible to remove.

2. About Hubble Space Telescope

- The Hubble Space Telescope is a large telescope in space.NASA launched Hubble in 1990.
- It was built by the United States space agency NASA, with contributions from the European Space Agency.
- Hubble is the only telescope designed to be serviced in space by astronauts.
- Expanding the frontiers of the visible Universe, the Hubble Space Telescope looks deep into space with cameras that can see across the entire optical spectrum from infrared to ultraviolet.
- The Hubble Space Telescope makes one orbit around Earth every 95 minutes.

3. Achievements

- It has helped in discovering the moons around pluto. Evidence regarding the existence of black holes has emerged based on observations through Hubble.
- The birth of stars through turbulent clouds of gas and dust has also been observed.
- The Hubble telescope made observations of six galaxies merging together.
- On February 11, 2021, Hubble made observations of small concentrations of black holes.

4. Images recorded by the Hubble are spoiled by passing satellites

- A study, published in the journal Nature Astronomy, reveals an increase in the percentage of images recorded by the Hubble that is spoiled by passing satellites.
- Thousands more satellites have been launched since then by SpaceX and other companies, and many more are expected to go into orbit in the years ahead, affecting the Hubble and potentially other telescopes in space.

Image Source: The Indian Express

5. Legacy of Hubble Space Telescope

- The Hubble Space Telescope's legacy cannot be overstated.
- Because of the observatory, we now know, for example, that the universe is 13.8 billion years old, that most galaxies contain a supermassive black hole at their centers, and that stars form in violent processes.
- The Hubble images including the gorgeous clouds of gas and dust in the "Pillars of creation" and the view of nearly 10,000 galaxies in the "Hubble ultra deep Field" never fail to inspire.
- But the number of satellites in orbit has significantly increased since the Hubble launched in 1990, and now it is staring at the cosmos through a field of satellites.

6. Findings of the study

- To quantify the effect of satellite constellations on Hubble, Sandor Kruk, an astronomer at the Max Planck Institute for Extraterrestrial Physics in Germany, and his colleagues analyzed an archive of images taken from 2002 through 2021.
- They had help from hundreds of citizen scientists who pored through images to tag those with clear satellite streaks.
- That data set was then used as a training set for a machine-learning algorithm that analyzed more than 100,000 individual Hubble photos.

- Their results show that the chance of seeing a satellite in a Hubble image from 2009 to 2020 is only 3.7 percent.
- But the chance of seeing one in 2021 is 5.9 percent an increase that they say corresponds to Starlink. By the date of the analysis, 1,562 Starlink satellites were in orbit. Another company, OneWeb, had lofted 320 satellites.

7. Threats posed by SpaceX Satellites

- The satellites could pose a serious threat to a telescope that hasn't launched yet.
- At the end of this year, China plans to send Xuntian, also known as the Chinese Survey Space Telescope, into low-Earth orbit.
- Xuntian will have a larger field of view than Hubble, making it much harder for satellites to slip by undetected.
- And Xuntian can't simply launch into a higher orbit. China's plan is for the telescope to share an orbit with the Tiangong space station so that astronauts can refurbish it if necessary.
- There are simply too many unknowns at the moment, including the ultimate number of satellites.
  SpaceX hopes to eventually expand the size of its fleet to 42,000 Starlink satellites.
- Many other companies are in the market, too: Amazon, the British satellite provider OneWeb, a Chinese company called Galaxy Space, and even governments.
- A combined 431,713 satellites are planned to launch in the coming years.

8. About SpaceX

- SpaceX is a commercial spaceflight company that launches satellites and sends astronauts to the International Space Station (ISS), including NASA astronauts. The company was founded in 2002 by Elon Musk to revolutionize space transportation, with the ultimate goal of making life multi-planetary.
- SpaceX designs manufacture and launch advanced rockets and spacecraft.
- It is the only private company ever to return a spacecraft from low-Earth orbit, which it first accomplished in December 2010.
- The company made history again in May 2012 when its Dragon spacecraft attached to the International Space Station, exchanged cargo payloads and returned safely to Earth a technically challenging feat previously accomplished only by governments.
- Since then Dragon has delivered cargo to and from the space station multiple times, providing regular cargo resupply missions for NASA.
- On May 30, 2020, SpaceX sent its first two humans to the International Space Station (ISS) onboard the SpaceX Crew Dragon and has since launched many additional crews on behalf of NASA and other organizations.

General Studies III: Disaster Management

FOREST FIRES

1. Context

Forest fires continue to rage in Odisha after the state recorded 642 large fire incidents from March 2-9, 2023 the highest in the country during the period, according to the Forest Survey of India (FSI) data. On March 9, the eastern state recorded 96 major fires in different jungles also the highest in the country. From all the other states combined, 189 active fire incidents were reported on the same day, according to FSI.

2. What is a forest fire?

- A forest fire is an uncontrolled fire occurring in vegetation more than 1.8 meters (6 feet) in height. These fires often reach the proportions of a major conflagration and are sometimes begun by combustion and heat from surface and ground fires.
- A big forest fire may crown that is, spread rapidly through the topmost branches of the trees before involving undergrowth or the forest floor.
- As a result, violent blowups are common in forest fires, and they may assume the characteristics of a firestorm.
- Though forest fire is often seen as harmful, several forests are specifically fire-adapted; the species of plants and animals native to those ecosystems are enhanced by or dependent on the occurrence of fire to persist and reproduce.
- Lightning strikes in a dry forest occur naturally, and fire can improve ecosystem health by reducing competition, fertilizing the soil with ash, and decreasing diseases and pests. some plant species even require fire for their seeds to germinate.
- In many regions that have historically experienced forest fires, such as forested areas of the western united states, years of fire exclusion and suppression in the 19th and 20th centuries allowed fuels to accumulate, altering the vegetation communities present and leading to more extreme conflagrations when fires do occur.
- The use of prescribed fire, in which areas are burned intentionally and under controlled conditions, can restore those ecosystems and promote the conditions that were present historically before the removal of wildfire.

3. Causes of Forest Fires

- Natural causes like lightning can set fires on trees which may be spread by wind. Sometimes, High atmospheric temperatures and dryness (low humidity) offer favorable circumstances for a fire to start.
- Man-made causes are usually the ones that become dangerous. Fire is caused when a source of fire like naked flame, cigarette, electric spark, or any source of ignition comes into contact with inflammable material.
- Other human-led causes are land clearing and other agricultural activities, maintenance of grasslands for livestock management, extraction of non-wood forest products, industrial development, settlement, hunting, negligence, and arson.

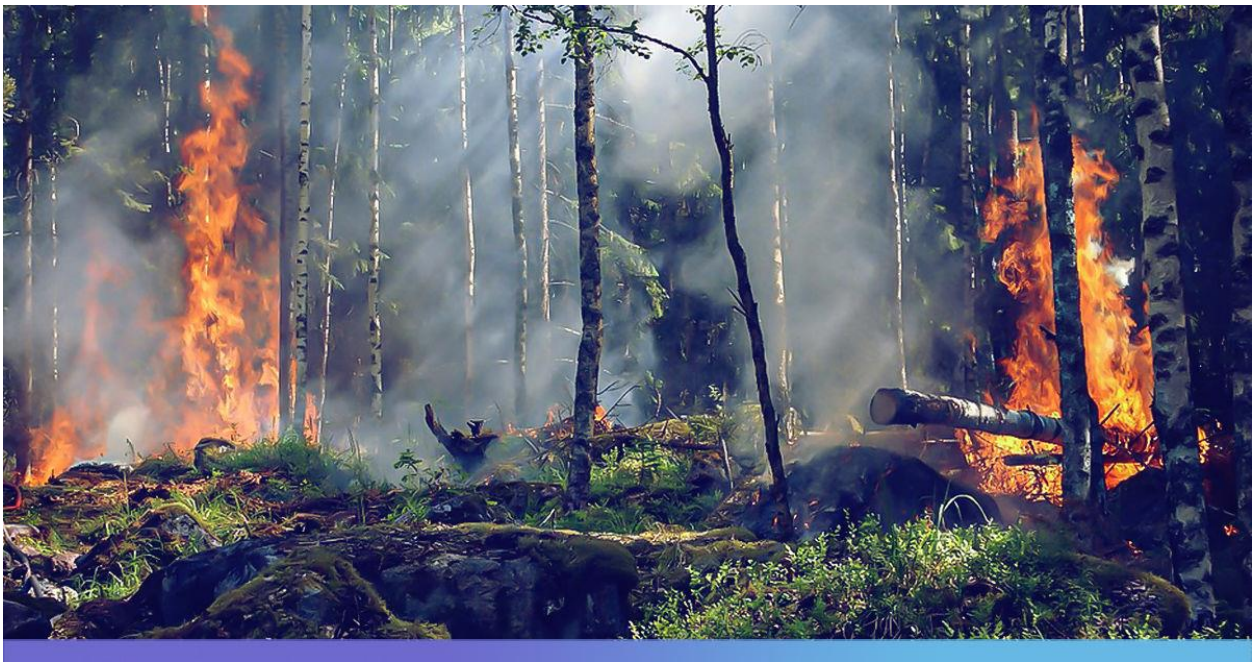
4. Types of forest fires

- **Surface fire:** Spread along the surface litter (leaves, twigs, dry grasses) on the forest floor.

- **Ground fire:** Fires in the subsurface organic fuels, such as duff layers under forest stands, burn underneath and are often ignited by surface fires.
- **Crown fire:** A Crown fire is one in which the crown of trees and shrubs burn, often sustained by surface fire.

5. Forest fires in Odisha

- A sudden jump in the incidents of fires across Odisha resulted in a massive loss of flora and fauna in the state's forests.
- A prolonged dry spell since October 2022 and the accumulation of inflammable material such as dry leaves are some of the reasons that started these forest fires.
- Some of the fires may have also been caused by human-made reasons. The tribal people set fire to forests for shifting cultivation, and collection of mahua flowers and kendu leaves.
- Forests are set on fire to cultivate turmeric in the Baliguda forest division in the Kandhamal district.
- Regeneration of the forests will be affected due to wildfires. The seeds which are supposed to germinate in the monsoon rain get burnt due to ground fires in the forest areas, affecting the forest growth.
- Forest fires result in the loss of timber, fruit-bearing trees, and medicinal plants. They also pose a threat to wildlife and their habitat areas.
- The forest department did not learn from the 2021 forest fires when a record 51,968 forest fire incidents occurred in the state. Massive fires had broken out in Similipal National Park in the Mayurbhanj district, which is one of the major biospheres of Asia.



Source: The Logical Indian

6. Mitigation measures by the Government

- The incidence of forest fires in the country is on the increase and more area is razed each year.
- The major cause of this failure is the slow and gradual approach to the problem.
- Both the national focus and the technical resources required for sustaining a systematic forest fire management program are lacking in the country.
- Important forest fire management elements like strategic fire centers, coordination among Ministers, funding, human resource development, fire research, fire management, and extension programs are missing.
- Taking into consideration the serious nature of the problem, it is necessary to make some major improvements in the forest fire management strategy for the country.
- The Ministry of Environment, Forests, and Climate Change has prepared a National Master plan for Forest Fire Control. The Forest Survey of India (FSI) monitors the incidence of wildfires.

CARBON SINK

1. Context

When India updated its international climate commitments first made in 2015 in the run-up to the Paris climate conference in August last year, it enhanced two of the three original targets it had promised to achieve by 2030.

2. Key Points

- It said it would reduce the emissions intensity of its economy emissions per unit of GDP by 45 per cent from the 2005 level instead of the 33 to 35 per cent promised earlier.
- And that it would ensure that renewables formed at least 50 per cent up from the original 40 per cent of its total installed electricity generation capacity.
- The **third target** is a commitment to increase its carbon sink by 2.5 to 3 billion tonnes of carbon dioxide equivalent by 2030 through the creation of additional Forest and tree cover left untouched.
- India's five-point "**Panchamrit**" action plan at the **Glasgow climate meeting** in 2021, there had been no mention of this third commitment.
- The seeming silence over the third commitment gave rise to speculation that India was possibly lagging on this target and that it might not be able to achieve it.

3. Carbon sink in India

- Government figures in 2022 showed that in the six years since 2015, the carbon sink in the country which is the total amount of carbon dioxide absorbed by and residing in forests and trees had increased by 703 million tonnes of CO_2 equivalent or roughly 120 million tonnes every year.
- At this pace, the target of 2.5 to 3 billion tonnes of CO_2 equivalent was unlikely to be met by 2030.

- The carbon sink target was much more ambitious and difficult than the other two which had been achieved about eight years before the deadline. But India was only hedging its bets.

4. The baseline year

- The carbon sink target had not been defined precisely in 2015.
- India had committed to an additional carbon sink of 2.5 to 3 billion tonnes of CO2 equivalent through additional forest and tree cover by 2030 but it had made no mention of the baseline year.
- That is, it did not say which year this additional 2.5 to 3 billion tonnes of CO2 equivalent of carbon sink would be measured against.
- By contrast, India's target on emissions intensity specified 2005 as the baseline year.
- And the commitment to renewable capacity did not require a baseline because it was an absolute target.
- The climate targets had been announced in a hurry ahead of the 2015 climate change conference because these were considered crucial to the finalisation of the Paris Agreement.
- India's original targets on emissions intensity and renewable capacity were quite modest and thus easy to define precisely.
- But the carbon sink target required a detailed study, which could not have happened in a short time.

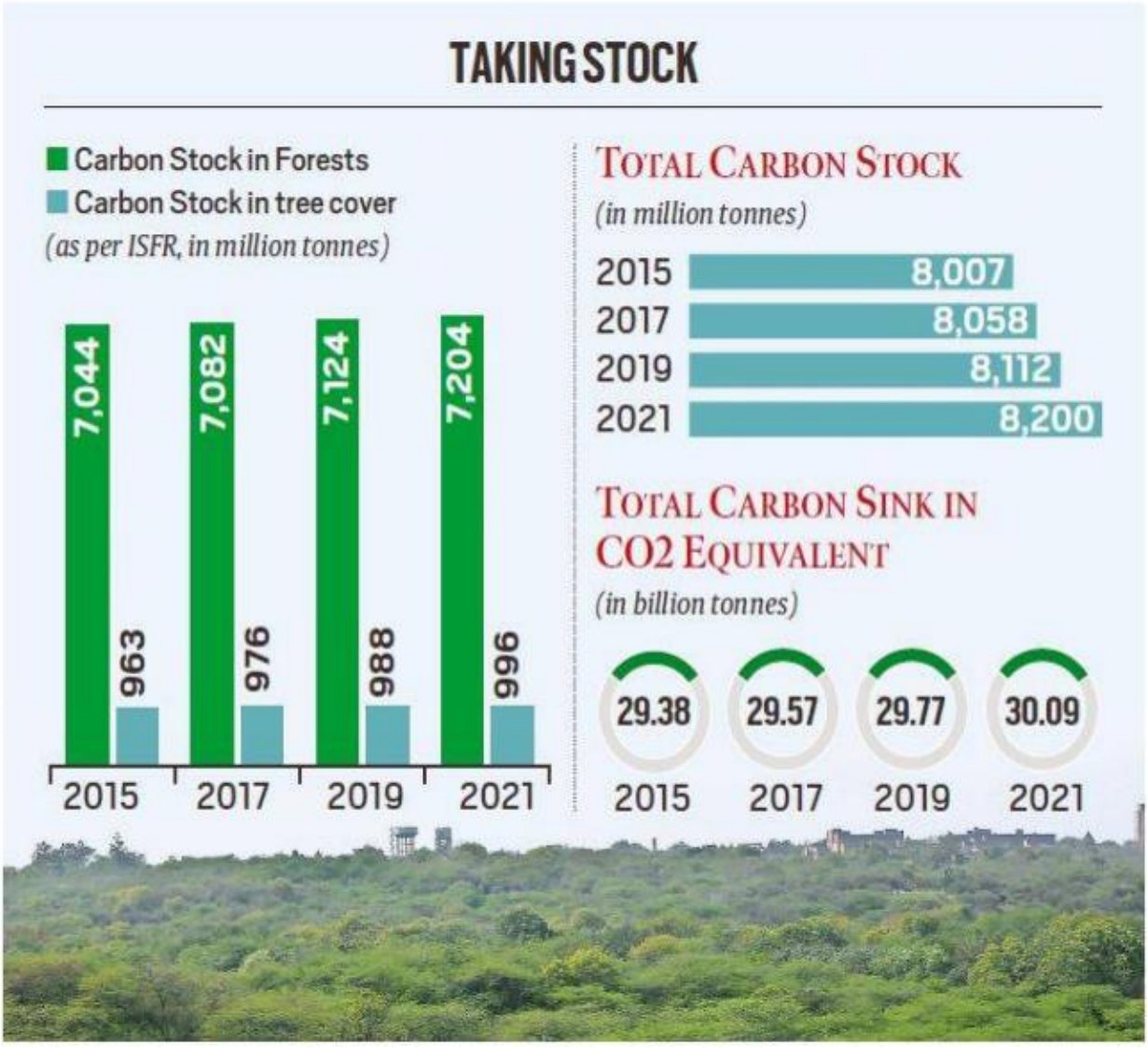


Image source: The Indian Express

5. Additional carbon sink

- There was another apparent ambiguity other than the absence of the baseline year as well.
- In an analysis published in 2019, the Dehradun-based **Forest Survey of India** (FSI) pointed out that the word "additional" in the Indian commitment could be interpreted in different ways. So, additional carbon sink" could mean

1. over and above the carbon sink that existed in the baseline year, or
2. over and above what it would be in the target yet as of 2030 in the business-as-usual scenario.

- India's forests and tree cover had a carbon sink of 29.38 billion tonnes of CO2 equivalent in 2015 and this was projected to increase in a business-as-usual scenario that is without the intervention of any fresh effort to 31. 87 billion tonnes in 2030 according to the FSI analysis.

- The first interpretation of "additional" (over and above the baseline year) would mean India's target would be met if the carbon sink in 2030 was in the range of 31.88 to 32. 38 billion tonnes of CO2 equivalent.
- In the second interpretation (over and above the target year) the target would be between 34. 87 billion tonnes of CO2 equivalent.

6. Persisting ambiguity

- Last year, the government appeared to remove the ambiguity regarding the baseline year for the carbon sink target by committing itself to the baseline of 2005.
- In a written reply to a Parliament question on July 25, 2022, Environment Minister said, "India had already achieved 1.97 billion tonnes of additional carbon sinks as compared to the base year of 2005".
- He added that "the remaining target can be achieved by increasing forest and tree cover of the country through the implementation of various central and state sponsored schemes".
- This announcement of 2005 as the baseline suddenly brought the carbon sink target within easy reach.
- Of course, India was well within its right to select 2005 as the baseline year.
- Under the Paris Agreement, countries themselves are supposed to set their climate targets and this includes the choice of baseline year.
- Additionally, as mentioned earlier, India's emissions intensity target also has 2005 as the base year.
- Several other countries including the United States, use 2005 as the baseline year for their commitments.
- The statement in Parliament also seemed to settle the question of additionality flagged by the FSI analysis.
- The promised addition to the carbon sink would have to be measured against what existed in the baseline year (2005) and not what it was projected to be in the target year (2030) in the business-as-usual scenario. This is not unusual. Additionality is measured in most cases from the baseline year.
- Curiously though just 10 days after the Parliament reply, when India formally submitted its updated international climate commitments to the UN climate body on August 4 last year, the forestry target seemingly settled was again left ambiguous.
- There was no mention of the baseline year in India's formal submission.
- While statements in Parliament are considered the official government position, internationally, India can only be held accountable for what is contained in its official submission to the secretariat of the UN Framework Convention on Climate Change.
- As of now, this seems to be a minor inconsistency and does not appear to reflect any desire to change the baseline year in future.
- The Environment Ministry has reaffirmed the 2005 baseline in written communication.
- Meanwhile, the rate of increase of carbon stock in India's forests and tree cover has been showing a rising trend, even though the total carbon stock in 2021 was slightly less than what the FSI has projected just two years ago.

YELLOWSTONE NATIONAL PARK

1. Context

Yellowstone National Park, which celebrated its 151st anniversary earlier this week, is widely considered to be the first national park in the world.
The first US national Park was born and with it, a worldwide movement to protect places for their intrinsic and recreational value.

2. Key Points

- Located in the northwest corner of Wyoming and extending into Montana and Idaho was established by the 42nd United States Congress with the Yellow Stone National Park Protection Act signed into law by President Ulysses S. Grant on March 1, 1872.
- It spans an area of over 9,000 sq km comprising lakes, canyons, rivers, and iconic geothermal features such as the Old Faithful geyser and mountain ranges.
- Over the years, it has been at the centre of many successful conservation endeavours and today is the most famous megafauna location in the contiguous United States home to grizzly bears, wolves and free-ranging herds of the endangered bison and elk.
- Native Americans were hunting and gathering here for at least 11,000 years. They were pushed out by the government after the park was established.

3. Establishing a "National Park"

- The Original legislation stated that Yellowstone would be reserved and withdrawn from settlement, occupancy or sale under the laws of the United States and that it would be set aside as a public park or pleasuring ground for the benefit and enjoyment of the people.

- In the lead-up to Yellowstone becoming a national park, three major expeditions in 1869, 1870 and 1871 raised public awareness of the area's natural beauty.
- The last of these known as the Hayden expedition was particularly important.

4. Actual motivations

- While there were those like Hayden who were concerned about the desecration of Yellowstone due to those trying to "**make merchandise of these beautiful specimens**", for US lawmakers, the actual motivation was different.
- Closing off Yellowstone to settlement and making it a tourist destination would be extremely profitable for his rail company, which would become the solely available mode of transportation to and from Yellowstone which lay in the still relatively less developed American West.

5. Ignoring the Native Americans

- Whatever the reason might have been since 1972, Yellowstone has been maintained as a pristine wilderness, with no permanent settlements.
- However, what this ignores is that the area had been home to many Native American tribes before being closed off for settlement.
- From archaeological research and oral history, it can be gleaned that at least 27 current Native American Tribes have connections to Yellowstone.
- However, when the national park status was being debated in Congress, there was next to no mention of the Native American presence.
- Once Yellowstone National Park Came into existence, several different tribal groups who used to camp there were removed by the US Army.

6. Settling in the Wild West

- Post the Civil War (1861-1865), spurred by the development of railways in the American West, white settlers began moving westwards and settling there in hopes of a prosperous future. The settlers soon transformed the land.
- Huge herds of American bison that once roamed the plains were almost completely wiped out.
- Farmers ploughed the natural grasses to plant wheat and other crops. There was also a mining boom.
- Most importantly, the westward migration ushered in an era of conflict between the settlers and the Native Americans who had lived and ruled over the land for many millennia.
- In 1868, President Grant began Pursuing a "Peace Policy" which included the goal of relocating various tribes from their ancestral lands to missionary-run Indian reservations.
- This was, however, far from peaceful; it led to some of the bloodiest fightings between the United States and the Native Americans, including several massacres of Native Americans at the hands of the US Army.

- The setting up of Yellowstone National Park, the subsequent removal of the land's Native American population and the erasure of their history cannot be extricated from the larger story of the colonisation of the American West.
- The park displaced multiple tribes and denied them their age-old hunting grounds while at the same time erasing their very existence from public consciousness which, over time, remembered the beauty of the western wilderness rather than the blood spilt to effectively create it.
- A 2021 Study in the Science Journal found that "indigenous people in the United States have lost nearly 99 per cent of the land they historically occupied" through "**forced migration".**
- The Consequences of this mass dispossession can be felt in the socio-economic deprivations of Native Americans to date.
- However, this is seldom spoken out in mainstream US discourse and even when it is, its sheer scale is often underplayed.
- While the history of this dispossession neither begins nor ends with Yellowstone National Park, it no doubt played its part, both in dispossessing and then numbing the public to the brutality of this dispossession by creating and sustaining the myth around the West's "**pristine wilderness**".

KUNO NATIONAL PARK

1.Background

Kuno National Park is a national park and Wildlife Sanctuary in Madhya Pradesh, India. It derives its name from Kuno River

It was established in 1981 as a wildlife sanctuary with an initial area of 344.686 km² in the Sheopur and Morena districts. In 2018, it was given the status of a national park

This area which has become a National Park today started out as a sanctuary of about 350 sq. kms. And was in shape of a leaf with Kuno river forming the main centre spine. This river not only helps in keeping a constant water supply in the area and irrigating the forest from inside out but also gave this protected area its name

2.History of Kuno National Park

- Kuno National Park / Kuno Wildlife Division and the surrounding area has historically been rich with wildlife.This area was known to be a dense forest in ancient times as well
- One of the gazette of Gwalior princely state of year 1902, records that the Mughal Emperor Akbar while returning from Malwa region captured a big herd of elephants in the forests near Shivpuri in the year 1564
- Abul fazal also mentioned this fact that Lions were found in this region and the last Lion in this region is known to be shot near to city of Guna in the year 1872.
- In the year 1904 Lord Curzon was invited for hunting by the then His Highness Madhavrao Scindia,the Ist, King of Gwalior

- Lord Curzon was so much impressed with the forest of valley of Kuno that he immediately suggested the King to bring Lions from Junaghad, Gir and released in the forest
- King Scindia started working on it with the audacity suitable to a Maharaja and tried collaborating on his level, with the Nawab of Junaghad
- Later Lord Curzon even presented the King with a letter addressed to the ruler of Abisinia (Current Ethopia) so that some lions from there could be brought to Kuno
- A Persian expert named D.M. Zaal was made in charge of this project by the King and in 1905 , this project was allocated Rs. 1 lakh budget in that year.

3. Significance of Kuno National Park

- The area surrounding Kuno river has been rich in biodiversity since ancient times. Its importance can be reflected in the 30,000-year-old cave paintings in nearby Pahargarh depicting multiple wild animals.
- Biogeographically this area falls under the Kathiawar-Gir dry deciduous forest eco-region and the forest types found in this area include the Northern tropical dry deciduous forest, Southern tropical dry deciduous forest, Dry Savannah forest & grassland, Tropical riverine forest
- It is equally rich in the faunal species and thus provide a rare amalgamation of various favourable factors for wildlife
- The significance of this area is strengthened by the fact that because of its aptness on various parameters Wildlife Institute of India chose this as the most suitable location for Lion Reintroduction Program in its study
- Government of Madhya Pradesh revised the status of this area, ameliorating it to become a National Park with 748.761 square km as the core and 557.278 buffer area as the buffer in December 2018
- This upgradation of Kuno Sanctuary to Kuno National Park further cements it's importance in the field of Wildlife Conservation in Central Indian Landscape.

4.Biodiversity of Kuno

- Thus Kuno National Park's forest area is mainly dominated by Kardhai, Salai, Khair trees among mostly mixed forests, this also helps it in having a variety of species of flora and fauna. In all, a total of 123 species of trees , 71 species of shrubs , 32 species of climbers and exotic species and 34 species of bamboos and grasses are found in Kuno National Park
- Kuno has one of the most unique combination of forest and vegetation in entire Madhya Pradesh and adjoining areas which can only be seen to be believed

The forests of Kuno National Park are broadly classified into the following types:

- **"Southern Tropical Dry Deciduous Forest"**
  - Southern Tropical Very Dry Teak Forest
- **Northern Tropical Dry Deciduous Forest**
  - Northern Dry Mixed Deciduous Forest

    - Northern Tropical Dry Deciduous Scrub
- **Northern Tropical Thorn Forest**
    - Ravine Thorn Forest
    - Zizyphus Scrub

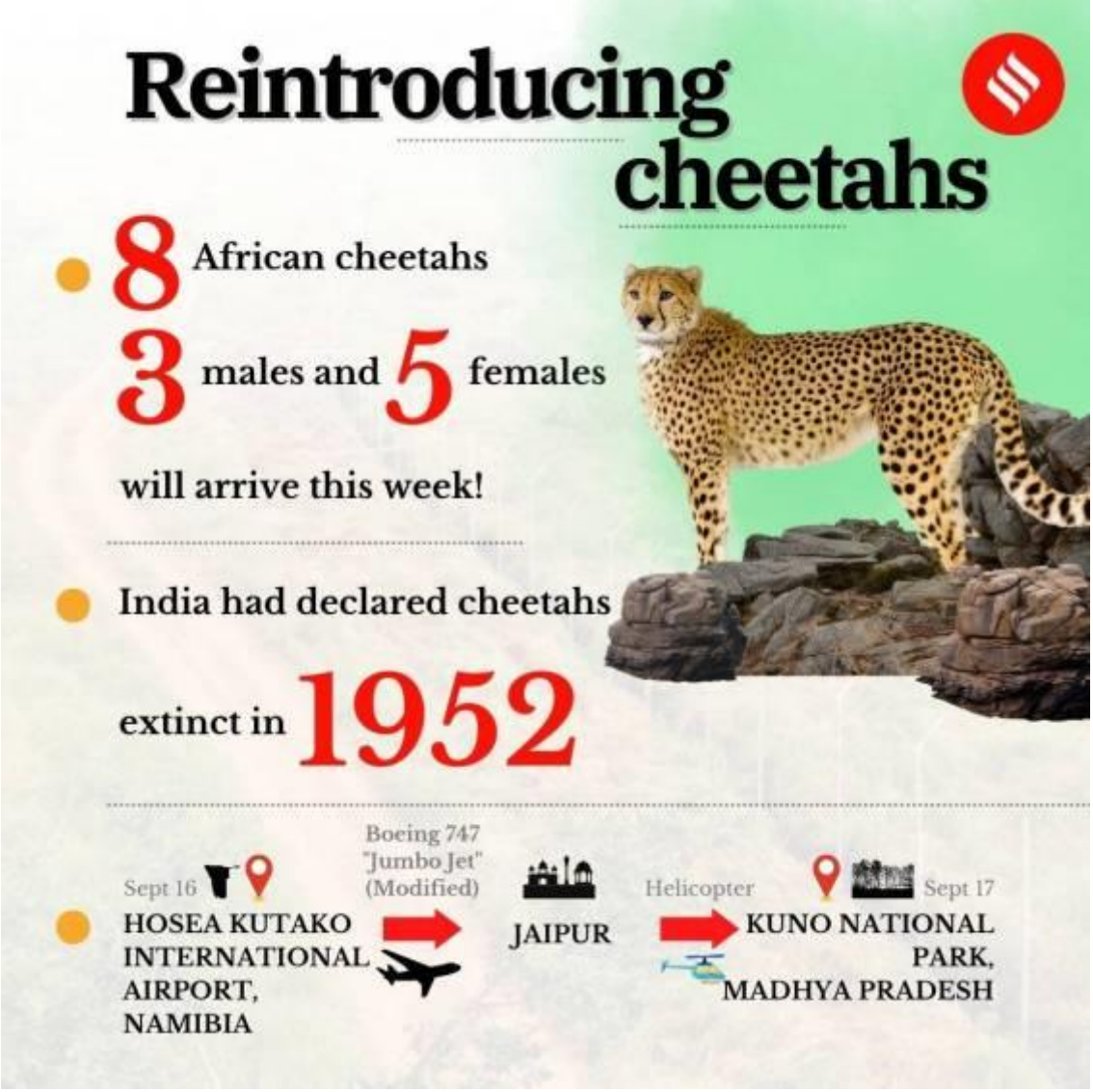
Kuno National Park which is mainly dominated by Kardhai, Salai, Khair trees among the mixed forests, supports a vide variety of both floral and faunal species. It has a rich biodiversity having a total of 123 species of trees , 71 species of shrubs , 32 species of climbers & exotic species, 34 species of bamboos and grasses, 33 species of mammals, 206 species of birds, 14 species of fishes, 33 species of reptiles and 10 species of amphibians. Such a high number of both floral and faunal species make it one of the most biodiverse areas of Central Indian Landscape.

5.Why Kuno is best for Cheeta re-introduction

The Kuno National Park has diverse habitats conducive for lions and cheetahs constituted by

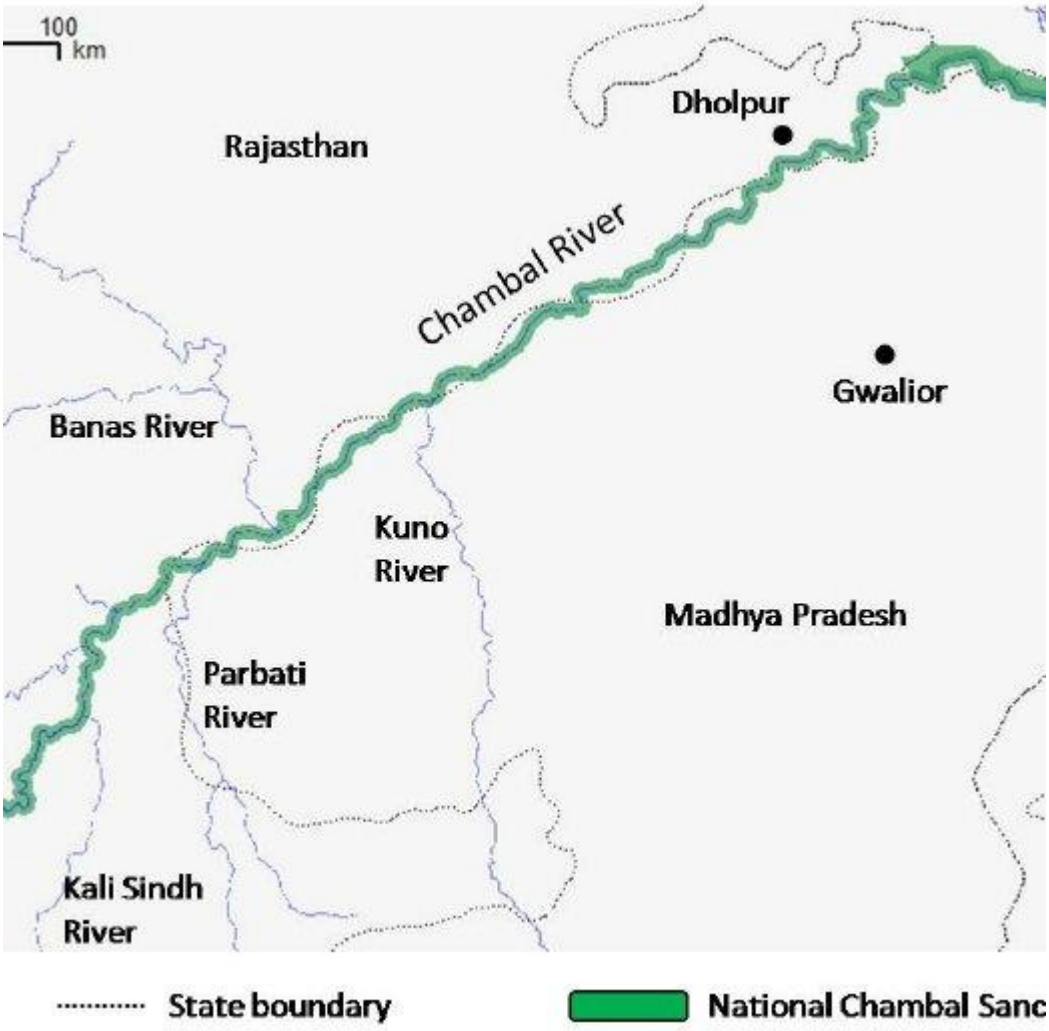
- Open woodlands,
- Savanna,
- Dry deciduous forests.
- Evergreen riverine forests

Forest grass species are common in valley habitats while plateau tops had shorter grasses
Kuno National Park is part of a large forested landscape constituted by the Sheopur-Shivpuri forests covering an area of -6800 sq. km.
The density of leopards in Kuno National Park is 8.9 per 100 sq. km



6.About Kuno river

The Kuno River is one of the main tributaries of the Chambal River
It flows through the Kuno National Park from south to north, draining the other rivulets and Tributaries into Chambal River in Morena at MP-Rajasthan border
It is 180 km long and originates from the Shivpuri Plateau



General Studies III: Economy

"SWAMIH" INVESTMENT FUND

1.Background

The Special Window for Affordable and Mid-Income Housing (SWAMIH) Investment Fund I has raised Rs 15,530 crore so far to provide priority debt financing for the completion of stressed, brownfield and Real Estate Regulatory Authority (RERA)-registered residential projects that fall in the affordable, mid-income housing category. SWAMIH has so far provided final approval to about 130 projects with sanctions worth over Rs 12,000 crore

2.Key Takeaways

- The Special Window for Affordable and Mid-Income Housing (SWAMIH) Investment Fund I is a social impact fund specifically formed for completing stressed and stalled residential projects

- The Fund is sponsored by the Ministry of Finance, Government of India, and is managed by SBICAP Ventures Ltd., a State Bank Group company
- Since the Fund considers first-time developers, established developers with troubled projects, developers with a poor track record of stalled projects, customer complaints and NPA accounts, and even projects where there are litigation issues, it is considered as the lender of last resort for distressed projects
- The Fund's presence in a project often acts as a catalyst for better collections and sales primarily in projects that were delayed for years
- According to the Finance Ministry, SWAMIH Fund has one of the largest domestic real estate private equity teams focused only on funding and monitoring the completion of stressed housing projects.

INDEX FUNDS

1.Context

Following a report by U.S based research firm Hindenburg levelling several allegations against the Adani group, global index providers like MSCI are reviewing some of the stocks inclusion in its indices that are replicated by many foreign portfolio managers

2. What are index funds

- With thousands of stock traded in stocks around the world their prices will move in different directions most observers assess a market's general trajectory amid these individual price swings by looking at broader benchmark indices.
- For example, Sensex represents 30 largest and most actively traded stocks on the Bombay Stock Exchange (BSE)
- While economists and governments look at market indices movements as a barometer of the confidence levels in the economy individual investors and fund managers use them as a gauge to compare their own portfolio's performance
- Mutual funds portfolio managers often pitch to prospective investors that their investment strategies have outperformed Sensex or other relevant benchmarks
- For retail investors selecting stocks or mutual fund schemes has always been a challenge
- While index funds and exchange-traded funds (ETF) have been an option for Indian investors for about two decades, they have seen exceptional growth in assets since 2015
- About 16% of the roughly 41 lakh crore assets managed by India's mutual funds are parked in Index funds and ETF

3.How indices are made

- Indices could be based on different industry sectors, size of companies (Small-cap, Mid-cap etc) and quantitative parameters like liquidity and trading volumes and the weightage assigned to each stock in an index may vary based on their market capitalisation or other gauges that index providers adopt
- NSE indices owns and manages over 350indices with 117 ETFs listed in India and 12 ETFs listed abroad using these products benchmarks
- The methodologies usually provide for a review of the index composition or cessation-specific indices owing to factors such as 'exceptional circumstances ' , ' market disruption ' or difficulty in replicating the indices
- However, they are not regulated by SEBI

4.SEBI proposal

Noting the " growing dominance of Index providers due to proliferation"of passive funds that drive capital flows towards assets that are part of particular market index, SEBI has proposed to bring them under its regulatory purview

5.About SEBI

5.1. Background

- Before SEBI came into existence, the Controller of Capital Issues was the regulatory authority; it derived authority from the Capital Issues (Control) Act, 1947.
- In April 1988 the SEBI was constituted as the regulator of capital markets in India under a resolution of the Government of India.
- Initially SEBI was a non-statutory body without any statutory power.
- It became autonomous and given statutory powers by SEBI Act 1992.

5.2. Structure of SEBI

- SEBI Board consists of a Chairman and several other whole-time and part-time members.
- SEBI also appoints various committees, whenever required to look into the pressing issues of that time.
- Further, a **Securities Appellate Tribunal (SAT)** has been constituted to protect the interest of entities that feel aggrieved by SEBI's decision.
- SAT consists of a Presiding Officer and two other
- It has the same **powers as vested in a civil court**. Further, if any person feels aggrieved by SAT's decision or order can **appeal to the Supreme Court**.

5.3. Aims associated with SEBI

- To protect the interests of investors in securities and to promote the development of, and regulate the securities market.

- It is the regulator of the securities and commodity market in India owned by the Government of India.

5.4. Functions

- SEBI is primarily set up to protect the interests of investors in the securities market.
- It promotes the development of the securities market and regulates the business.
- SEBI provides a platform for stockbrokers, sub-brokers, portfolio managers, investment advisers, share transfer agents, bankers, merchant bankers, trustees of trust deeds, registrars, underwriters, and other associated people to register and regulate work.
- It regulates the operations of depositories, participants, custodians of securities, foreign portfolio investors, and credit rating agencies.
- It prohibits insider trading, i.e. fraudulent and unfair trade practices related to the securities market.
- It ensures that investors are educated on the intermediaries of securities markets.
- It monitors substantial acquisitions of shares and take-over of companies.
- SEBI takes care of research and development to ensure the securities market is efficient at all times.

5.5. Powers of SEBI

- **Quasi-Judicial:** SEBI has the authority to deliver judgements related to fraud and other unethical practices in terms of the securities market. This helps to ensure fairness, transparency, and accountability in the securities market.
- **Quasi-Executive:** SEBI is empowered to implement the regulations and judgements made and to take legal action against the violators. It is also authorized to inspect Books of accounts and other documents if it comes across any violation of the regulations.
- **Quasi-Legislative:** SEBI reserves the right to frame rules and regulations to protect the interests of the investors. Some of its regulations consist of insider trading regulations, listing obligations, and disclosure requirements. These have been formulated to keep malpractices at bay. Despite the powers, the results of SEBI's functions still have to go through the Securities Appellate Tribunal and the Supreme Court of India.

5.6. Other Powers and Functions of SEBI

- SEBI is a **quasi-legislative and quasi-judicial body** which can draft regulations, conduct inquiries, pass rulings and impose penalties.
- It functions to fulfil the requirements of three categories –

- **Issuers –** By providing a marketplace in which the issuers can increase their finance.
- **Investors –** By ensuring safety and supply of precise and accurate information.
- **Intermediaries –** By enabling a competitive professional market for intermediaries.

- By **Securities Laws (Amendment) Act, 2014,** SEBI is now able to regulate any money pooling scheme worth Rs. 100 cr. or more and attach assets in cases of non-compliance.
- SEBI Chairman has the authority to order **"search and seizure operations"**. SEBI board can also seek information, such as telephone call data records, from any persons or entities concerning any securities transaction being investigated by it.
- SEBI perform the function of registration and regulation of the working of venture capital funds and collective investment schemes including mutual funds.
- It also works for promoting and regulating self-regulatory organizations and prohibiting fraudulent and unfair trade practices relating to securities markets.

Mains Corner

1. **What are various reasons for forest fires? Discuss the consequences of fires and suggest some solutions to prevent them (250 Words)**

2. Describe the various causes and the effects of landslides. Mention the important components of the National Landslide Risk Management Strategy. (250 words)

3. What is the Diurnal Temperature range? Discuss the innovative climate action strategies that one can emulate (250 Words)

4. Discuss the significance of the Treaty of High Seas and explain how to save our high seas from overfishing and pollution (250 Words)

5. What is lightning and discuss how does it occur and explain why Hot lighting has more potential of triggering a wildfire than typical lightning?

Prelims Corner

1.FRINJEX-2023 is a joint army exercise between which of the following

A. India- France B. India-UK C. India-Mangolia D.India-China

2. Which is the deepest oceanic trench on Earth?

A. Cayman trench B. Tonga Trench C.Kermadec Trench D. Mariana Trench

3. Who are the signatories to the Bru-Reang agreement?

A. Government of India, Government of Tripura, Mizoram, Bru-Rang representatives

B. Government of India, Government of Tripura, Nagaland, Bru-Rang representatives

C. Government of India, Government of Tripura, Assam, Bru-Rang representatives

D. Government of India, Government of Assam, Mizoram, Bru-Rang representatives

4. There are 46 species of this marine fish reported worldwide. The population of the species is declining due to its overexploitation for traditional Chinese medicines and as an ornamental fish. They are known to be poor swimmers but migrate by rafting to new habitats for the successful maintenance of their population. Identify the species.

A. Seahorse B.Clownfish C.Royal gramma D.Sea goldie

5.Which of the following reasons for the Causes of 1857 revolt

1. The British administration's attitude toward the native Indian population had racial overtones and a superiority mentality

2. Satara, Nagpur, and Jhansi were annexed under the Doctrine of Lapse

3. Corruption was rampant in the Company's administration, particularly among the police, minor officials, and subordinate courts, which was a major source of dissatisfaction

4. Due to severe taxes, peasants were forced to take out loans from moneylenders/traders at exorbitant interest rates, with the latter frequently evicting the former from their property for non-payment of debt dues

Which of the above given statement is/ are true

A. Only one statement is correct

B. Only two statements are correct

C. Only three statements are correct

D. All four statements are correct

Answer Key

1	2	3	4	5
A	D	A	A	D