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SAURABH PANDEY
CSE
(CIVIL SERVICES EXAMINATION)
FROM BASICS TO UPSC BRILLIANCE

By Saurabh Pandey Sir

For Civil services exam

Geography, environment , science andTechnology current affairs

SAURABH PANDEY MENTOR

VISHALI SHARMA CHIEFEDITOR

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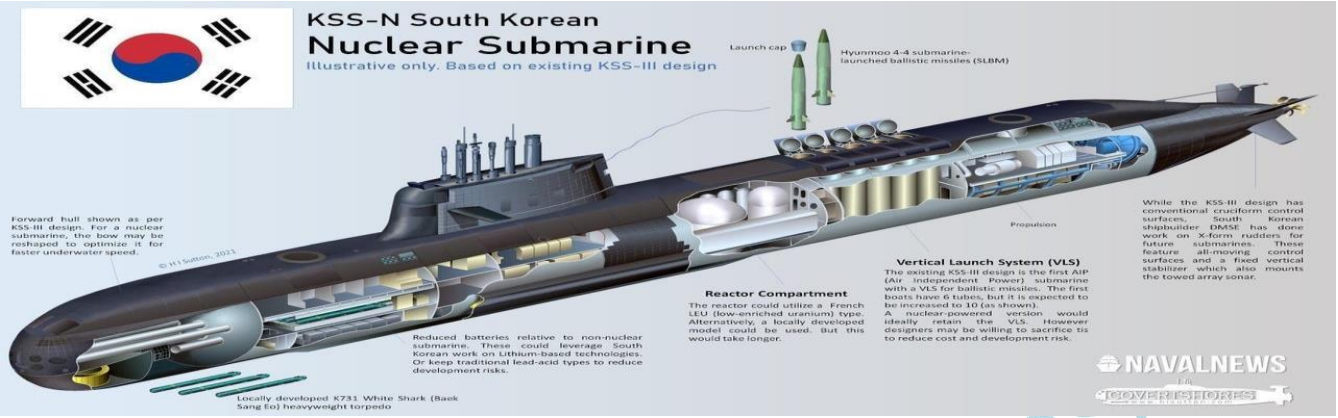
AUKUS



- An announcement about an “optimal pathway” for AUKUS the security partnership between the United States, Australia, and the United Kingdom is onthe horizon, with implications for Australia’s plans to operate a fleet of nuclear powered

WHAT IS AUKUS?

AUKUS is a trilateral security pact between Australia, the United Kingdom, andt he United States, announced on 15 September 2021 for the Indo-Pacific region.

DO YOU KNOW?

Multilateral groupings are the ones involving three or more nations having similar geopolitical, geostrategic, economic or security interests.They address the issues of all the countries that are part of it.AUKUS is one such multilateral grouping that was in news recently.

- The main issue for Australia is that many of its regional partners oppose the Royal Australian Navy operating nuclear attack submarines. Some, such as Indonesia, have been open about their reservations.
- Others, such as India, despite being politically supportive of AUKUS, appear conflicted about the prospect of these submarines operating in the regional littorals.
- For its part, Canberra has attempted to assuage concerns by explaining to its counterparts in regional capitals that AUKUS does not provide Australia with nuclear weapons capability, but is rather a means of acquiring nuclear maritime propulsion

Options and challenges for Canberra

1. The first, which Australian officials hope will be the chosen pathway, is for the U.S. to build nuclear •powered attack submarines (SSNs) for Australia.
2. Two top U.S. Senators wrote to President Joe Biden in January this year, urginghim not to sell nuclear submarines to Australia, warning that it would jeopardise U.S. national security given the vessels' scarcity.
3. The second option is for the U.K. to expand its Astute class programme to Australia.The third and perhaps most likely option is a trilateral effort to developa new nuclear submarine design.
4. Even with its closest allies, the U.S. is facing difficulties transferring technology.
5. It is not that Washington does not want to help a partner; it is more that the U.S.export control system is so rigid and archaic that it cannot make room for the priority transfer of know•how to a trusted ally.
6. For India, which has never been in the same league of U.S. partners as Australia,acquiring critical technology from the U.S. remains a more daunting prospect. .

Technology transfer is complicated

1. For Australia to operate nuclear powered submarines with high enriched uranium(HEU) fueled reactors, it will have to exploit a loophole that allows non- nuclear

2. weapon countries to withdraw the fissile material required for submarine reactorsfrom the International Atomic Energy Agency (IAEA)•monitored stockpile.

3. The removal, experts say, could set a dangerous precedent, allowing potential proliferators to use naval reactors as a cover for future nuclear weapons development.
   - .A total of 191 States have joined the Treaty, including the five nuclear-weapon States.India has not signed the NPT, citing concerns about the discriminatory nature of the treaty as it perpetuates the nuclear weapons monopoly of the five recognized nuclear weapon states (China, France, Russia, the UK, and the USA).

The **Nuclear Non-proliferation Treaty (NPT)** is an international treaty whose objective is to prevent the spread of nuclear weapons and weapons technology, to promote cooperation in the peaceful uses of nuclear energy and to further the goal of achieving nuclear disarmament and general and complete disarmament.

DO YOU KNOW?

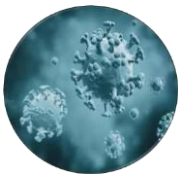
Transfer of technology is a process of transferring technology (innovations, knowledge and techniques) from one organisation or country to another organisation or country through formal or informal channels. Formal channels include FDI, licensing, trade, foreign patenting etc. whereas informal channels

1. **Pillar 1** focuses on **supporting Australia to acquire its first conventionallyarmed,** nuclear-powered submarine fleet. (It does not involve the transfer of nuclear weapons to Australia.)
2. **Pillar 2** focuses on **cooperation in eight advanced military capability areas:artificial intelligence (AI),** quantum technologies, innovation, information sharing, and cyber, undersea, hypersonic and counter-hypersonic and electronic warfare domains.

- Acquiring nuclear propulsion technology is likely to be also complicated for India, which is not a party to the Nonproliferation Treaty.
- The complexities involved in the transfer of technology for HEU •fueled reactorsin nuclear attack submarines from the U.S. and U.K., leave India with only one practical option: buying a high power reactor from France.

- AUKUS will **make Australia** the **seventhcountry** in the world to be **armed with nuclear-powered submarines** and the **second, after the United Kingdom**, **with** whom the **United Stateshas shared this technology.**
- It will significantly enhance Australia's undersea capabilities in the Indo-Pacific as nuclear-powered submarines offer many advantages, such as extended range, endurance, and stealth—features.
- These countries, however, made it clear that their aim is **not to arm the new submarines with nuclear weapons**. This is **because Australia is a signatory to** the Nuclear Non-proliferation Treaty (NPT), which bans it from acquiring or deploying nuclear weapons.

Influenza -H3N2



- Influenza viruses, which cause the infectious disease knownas flu, are of four different types: A, B, C and D.
- Influenza A is further classified into different subtypes and one of them is theH3N2

- Influenza viruses that normally circulate in pigs are called "variant" viruses whenthey are found in people.
- Influenza A H3N2 variant viruses (also known as "H3N2v" viruses) with the matrix (M) gene from the 2009 H1N1 pandemic virus were first detected in people in July 2011.
- Infections with H3N2v have mostly been associated with prolonged exposure topigs at agricultural fairs. Limited human-to-human spread of this virus has beendetected in the past as well but no sustained or community spread of H3N2v hasbeen identified at this time.

DO YOU KNOW?

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.

POINTS TO REMEMBER-

Symptoms- Fever, body ache, sore throat, cough, runny/blocked nose and a few shortness of breath.

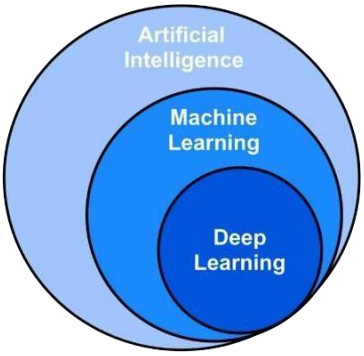
It can spread from person to person and while anyone can get infected- older, adults and younger children are at a higher risk from H3N2.

The **method of testing** for H3N2 is also **similar to COVID-19 testing** – RTPCR.

Influenza A is further classified into different subtypes and one of them is H3N2.

- Aquatic and wild birds are the major source of the influenza A virus.
- It can spread to mammals too, including pigs and humans.
- Occasionally, it is transmitted from wild to domestic birds, and this may cause severe disease, outbreaks, or human influenza pandemics.

Machine learning and Deep Learning



- A machine learning algorithm that maps evidence of past or present life couldhelp scientists to find such bio signatures on Mars.

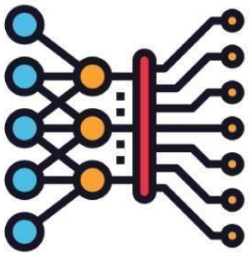
- Researchers tested the algorithm in Chile's Atacama Desert, where it reduced their search area by up to 97% and increased their likelihood of finding endoliths,a type of rock dwelling organism, by up to 88%.
- Targeted approaches augmented by deep learning delivered 56.9-•87.5% probabilities of biosignature detection versus less than 10% for random searches

MACHINE LEARNING

- Simple models with few layers.
- Easier and quicker to set up.
- May have limitations in effectiveness.
- Works well with structured data.
- Often requires manual feature engineering.
- Works with smaller datasets and Les computational
- Provides more interpretable models.

Deep learning

- Deep learning is a subset of machine learning, which is essentially a neural network with three or more layers.
- Deep learning technology lies behind everyday products and services (for example, digital assistants, voice-enabled TV remotes, and credit card fraud detection), as well as emerging technologies (for example, self-driving cars).



DEEP LEARNING

- Deep, hierarchical structure with multiple layers.
- Takes more time to set up but gives immediate and effective results.
- Suited for unstructured data like images and text.
- Tasks like image and speech recognition
- Can automatically learn features from raw data.
- Requires large amounts of data and computational resources.
- Often criticized for its "black box" nature

Causes of global warming

- The Food and Agricultural Organisation (FAO) has published the Global ForestResources Assessment, and points out that 31% of the land on earth is covered by forests.
- When trees are felled, they lead to the accumulation of carbon dioxide in the atmosphere and hence, global warming.
- Deforestation increases 11% of the global greenhouse gas emissions (CO2, CH4,N2O, SO2, and chlorofluorocarbons).
- The Harvard University Public Health Group further points out that deforestationleads to spikes in infectious germs such as those causing diseases such as malariaand dengue, whichcan adversely affect humans
- A 1% increase in deforestation leads to a 0.93% decrease in the availability of clean drinking water in rural communities that depend on open wells and flowingstreams. Also, trees release water into the atmosphere during transpiration, and this comes down as rainfall.
- Thus, deforestation has double effects
- Global warming occurs when **carbon dioxide (CO2)** and other air pollutants collect in the atmosphere and **absorb sunlight and solar radiation** that have bounced off the earth's surface.
- Normally this radiation would escape into space, but these pollutants, which can last for years to centuries in the atmosphere, **trap the heat and cause the planet to get hotter**.
- These heat-trapping pollutants—specifically carbon dioxide, methane, nitrous oxide, water vapor, and synthetic fluorinated gases—are known as greenhouse gases, and their impact is called the greenhouse effect.

- ”Colonial British set up a port there, in order to export timber elsewhere.

- The present government is also targeting these islands in order to expand its navy and also to attract more mainlanders to not just visit but even settle down here. So much for saving these island

- The Himalayan States of Jammu and Kashmir, Uttarakhand, and Himachal Pradesh have about 21,000, 24,000 and 16,000 sq km of forest area, respectively.Yet, the government of India has removed a significant fraction of trees in orderto build underpass and overpass highways in these regions.

Viral infection in Bengal

What is the adenovirus infection?

- The Centre for Disease Control and Prevention of the United States government States that adenoviruses are common viruses that typically cause mild cold or flulike illness and are usually spread from an infected person to others by close personal contact.
- Adenoviruses are common viruses that typically cause mild cold or flu-like illness and are usually spread from an infected person to others by close personal contact
- The virus is transmitted through the air by coughing and sneezing and also by touching an object or surface with adenoviruses on it
- While the virus can affect people of any age group, children with low and compromised immunity are at a higher risk

D O YOU KNOW?

- **Fecal material can spread** the infection **via contaminated water**, dirty diapers, and poor hand washing.
- There is currently **no specific course of treatment** or approved antiviral medication.
- **Some medications with proper rest** are advised **to control thesymptoms**

What is acute bronchitis?

Acute bronchitis is a contagious viral infection that causes inflammation of the bronchial tubes. These are the airways that carry air into your lungs. When these tubes get infected, they swell. Mucus (thick fluid) forms inside them. This narrows the airways, making it harder for you to breathe.

- The virus is transmitted through the air by coughing and sneezing and also by touching an object or surface with adenoviruses on it.
- While the virus can affect people of any age group, children with low and compromised immunity are at a higher risk.
- The symptoms of the viral infection, other than common cold or flu•likesymptoms, include acute bronchitis, pneumonia, pink eye (conjunctivitis) and acute gastroenteritis
- A recombinant of two strains of adenovirus is causing a spike in viral infectionsin West Bengal.
- "It is a recombinant strain of human adenovirus type 3 (HAdV•3) and type 7 (HAdV•7) that is causing the majority of infection

Crypto currency in PMLA

The story so far:- On March 7, to further tighten the loosely regulated crypto market, the Finance Ministrysaid that all virtual digital assets (VDAs) will come within the ambit ofthe Prevention of Money Laundering Act, 2002 (PMLA).

What is the PMLA ?

- The anti money laundering legislation was passed by the National Democratic Alliance government in 2002, and came into force on July 1, 2005.
- The PMLA was showcased as India's commitment to the Vienna Convention oncombating money laundering, drug trafficking, and countering the financing of terror (CFT).
- The law was aimed at curbing the process of converting illegally earned money into legal cash.

disseminating information related to suspicious financial transactions to law enforcementagencies and overseas FIUs.

- In its analysis, if the FIU•IND finds wrongdoing, it will alert the ED.

- Under Section 5 and 8(4) of the Act, the ED has discretionary powers to search and seize suspected property without any judicial permission.

.What tools can be used to track money laundering via crypto transactions?

- Tracking money trail in cryptocurrency transactions may require new tools and approaches as such transfers differ fundamentally from traditional banking channels.
- The Egmont Group that facilitates cooperation between FIUs to prevent money laundering recommends the analysis of crypto wallets, its associated addresses and Blockchain records, and hardware identifiers like IMEI (International Mobile Equipment Identity), IMSI (International Mobile Subscriber Identity) or SEID (Secure Element Identifier) numbers, as well as MAC addresses...

Neutralising antibodies

- A small study involving 266 children, who had received two doses of a live, attenuated Japanese encephalitis vaccine SA•14•14•2 made in China, found very low levels of neutralizing antibodies IgG at different time points after vaccination neutralizing antibody (Nab
- A neutralizing antibody (NAb) is an antibody that is responsible for defending cells from pathogens, which are organisms that cause disease.
- They are produced naturally by the body as part of its immune response, and their production is triggered by both infections and vaccinations against infections.
- The team's **antibody targets a conserved region** in the core of the **three-finger toxin (3FTx)** found in elapid venom, despite variations in this toxin among different elapid species.
- The researchers tested their synthetic antibody on animal models, finding it effective against toxins from the **Taiwanese banded krait**, monocled cobra, and black mamba, with a potency nearly 15 times that of conventional antivenom, even when administered after a delay

Why is ESG relevant in India?

India has long had a number of laws and bodies regarding environmental, socialand governance issues, including the Environment Protection Act of 1986, quasi-judicial organisations such as the National Green Tribunal, a range of labour codes and laws governing employee engagementand corporate governance practices. The penalty for violations can be substantial.

Legislation regarding ESG are likely, given the increased emphasis by the Indiangovernment on ESG issues, which can be seen in India's more active role in global climate forums as well as inspecific policy developments, such as the announcement in January by the Reserve Bank of India that it would be auctioning ₹80 billion ($981 million) in green bonds

In particular, compliance by Indian companies with the ESG regulations of the U.S., the U.K.,

the European Union, and elsewhere will be critical if India is to take full advantage of the growing decoupling from China and play a more prominent role in global supply chains and the global marketplace overall.That companies have a distinct responsibility as corporate citizens, the main driver is the realization that environmental, social and governance ("ESG") considerations need to be included by investors in a company's risk profile inorder to accurately assess the enterprise.

- The evolution of ESG laws and regulations is, however, still at a nascent stage inIndia,belief that companies have a distinct responsibility as corporate citizens, the main driver is the realization that environmental, social and governance ("ESG")considerations need to be included by investors in a company's risk profile in order to accurately assess the enterprise.
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What is the Meaning of ESG Regulations?

- ESG is an acronym for **Environmental**, **Social**, and **Governance**.
- ESG takes the holistic view that ***sustainability extends beyond just environmental issues***.
- ESG can be best explained as a framework that helps the stakeholders understand how an organization is managing risks and opportunities related to environmental, social, and governance criteria.
- In a simple manner, the ***main objective of ESG norms is basically to ensure that businesses are conducted in a more responsible manner***.
- While the term ESG is often used in the context of investing, stakeholders include not just the investment community but also consumes customers, suppliers, and employees.
- All of them are increasingly interested in how sustainable an organization's operations are.

How ESG differs from CSR?

India has a robust corporate social responsibility (CSR) policy that mandates thatcorporations engage in initiatives that contribute to the welfare of society. This mandate was codified into law with the passage of the 2014 and 2021 amendments to the Companies Act of 2013.

ESG regulations, on the other hand, differ in process and impact.

The U.K. Modern Slavery Act, for example, requires companies with businessinthe U.K. and with annual sales of more than £36 million to publish the efforts they have taken to identify and analyse the risks of human trafficking,child labour and debt bondage in their supply chain; establish internal accountability procedures; evaluate supplier compliance and to train supply chain managers regarding these issues

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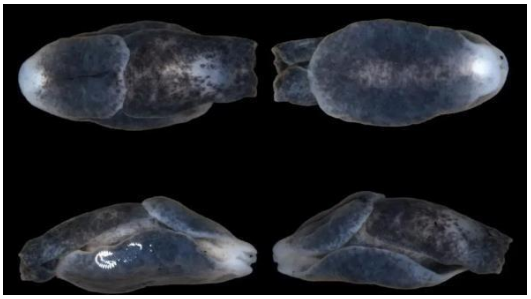
- In particular, compliance by Indian companies with the ESG regulations of the U.S., the U.K., the European Union and elsewhere will be critical if India is to take full advantage of the growing decoupling from China and play a more prominent role in global supply chains and the global marketplace overall.

- Reproduction of the species is observed between **November and January.**

Melanochlamys droupadi.

- **The Zoological Survey of India (ZSI) has named a new marine species of head-shield sea slug with ruby red spot which was discovered from West Bengal and Odisha coast after President of India Droupadi Murmu.**
- **This species belonging to Melanochlamys genus was discovered from Digha of West Bengal coast and Udaipur of Odisha coast.**



NOTE:

- It is a small invertebrate with a maximum length of up to 7 mm.
- Habitat: It inhabits wet and soft sandy beaches.
- It is brownish black in colour with a ruby red spot in the hind end.

- **The new species of head-shield sea slug, which is found nowhere else in theworld, has been named Melanochlamys Droupadi.**

Species of the genus

- **Melanochlamys are characterised morphologically by a short, blunt andcylindrical body and a smooth dorsal surface with two dorsal equal or unequal shields, named the anterior cephalic and posterior shield**.

- Melanochlamys droupadi **secrete transparent mucus, shielding them from sand grains** while crawling beneath smooth sand, making its body rarely visible.

- The ZSI states that while species in this group are **typically found in temperate regions of the Indo-Pacific Oceanic** realm, three species are truly tropical: ***Melanochlamys papillata*** from the Gulf of Thailand, ***Melanochlamys bengalensis*** from West Bengal and Odisha , coast, and the Melanochlamys droupadi.

Leopard census

- **India's leopard numbers rose by 8% from 12,852 in 2018 to 13,874 in 2022, according to a report made public by the Environment Ministry on Thursday.**
- **While the highest number of leopards were reported in Madhya Pradesh (3,907), only three other States reported over 1,000 animals each Maharashtra (1,985), Karnataka (1,879) and Tamil Nadu (1,070). While Uttarakhand reported a 22% decline in the big cat numbers reportedly due to poaching and man-animal conflict, Arunachal Pradesh, Assam and West Bengal saw a collective 150% rise to 349 animal.**

The leopard is the smallest of the Big Cat family (of **genus Panthera** namely the **Tiger**, **Lion** (***Panthera leo***), **Jaguar**, **Leopard, and Snow Leopard**), and is known for its ability to adapt in a variety of habitats.

A **nocturnal animal,** feeds on smaller species of herbivores found in its range, such as the chital, hog deer and wild boar.

Melanism is a common occurrence in leopards, wherein the entire skin of the animal is black in colour, including its spots.

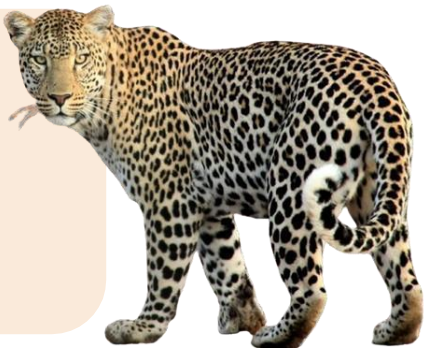
- **The survey covered 20 States of India, and focused on about 70% of the animals' expected habitat, which are India's tiger reserves and protected forest areas.**

Conservation Status:

IUCN Red List: Vulnerable

CITES: Appendix-I

Indian Wildlife (Protection) Act, 1972: Schedule-I



- **Unlike tigers, which are largely confined to forest reserves, leopards are far more adaptable and tend to be found in significant numbers, in villages and sometimes, even in cities.**
- **They are also known to prey on cattle and thus be involved in conflict, resulting in higher mortality**

Big Cat Alliance

- **The Union Environment Ministry plans to set up and coordinate an International Big Cat Alliance**
- **(IBCA), along the lines of the International Solar Alliance, an India-headquartered initiative to promote solar installations globally.**

International Union for Conservation of Nature (IUCN) from Switzerland; Science and Conservation International Snow Leopard Trust from Kyrgyzstan; The Amur Tiger Centre from Russia include nine partner organisations have also agreed to join the IBCA as partner organisations.

The 16 countries that have expressed interest in joining the alliance include, Armenia, Bangladesh, Bhutan, Brazil, Cambodia, Egypt, Ethiopia, Ecuador, Kenya, Malaysia, Mongolia, Nepal, Nigeria, and Peru.

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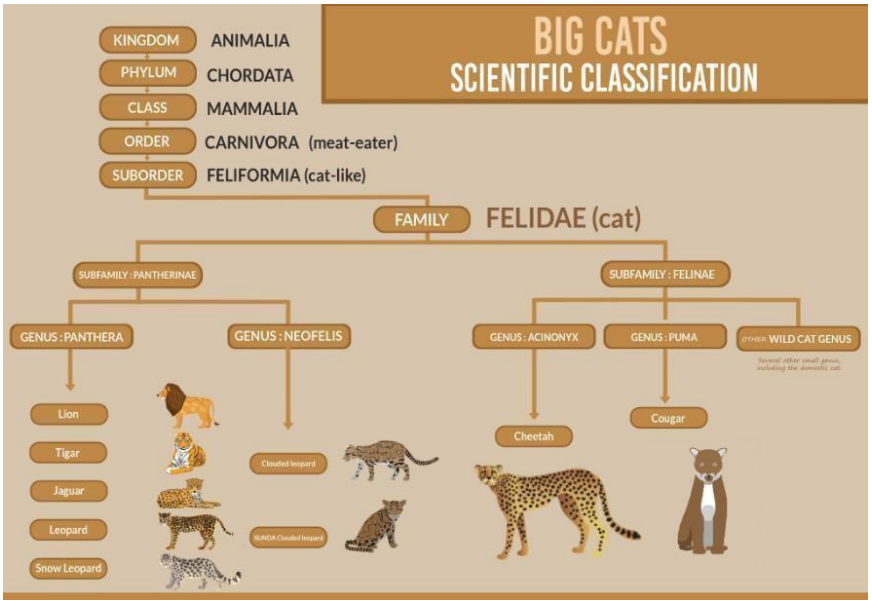
DO YOU KNOW?

IBCA provides a **platform for the member nations to share knowledge and expertise** and **extend support to recovery efforts** in potential habitats.



There are two recognized subspecies of tiger:

- **The continental (*Panthera tigris tigris*)**

- **The Sunda (*Panthera tigris sondaica*) Habitat: Tropical rainforests,evergreen forests, temperate forests, mangrove swamps, grasslands, and savannas. The tiger historically ranged from eastern Turkey and Transcaucasia to the coast of the Sea of Japan, and from South Asia across Southeast Asia to the Indonesian islands of Sumatra, Java, and Bali.**

Elephant Behaviour

- Elephants in the eastern Himalayan Floodplains bury their calves in a 'legs upright' position, a new study has found.
- Through long-term observation, the researchers also found that elephantherds tend to avoid the paths where the carcasses were buried and take parallel routes.

DO YOU KNOW?

Karnataka holds the highest number of elephants, followed by Assam and Kerala.

Conservation Status:

- IUCN Red List: Endangered.
- CMS: Appendix I.
- Wildlife (Protection) Act, 1972: Listed underSchedule I,
- CITES: Appendix I.

- The major findings reflect that the carcasses were carried by trunks and legsfor a distance before being buried in a 'legs upright' position.
- India has about 27,000 Asian Elephants, which is the world's largest population of the species
- As per Elephant Census (2017), **Karnataka** has the highest number of elephants (6,049), followed by Assam (5,719) and Kerala (3,054)
- More than **60% of the world's elephant population** is in India.
- The elephant is the **Natural Heritage Animal of India**

Species of Elephants: Elephants are divided into three main species and other subspecies spreading across two continents in the world.

Africa: African forest elephant and African Savannah elephant, named according to their habitats. Both African species have ivory tusks tempting poachers.

Asia: Asiatic elephants are primarily forest elephants; an important sub-species is Sumatran elephant. Only some of the males have tusks.

- **Rampant environmental changes and forest destruction push Asian elephants (Elephas maximus) and their African counterparts (Loxodonta africana) to explore human spaces to fulfil their dietary and ecological requirements, leading to 'novel' elephant behaviours in shared spaces**

Faulty rain in Philippine

- Faulty warning systems, poverty and deforestation of mountains in the southern Philippines turned recent unseasonably heavy rain into deadly disasters, scientists said in a report. A study by the World Weather Attribution group found the unusually heavy rain in eastern Mindanao wasnot "particularly extreme".
- But with people living in landslide-prone areas and shortcomings in weatheralerts, the rain became "devastating"
- The scientists found that a higher-than-average rate of poverty in the mountainous region had left people vulnerable to the impacts of heavier rainfall, while "intensified deforestation" had increased the risk of landslides.
- For example, automated sensors for rainfall and stream level in the region "have not been recording data since at least 2022", after funding for maintenance and data transmission was cut. The report also faulted the country's weather forecasts and warnings, which "have limited granularity on local risk and lack instructions on where and when to evacuate".

Finland NATO 31st Member

- **Alexander Stub was sworn in on Friday as Finland's new President and said the Nordic country has taken "the final step into the Western community of values" by becoming a NATO member. Finland joined NATO in April 2023 following Russia's 2022 attack on Ukraine.**
- **It has the military alliance's longest land border with Russia 1,340 km and is one of the most active European providers of military and civilian aid to Ukraine.**

DO YOU KNOW?

Finland is a country located in northern Europe. It is situated between Sweden to the west, Norway to the north, and Russia to the east. Finland also shares a maritime border with Estonia to the south across the Gulf of Finland. The coordinates of Finland's capital city, Helsinki, are 60.1699° N, 24.9384° E.

Article 5 of the Washington Treaty?

Article 5 of the Washington Treaty is a critical component of the North Atlantic Treaty Organization (NATO) agreement. It states that an armed attack against one or more NATO members in Europe or North America shall be considered an attack against all NATO members

GI Tag to Cuttack Rupa Tarakasi/ Assam majuli mask

Latest GI Tags **The famous Cuttack Rupa Tarakasi (silver filigree) has been given the Geographical Indication (GI) tag by the Geographical Indications**

Governing body for GI

- International Level: It is governed by WTO's Agreement on Trade-Related Aspects of Intellectual Property Rights (TRIPS).
- In India - Controller General of Patents, Designs and Trade Marks, who is also Registrar of Geographical Indications.

Registry in Che Archaeological evidence suggests that Filigree was incorporated into jewellery as early as 3,500 BCE in Mesopotamia where it is practised even today as Telkari work.

According to historians, there is every possibility that the Tarakasi work reached Cuttack from Persia through Indonesia some 500 years ago by sea trade..

About Majuli masks

These are handmade masks used in bhaonas on the island of Majuli in Assam.

Bhaonas are theatrical performances with devotional messages under the neo- Vaishnavite tradition.

The masks are used to depict characters in devotional performances.

It was introduced by the 15th-16th century reformer saint Srimanta Sankardeva.

Ratlam Riyawan Lahsun (Garlic), a variety named after Riyawan village in Ratlam district of Madhya Pradesh, also bagged the GI tag along with the Ambaji White Marble, which is formed when limestone is re-crystallised under the earth's crust due to intense pressure and heat.

Tripura Risa Textile, Hyderabad Lac Bangles, Majuli Mask of Assam and the Assam Majuli Manuscript Painting are other products that got GI tag.

The Majuli Mask of Assam is made in different varieties and sizes as they are mainly divided into different categories — Mukha bhaona covers the face; the Lotokoihanging mask, which is bigger in size, extends to the chest; while Cho Mukha (huge mask) covers the head and body.

Instrument Landing System (ILS)

WHY IN NEWS?

- Thick mist which hampers flight operations, necessitating the reliance on instruments like the "Instrument Landing System" (ILS) to navigate through the obscured surroundings.
- .ILS is a standard precision landing aid established by the International Civil Aviation **Organisation (ICAO). It is used to provide accurate lateral and vertical guidance to aircraft for landing on the runway under normal or adverse weather conditions.**
- **ILS-equipped runways have ground-based transmitters positioned at the runway's end, emitting signals**. Aircraft are equipped with onboard ILS receivers that pick up these signals.
- As the aircraft approaches the runway, the pilot uses visual and audible cues provided by the ILS. Real-time adjustments are made based on these cues to keep the aircraft aligned with the desired glide path.

With the help of ILS systems, pilots are able to understand how their aircraft is positioned with respect to an airport runway without needing to physically see it.

DO YOU KNOW?

ILS comprises two main components, the localiser, and the glide slope-

- The localizer ensures lateral alignment, guiding the aircraft along the correct azimuth toward the runwaycenterline.
- Simultaneously, the glide slope provides vertical guidance, aiding pilots in maintaining the properdescent angle for a safe landing.

Interestingly, the need for advanced ILS is now felt in airports which traditionally would not have fog problems, but report visibility challenges due to increased pollution (or smog).

Mapping

Dana Point is a city located in southern Orange County, California, United States.

Resonance.

It is a phenomenon when the frequency of an externally applied periodic force ona body is equal to its natural frequency, the body readily begins to vibrate with an increased amplitude

Resonance can be good or bad, depending on the context. It is good in applications like the quartz crystal in a quartz watch, when playing musical instruments or singing (with the vocal chords), when producing laser light, and in nuclear magnetic resonance (which MRI scanners use to look inside your body).

You may have noticed the detrimental effects of resonance when you're sitting in a bus, the engine is idling, and you feel the vehicle's metal structure rattling. On April 12, 1831, British soldiers were marching on the Broughton Suspension Bridge in England. As they marched in step

Artificial glacier

In the Tian-Shan mountains of Kyrgyzstan, villagers have made an artificial glacier to provide water for their drought-hit farms.

- **Condition of glacier formation:**
  - **Mean annual temperatures** are close to the freezing point.
  - **Winter precipitation** produces significant accumulations of snow.
  - **Temperatures throughout the rest of the year** do not result in the complete loss of the previous winter's snow accumulation.

Formation of Glacier

- Glaciers begin forming in places where more snow piles up each year than melts. Soon after falling, the snow begins to compress, or become denser and tightly packed.
  - The process of snow compacting into glacial firn (dense, grainy ice) is called **firnification**
  - When the ice grows thick enough, about 50 meters (160 feet), the firn grains fuse into a huge mass of solid ice. The glacier begins to move under its own weight.
  - Different parts of a glacier move at different speeds. The flowing ice in the middle of the glacier moves faster than the base

Plastic pollution Himalaya

Microplastics are formed by the degradation and the fragmentation of large plastic pieces that are improperly disposed of.

Microplastic deposition and accumulation has been found in the Himalayan mountains, rivers, lakes and streams.

These Microplastics can be trapped in glaciers for a long time and released into rivers during snow melting.

The Indian Himalayan Region is a critical source of water in the subcontinent, feeding a number of major rivers of India that include the Indus, Ganges and Brahmaputra river systems.

Unscientific plastic disposal is causing soil and water pollution in the Indian Himalayan Region and impacting its biodiversity, which is having an adverse impact on the fresh water sources that communities downstream depend on.

Rapid and unplanned urbanization and changing production and consumption patterns are responsible for the plastic waste crisis in the Indian Himalayan Region. A quantum jump in tourist footfalls is another reason for exacerbation of the problem.

Legal mandate for waste management Solid Waste Management Rules (SWM) 2016, Plastic Waste Management (PWM) Rules 2016 and Extended Producer Responsibility (EPR) 2022 constitute the regulatory framework for plastic waste management for India (at the country level).

Special needs of hill areas are recognised by the SWM but are not factored in while creating a mandate for both local bodies and producers, importers, and brand owners (PIBOs), while PWM and EPR have not even recognised the special needs of the hills.

Himachal Pradesh has a buy back policy for non-recyclable and single-use

- **plastic waste since 2019, but there is still widespread littering of plasticwaste.**
- **Sikkim banned packaged mineral water use from January 2022 and has afairly robust regulatory system.**
- **Under the SWM, PWM and EPR, the task of waste management from collection to its scientific disposal is the duty of local bodies.**
- **There is no clarity regarding the mandate to ensure collaboration betweenlocal bodies and PIBOs. There is a need to include**
- **traditional institutions within the definition of local bodies when it comes tothe Indian Himalayan Region**

Steps needed

- **Empowering local bodies and creating the necessary infrastructure for wastemanagement need immediate attention.**
- **Segregation of waste and the participation of the people in this endeavour with the helpof sustained public education campaigns are a sine qua non.**
- **The geographical neutrality of targets under the EPR could be countered if the highercost of EPR operationalization in the mountain region is given due consideration.**
- **The value of the EPR certificate which is earned by a PIBO in the Indian Himalayan Region could be higher than one earned in the rest of the country for every ton of plasticwaste processed.**
- **Data gaps in terms of the quantum and quality of waste being generated in the Indian Himalayan Region States should be plugged.**
- **Convergence in existing schemes such as SBM, the Mahatma Gandhi National Rural Employment Guarantee Act, and the Finance Commission's grants could be used to create the infrastructure, maintain and run operations.**
- **The Swachh Bharat Kosh Trust set up to facilitate the channelization of philanthropic contributions and corporate social responsibility funds towards this cause could also beused to augment resources.**

The Atal Mission for Rejuvenation and Urban Transformation (AMRUT) and Smart Cities Scheme under which many cities in the Indian Himalayan Region are selected, could also work in convergence on the issue of scientific waste management and making cities in the Indian Himalayan Region free of plastic

Narasapur croche laceed

Narasapur crochet lace craft has received the Geographical Indications (GI) tag, giving a new lease of life to the dying craft in the region godavan of Andhra Pradesh
This recognition aims to revitalize the dwindling craft and provide a boost to its demand, in the face of competition from machine-made lace products from China.

Inflammatory Bowel Disease (IBD)

Inflammatory Bowel Disease (IBD) describes disorders where the lining of the digestive tract is inflamed. There are two types of IBD disorders: ulcerative colitis, where the large intestine and the rectum are prone to inflammation and sores, and Crohn's disease, which usually affects the small intestine. Researchers have reported diet, age, family history, cigarette smoking, and certain medications, among other factors, as being responsible for causing or worsening IBD. They have also said changing diet patterns can help explain changing patterns of the prevalence of IBD.

Drought in Himalaya

About 90% of the Himalayan region will experience drought lasting over a year if the world warms by 3 degrees C, according to a new research. It added that in India, pollination was reduced by half at 3-4 degrees versus reduction by a quarter at 1.5 degrees. The team also reported large increases in the exposure of agricultural land to drought with 3 degrees of warming: more than 50% of the agricultural land in each of the countries was projected to be exposed to severe droughts longer than a year over a 30-year period. The results presented in this collection confirm the need for the implementation of climate policies aligned to the Paris Agreement limits if widespread and escalating climate change risk

Fast Breeder Reactor

Prime Minister Narendra Modi witnessed the start of the process of core-loading the indigenous Prototype Fast Breeder Reactor (PFBR) at the Madras Atomic Power Station in Kalpak am, Tamil Nadu.

What is a Fast Breeder Reactor??

A Fast Breeder Reactor (FBR) is a nuclear reactor that uses fast neutrons togenerate more nuclear fuels than they consume while generating power, dramatically enhancing the efficiency of the use of resources.

Nuclear fission by fast neutrons causes an increase in neutrons generated.

What role can SMRs play?

- **The delays brooked another potential complication in the form of Small Modular Reactors (SMRs).**
- **These reactor designs have a maximum capacity of 300 MW, require less land, and accommodate more safety features.**
- **"Several countries are developing SMRs to complement conventional [facilities] since SMRs can be installed at reduced cost and time by repurposing infrastructure in brownfield sites.**

NOTE:

Fission:

1. Definition: Splitting of a heavy nucleus into lighter nuclei.
2. Isotopes: Involves uranium-235, plutonium-239.
3. Application: Generates electricity in nuclear reactors.
4. Waste: Produces radioactive waste.

Fusion:

5. Definition: Combining light nuclei to form heavier nucleus.
6. Isotopes: Involves hydrogen (deuterium, tritium).
7. Application: Powers stars, potential energy source on Earth.
8. Waste: Produces helium, non-radioactive waste.

Core Loading:

- **Definition: Process of loading nuclear fuel assemblies into the reactor core.**
- **Components: Fuel assemblies comprise fuel rods containing fissile material like enriched uranium or plutonium.**
- **Fast Breeder Reactor (FBR): Designed to produce more fissile material (e.g., Plutonium-239) than it consumes.**

  Achieves this through converting non-fissile isotopes (e.g., Uranium-238) into fissile isotopes (e.g., Plutonium-239) using fast neutrons.Process known as "breeding."

NOTE:

Capacity of PFBR in Tamil Nadu:

500 Megawatt Electric (MWe) Capacity:

1. India's Prototype Fast Breeder Reactor (PFBR) in Tamil Nadu.
2. Designed by Indira Gandhi Centre for Atomic Research and constructed by BHAVINI (Bharatiya Nabhikiya Vidyut Nigam Limited).

Significance:

1. PFBR considered a precursor to future FBRs.
2. After core loading, PFBR will approach criticality and begin power generation.
3. India will be second country after Russia to have a commercial operating FBR.

Symbolism:

1. Marks India's entry into the crucial second stage of its three-stage nuclear programme.

Angkor Wat Temple

WHY IN NEWS?

Recently the Cambodian Government evicted people living around the Angkor Wat TempleComplex.

About Angkor Wat

- **Angkor Wat is an enormous Buddhist temple complex located in northern Cambodia. It was originally built in the first half of the 12th century as a Hindu**

temple.

- **Spread across more than 400 acres, Angkor Wat is said to be the largest religious monument in the world.**
- **Its name, which translates to "temple city" in the Khmer language of the region references the fact it was built by Emperor Suryavarman II, who ruled the region from 1113 to 1150, as the state temple and political center of his empire Originally dedicated to the Hindu god Vishnu, Angkor Wat became a Buddhist temple by the end of the 12th century.**

Buddhism: The carvings in the temple, which show scenes from both **Buddhist and Hindu mythology, represent the change from Hinduism to Buddhism.**
Neighboring Structures: Angkor Wat is a component of a larger **complex that also contains the sculpturally decorated Bayon Temple at Angkor Thom.**

DO YOU KNOW?

It was built by **King Suryavarman II in the 12th century.** Suryavarman II was the king of the Khmer (Cambodian) empire renowned as a religious reformer and temple builder.

CHINA VS PHILIPPINE DISPUTE

Chinese and Philippine coast guard vessels collided in the disputed South China Sea and four Filipino crew members were injured in high-seas confrontations as Southeast Asian leaders gathered for an Asian summit where alarm over Beijing's aggression at sea was expected to be raised.

- Territorial Disputes
- China claims most of the South China Sea, conflicting with claims from the Philippines, Malaysia, Brunei, Taiwan, and Vietnam.

2. **Resource Rich Waters**
   - Valuable natural resources like oil and gas reserves.
   - Essential global shipping route, with trillions of dollars in trade passing through annually.
3. **Military Build-up**
   - China accused of militarizing the area with missiles and military installations.
   - Raises concerns over freedom of navigation and regional stability.
4. **Legal Disputes**
   - 2016 international tribunal ruled against China's historical claims.
   - China rejects the ruling, continues activities, like island-building and military deployment.
5. **Strategic Importance**
   - Vital maritime corridor linking Indian Ocean and Pacific Ocean.
   - One-third of global shipping passes through, critical for international trade.
6. **Specific Atolls and Shoals**
   - Second Thomas Shoal (Ayungin Shoal) is significant due to its location in the Philippine exclusive economic zone.
   - Disputes over Paracel Islands, Spratly Islands, Scarborough Shoal, among

About ASEAN

REGIONAL FORUM

- **Established in 1994, the ASEAN Regional Forum (ARF) is an important platform forsecurity dialogue in the Indo-Pacific.**
- **It provides a setting in which members can discuss current security issues and develop cooperative measures to enhance peace and security in the region.**
- **The ARF is characterised by consensus based decision-making and frank dialogue.**
- **It comprises 27 members: the 10 ASEAN member states (Brunei, Cambodia, Indonesia,Laos, Malaysia, Myanmar, Philippines, Singapore, Thailand and Vietnam); 10 ASEANDialogue Partners (Australia, Canada, China, the European Union (EU), India, Japan,New Zealand, the Republic of Korea (ROK),**

UN Women and climate change

Women who run farms and rural households in poor countries suffer more from climate change and are discriminated against as they try to adapt to other sources of income in times of crises, the United Nations warned Tuesday.

A new report by the Food and Agriculture Organization, "The Unjust Climate," found female-headed rural households lose on average 8% more of the income during heat waves and 3% more during floods, compared with male-headed households. That disparity translates into a per capita reduction of $83 due to heat stress and $35 due to Floods coming upto an annual total of $37 billion and $16 billion respectively in poor countries, the U.N. agency said in the report.

Environment and women/ Green jobs and Women

1. **The transition to low-carbon development has the potential to add about 35 million green jobs in India by 2047.**
2. **The International Labour Organization defines green jobs as "decent jobs that contribute to the preservation or restoration of the environment".**
3. **Many of these span across sectors, such as manufacturing, construction, renewable energy, energy efficiency and automobiles, which traditionally saw a lower representation of women.**

4. **Globally, men are likely to transition to green jobs faster than women. Even as India increased its renewable energy capacity by 250% between 2015 to 2021, women comprised merely 11% of workers in the solar rooftop sector.**

5. The Annual Survey of Industries 2019-20 shows that women workers are mostly concentrated in industries such as apparel, textile, leather, food, and tobacco. In contrast, a Confederation of Indian Industry (CII) 2019 report shows that men comprise 85% of theworkforce in sectors such as infrastructure, transport, construction, and manufacturing.

6. **A study in 2023 by the Skill Council for Green Jobs indicated that 85% of the training for green skills was imparted to men while over 90% of women believed that social norms limited their participation in training for green jobs.**

7. **These restrictive social norms include factors such as the belief that women are unsuitable for certain technical roles, safety concerns, lower representation in science, technology, engineering, and mathematics (STEM) subjects, and familial constraints.**

8. **As India embraces a green transition, empowering women and advancing gender equityin climate actions will be one of the keys to unlock the co benefits of a low-carbon and environmentally sustainable economy. Increasing women's representation in green jobshas several benefits. In the short run, it can address the gender biases in the Indian labour market and improve women's labour force participation rates.**

9. **In the long run, this can contribute to improving women's agency and their empowerment by creating economic, technical, and social opportunities**

10. Supporting women entrepreneurs Gender-focused financial policies and products catering to the requirements of women entrepreneurs can spur their ability to enter the green transition market.

11. Collateral-free lending, financial literacy training, and building supportive networks are crucial steps to unlock their potential. Suitable tools must be developed to assess creditworthiness, disburse loans, and reduce operational costs for women owned businesses.

12. Finally, bringing in more women into leadership positions to incorporate gender-specific needs in low-carbon development strategies can promote women's integration in green jobs. A gender-just transition demands a multi-pronged strategy that focuses on employment, social protection, reduce the burden of care work and enables skill development.

INS JATAYU

- **The Indian Navy commissioned INS Jatayu at Minicoy island, its second base in Lakshadweep after INS Dweeprakshak in Kavaratti.**
- **Later, the Navy commissioned its first MH-60R multi-role helicopter squadron INAS 334 'Seahawks' at Kochi, a major capability boost for its rotary Fleet and its anti-submarine warfare capabilities. INS Jatayu is the beginning of a phased expansion plan to strengthen India's surveillance and security posture in the strategically located islands close to the Nine Degreechannel and critical sea lanes of communication.**
- **"This is very close to the Nine Degree channel, so this is the region [in] whichlot of the maritime traffic flows both into and out of the Arabian Sea**

- It is the second Naval base in Lakshadweep after INS Dweeprakshak in Kavaratti.
- With the commissioning of INS Jatayu, the Indian Navy will strengthen its foothold in the Lakshadweep islands and along with extending operational surveillance, reach and sustenance.
- It will usher in a new era of capacity building and comprehensive development of the island territories.
- The event marks an important milestone in the Navy's resolve to incrementally augment security infrastructure at the strategically important Lakshadweep Islands.

DO YOU KNOW?

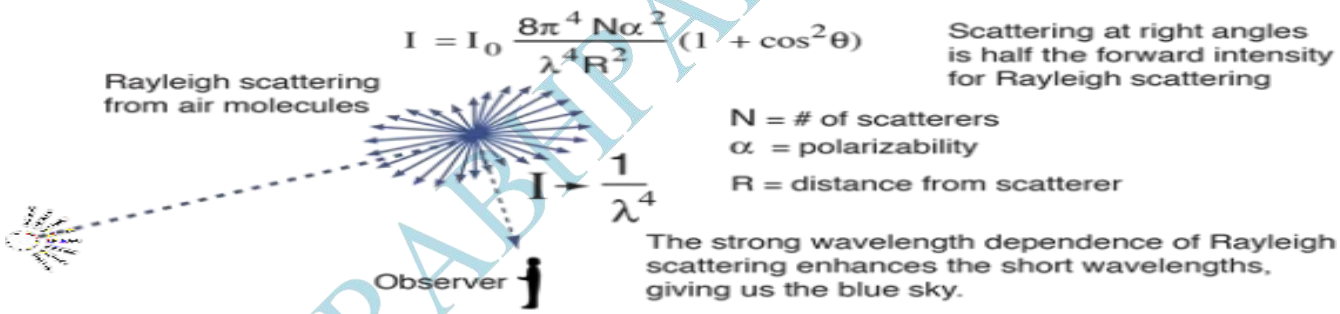
- **Minicoy Island is the southernmost island of the Lakshadweep archipelago.**
- **It strategically straddles the vital Sea Lines of Communications (SLOCs).**
- **Established in the early 1980s under the operational command of the Naval Officer-in Charge (Lakshadweep).**
- **Provides a naval presence in the region for security and surveillance purposes.**

Computers denote data in bits the famous 0s and 1s —using semiconductors.

These are small physical devices that store these values and perform mathematical operations on them. The sum of all these operations is what allows the computer to compute. The world has powerful computers almost everywhere around us thanks to a technology called semiconductor lithography the science of printing intricate circuits with extreme precision.

There are machines that automate this process, at a cost of anywhere between ₹800 crores and ₹1,600 crores.

Only one company, ASML, headquartered in the Netherlands, makes them, giving it an absolute monopoly in a market worth $125 billion and rendering it the technology company with the highest market value in Europe Rayleigh scattering refers to the scattering of light off of the molecules of the air, and can be extended to scattering from particles up to about a tenth of the wavelength of the light. It is Rayleigh scattering off themolecules of the air which gives us the blue sky.



Rayleigh scattering criterion The smallest feature size that can be moulded on the silicon water is governed by a physics principle called the Rayleigh scattering criterion. According to this criterion, the size of the feature to be projected on the wafer is proportional to the wavelength of light used and inversely proportional to the aperture of the lens that collects light before projecting it onto the wafer.

EL-NINO

The 2023-2024 El Niño has peaked as one of the five strongest on record and will continue to affect climate in the coming months despite a weakening trend, the World Meteorological Organisation

(WMO) .

- **Scientists closely tracking the development in India have said La Niñconditions setting in by June-August could mean monsoon rains will be better this year than they were in 202El Niño is the periodic warming of the ocean surface in the central and eastern tropical Pacific Ocean.**
- **It occurs every two to seven years on average and typically lasts nine to 12 months at a time.**
- **nIt is associated with more rainfall in the Horn of Africa and the southern U.S. and dry and warm conditions in Southeast Asia, Australia, and southern Africa.**

THE TIMELINE

- **April 17, 1998:** A five-judge Constitution Bench held in the Narasimha Rao vs CBI case that lawmakers have immunity against criminal prosecution for any speech made and the vote cast inside the House under Articles 105(2) and 194(2) of the Constitution
- **February 17, 2014:** Jharkhand HC refuses to quash criminal case against JMM leader Sita Soren for allegedly taking bribe in Rajya Sabha polls in 2012
- **September 23, 2014:** A two-judge SC Bench places before a larger Bench the plea of JMM leader Sita Soren
- **March 7, 2019:** A three-judge Bench refers the issue related to immunity of lawmakers to a larger Bench
- **September 20, 2023:** A five-judge Bench refers the issue and reconsideration of the 1998 verdict to a Bench of seven judges
- **October 5, 2023:** The seven-judge Bench reserves judgment
- **March 4, 2024:** Observing that bribery is not protected by parliamentary privileges, the seven-judge Bench overturns five-judge Bench's interpretation in the 1998 verdict in the JMM bribery case

During El Niño, there's typically an increase in tropical cyclone activity in the central and eastern Pacific, while La Niña tends to bring more hurricanes to the Atlantic.
El Niño events have been linked to increased rainfall in some regions (like the western coast of South America) and droughts in others (like Australia and Indonesia).

NOTE:

El Niño:

1. Unusual warming of surface waters in the eastern tropical Pacific Ocean.
2. Described as the "warm phase" of the El Niño-Southern Oscillation (ENSO).
3. Occurs more frequently than La Niña.
4. Events typically last 9 to 12 months but can extend for years.
5. Peaks during Northern Hemisphere winter.

La Niña:

6. Unusual cooling of the tropical eastern Pacific.
7. Described as the "cool phase" of ENSO.
8. Events may last between one and three years.
9. Peaks during Northern Hemisphere winter.

The **Oceanic Niño Index (ONI),** is a measure of the departure from normal sea surface temperature in the east-central Pacific Ocean, is the standard means by which each El Ninode is determined.

"Understanding Parliamentary Privileges in India"

- **In a significant ruling, the Supreme Court overturned the 1998 PV**
- **Narasimha Rao judgement, denying MPs and MLAs immunity for bribery charges related to legislative activities. A seven-judge bench, led by Chief Justice DY Chandrachud, set aside the earlier ruling, holding that parliamentary privilege doesn'tshield lawmakers from criminal prosecution for accepting bribes.**
- **The 1998 verdict, allowing immunity under Articles 105(2) and 194(2), was challenged in an appeal by Jharkhand Mukti Morcha leader Sita Soren**

What are the parliamentary privileges?

- **Definition: Special rights, immunities, and exemptions for Parliament, committees, andmembers, defined in Article 105 of the Indian Constitution.**
- **Exemption: MPs exempt from civil liability (not criminal) for statement or acts during duties.**
- **Membership Requirement:** Privileges applicable only to current members; end with membership termination

About Article 105(2):

Article 105(2): Protects MPs from legal proceedings for their speech or votes in Parliament or its committees.

Aims to enable MPs to discharge their duties without fear of legalrepercussions.
About Article 194(2):

Article 194(2): Offers similar protection to members of state legislaturesfor their actions within the legislature.

Ensures freedom of expression and voting without threat of judicialIntervention

Italian Court Rules Against Returning Sea Migrants to Libya

The Italian top court's ruling on sea migrants from Libya

On July 30, 2018, the ship Asso 28, picked up 101 migrants from a dinghy and returnedthem to the Libyan coastguard at the Tripoli port.

- Italy's highest court, the Court of Cassation, ruled that it is illegal to return rescued sea migrants to Libya.
- The court's ruling is based on the principle of non-refoulement that forbids the forced return of people to countries where their lives or rights are at risk.
- The court's ruling affirms Libya as unsafe for migrants, highlighting the risk of "inhuman and degrading treatment" in detention centres under coastguards and militias if returned.
- Italy's top court ruling that it is illegal to return sea migrants to Libya aligns with Article 98 of the United Nations Convention on the Law of the Sea (UNCLOS). This article obligates states to help anyone found at sea in danger of being lost and to rescue those in distress if they can do so without serious danger to their own ship or people.

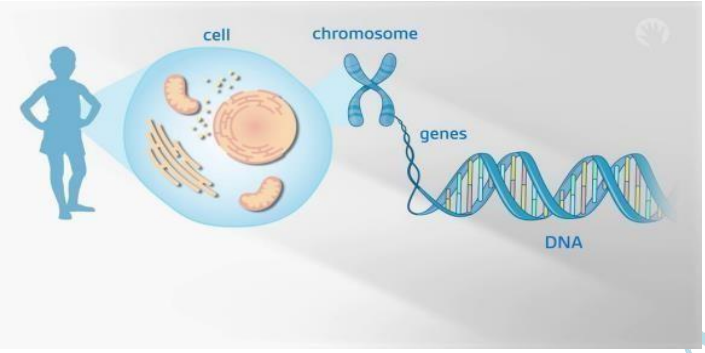
Libya's most outstanding natural attributes are the Sahara Desert and the Mediterranean coast. The nation borders six countries namely Algeria, Chad, Egypt, Niger, Sudan, and Tunisia, while also bordering the Mediterranean Sea on the northern side.

- **The expanse of theMediterranean Sea between Libya and Italy is among the most dangerous albeit oft-usedpassage for migrants from sub Saharan Africa fleeing ethnic conflict, war and famine.**
- **A UN Human Rights Council fact finding mission last year said there were "reasonable grounds to believe that crimes against humanity have been committed against Libyans and migrants throughout Libya"**
- **Under Article 98 of the United Nations Convention on the Law of the Sea, every shipmaster is required "to render assistance to any person found at sea in danger of being lost."**
- **International maritime law also requires coastal states to conduct search and rescue**

services, and if needed, coordinate with other nations during these operations. Still, countries like Italy and Malta have delayed ships' arrivals or ignored requests for disembarking altogether. More than 24,000people were intercepted and forced to go back to Libya in 2022, according to HRW

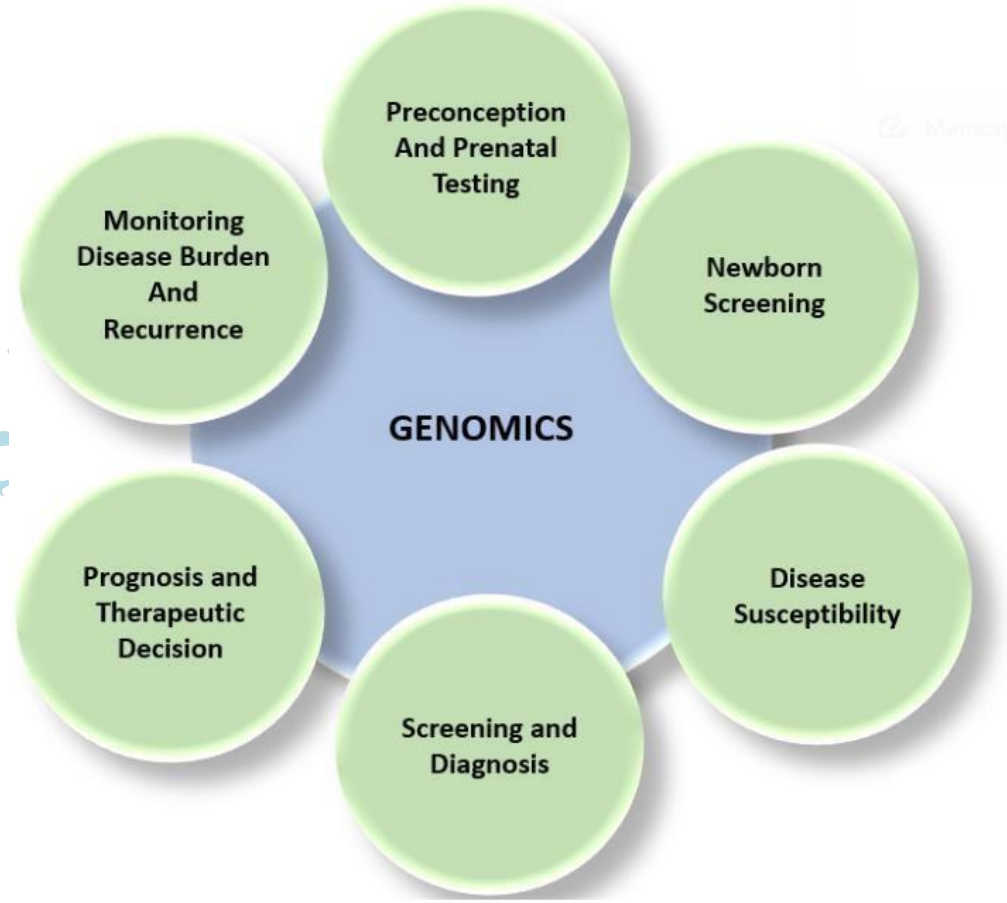
GENOMICS REGULATION

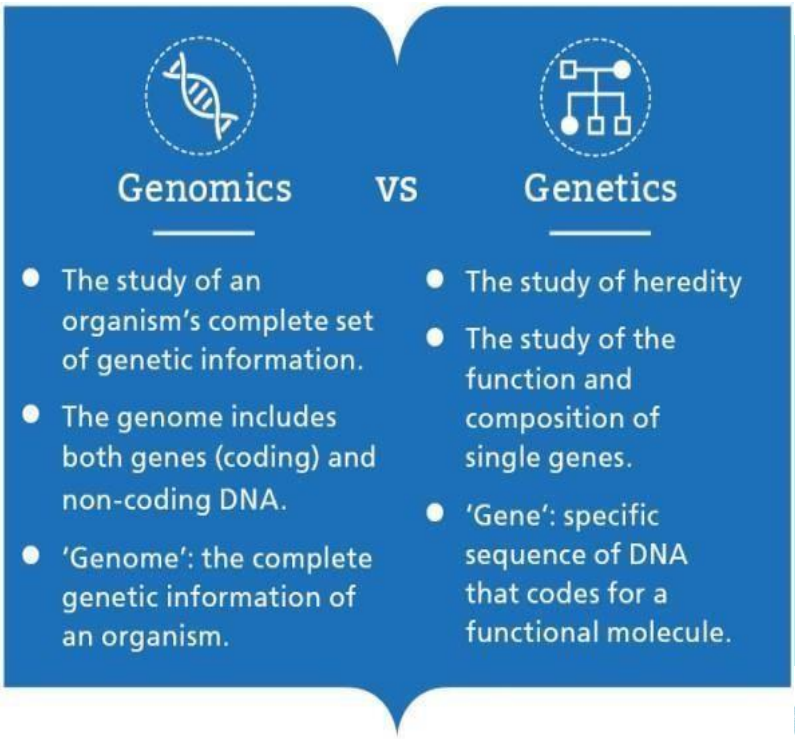
- Genomics is the study of all of a person's genes (the **genome**), including interactions of those genes with each other and with the person's environment.
- The field of genomics uses **biochemistry, genetics** and **molecular biology methods** to understand and use **biological information in deoxyribonucleic acid (DNA)** and **ribonucleic acid (RNA).**

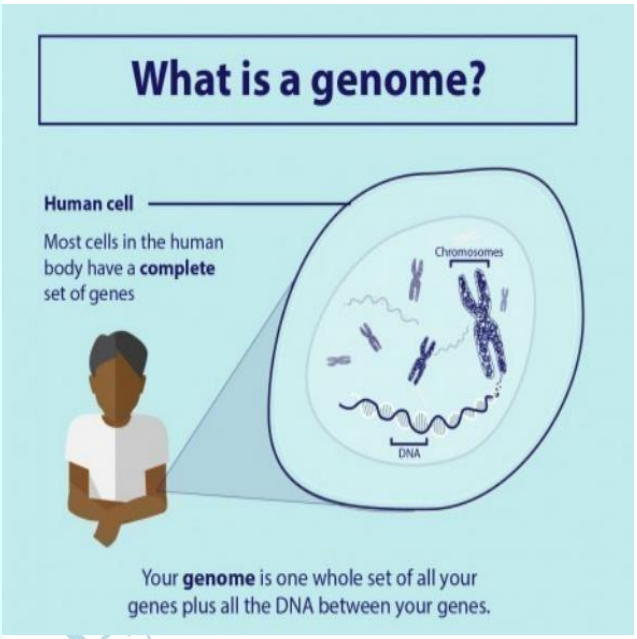


Application of Genomics:
Mapping the **evolution of infectious agents**.

Assigning **phenotypic**, such as infectivity and pathogenicity, to specific genes.







Non mammal producing milk several non-mammalian species have been documented as producing nutrients to feed offspring in a functionally similar way to mammalian milk. An egg-laying species of worm-like amphibian feeds a lipid-rich milk like substance to its hatchlings, according to a new study. The findings report a previously unobserved behaviour and offer new insight into the species' parental care and communication.

CO2 and chemical weathering

Atmospheric carbon dioxide draw down from the chemical weathering of rocks peaks across a range of moderate erosion rates, according to a new study. The findings provide new insights into the constraints of weathering-mediated carbon dioxide drawdown and help resolve conflicting data on the impact of erosion on the carbon cycle.

The chemical weathering mediates the concentration of carbon dioxide in the atmosphere and, thereby, the planet's climate.

Chemical weathering changes the molecular structure of rocks and soil.

For instance, carbon dioxide from the air or soil sometimes combines with water in a process called carbonation. This produces a weak acid, called carbonic acid, that can dissolve rock.

Resveratrol

Resveratrol is part of a group of compounds called polyphenols. They're thought to act like antioxidants, protecting the body against damage that can put you at higher risk for things like cancer and heart disease.

Diabetes: Resveratrol helps prevent insulin resistance, a condition in which the body becomes less sensitive to the blood sugar-lowering hormone insulin. The condition can lead to diabetes.

What is metastasis?

- **Metastasis means that cancer has spread to a different part of your body part than whereit started.**
- **When this happens, doctors say the cancer has "metastasized." The terms "metastatic cancer," "advanced cancer," and "stage 4 cancer" can also be used to describe metastasis, but these terms can have somewhat different meanings.**
- **The term advanced cancer can also be used to describe large cancers that havenot spreadto other parts of the body.**

Government AI Advisory

1. **On March 1, the Ministry of Electronics and Information Technology (MeitY) issued anadvisory to the Artificial Intelligence industry.**
2. **It said that all generative AI products, like large language models on the lines of ChatGPT and Google's Gemini, would have to be made available "with theexplicit permission of the Government of India" if they are "under-testing/ unreliable.**

Survey on langur

- **A survey conducted by reputed organisations found that the total population of Golden Langurs stands at 7,396 who cohabit in 707 groups,. The survey of the golden langur (Trachypithecus geei) has unveiled vital insights into the population dynamics of this endangeredprimate.**

- **The survey, conducted in two phases, covered the entire distributionrange of the golden langur, primarily spanning the Manas BiosphereReserve and fragmented forests in the western part of Assam**
- **The population of golden langurs is divided into two major sub populations: the northern extended population and the southernfragmented population.**
- **The northern population, encompassing the western part of the Manas Biosphere Reserve, was estimated at 5,566 individuals, while the southern fragmented population, occurring along the southern side ofNH27 up to the Brahmaputra River, was estimated at 1,830 langurs.**

- **.Highlighting the unstable situation in the fragmented habitats of golden langurs, the survey underscored the need for corridor linkageamong these habitats through plantations and canopy bridges to mitigate potential threats posed by anthropogenic interactions.**

- **The survey, conducted in two phases, covered the entire distributionrange of the golden langur, primarily spanning the Manas BiosphereReserve and fragmented forests in the western part of Assam.**

- **During the first phase, which took place in March-April 2020, the survey focused on the western part of the Manas Biosphere Reserve, including significant areas such as Ripu Reserved Forest, now part ofthe Raimona National Park, Chirang Reserve Forest, Manas ReserveForest, and Manas National Park.**

- **The second phase carried out during the same months in 2021, targeted fragmented forest habitats in the Bongaigaon, Kokrajhar,and Dhubri districts of western Assam.**

Golden Langurs

- It can be most easily recognized by the color of their fur, after which they are named.
- It has been noted that their fur changes colors according to the seasons.
- The color of the young also differs from adults in that they are almost pure white.
- It is limited to Assam, India and neighboring Bhutan where they live year-round.
- The area they inhabit is restricted to the region surrounded by four geographical landmarks: the foothills of Bhutan (north), Manas river (east), Sankosh river (west), and Brahmaputra river (south).

Parthenogenetic

- **Fatherless reproduction is known as parthenogenesis.**
- **One species of fruit fly, Drosophila mangabeiras, was found to consistonly of females.**
- The eggs produced by isolated females developed directly into femaleprogeny without having to be fertilised by sperm from a male
- Researchers found that if the genome of a D. melanogaster specimen was modified to have two extra copies of the polo gene, an extra copy of the Myc gene, and a lower expression of the Desat2 gene, 1.4% of the specimen's **eggs were parthenogenetic and whose off spring survived to adulthood**
- Parthenogenesis (PG) is an a sexual reproduction in which a female canproduce an embryo without fertilising an egg with sperm.

What is connectome?

- **The connectome is a comprehensive map of connections – or synapses – between neuronsin the brain, sort of like a cartogram for the electrical and chemical signals the neurons send and receive.**
- **A neuron's dendrites receive chemical signals and convert them into electrical information, which is then sent through the axon, the neuron's tail.**
- **At the end, based on the electrical inputs, the cell releases new chemicals into synapses, relaying the message to the next neuron.**

Guillemots Beaching

The French League for Birds has estimated that more than 500 common guillemots – seabirds related to penguins and puffins – Add a little bit of body text **have been found dead along the French Atlantic coast since the year began. Guillemot beachings happen regularly in winter but not to the scale of the past weeks. Scientists say the birds likely died from exhaustion due to difficult conditions at sea**

Toll collection and Technology

Road Transport and Highways Minister Nitin Gadkari said in Parliament last weekthat the government plans to implement a new highway toll collection system based on theglobal navigation satellite system.

Its implementation will involve an On-Board Unit (OBU), or a tracking device, fittedinside a vehicle whose location can be mapped using GAGAN, the Indian satellite navigation system with an approximate accuracy of 10 metres. The new tolling system will co exist with the FASTag-based toll collection as the government has not yet taken a decision on whether OBUs will be made mandatoryfor all vehicles or only for new vehicle.

Live-attenuated vaccines

1. **Live-attenuated vaccines contain live pathogens from either a bacteriaor a virus that have been "attenuated," or weakened.**
2. **According to Dr. Scully, live-attenuated vaccines are produced by selecting strains of a bacteria or virus that still produce a robust enough immune response but that does not cause disease.**

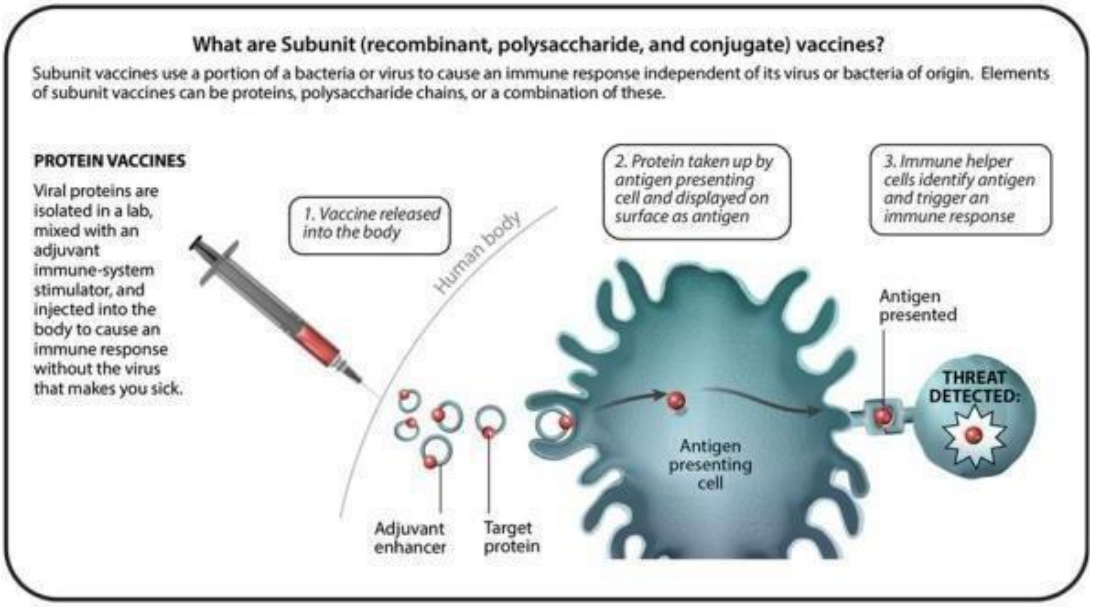
Inactivated vaccines

1. Inactivated vaccines take a live pathogen and inactivate or kill it.

2. When the vaccine is then introduced to a human through a shot, for example, the inactivated pathogen is strong enough to create an immune response, however, is incapable of causing disease. Multiple doses are often needed inorder to buildup immunity and offer full protection. Examples: Polio vaccine, influenza vaccine

3. Live-attenuated vaccines differ from traditional inactivated vaccines where the pathogen is “killed”, and as the name suggests the pathogen (typically a virus) remains active in live vaccines, however, is attenuated or modified in a way that the pathogen is not able to cause disease itself but can produce a robust immune response. Typically, live vaccines lead to a stronger, more prolonged and robust immune response in comparison to inactivated vaccines.

4. Advantages of live-attenuated vaccines over some other forms of vaccines (such as inactivated) include the production of a robust, strong antibody and cell-mediated immune response, long-lasting immunity, with a relatively quick onset of action.



Latest research on covid Vaccine Despite these promising results, over vaccination should be avoided.
The COVID-19 vaccines have been associated with autoimmune diseases like immune thrombotic throm bocytopaenia, autoimmune liver disorders, Guillain-Barré syndrome, IgA nephropathy, rheumatoid arthritis, and systemic lupus erythematosus.

Molecular mimicry, autoantibody synthesis, and vaccine adjuvants appear to contribute significantly to these disorders. overloading the immune system rarely causes harm.

Hyper vaccination may rarely cause an 'Arthus reaction', a condition characterised by localised acute small-vessel inammation and possibly entire limb edema.

James Webb telescope on Galaxy

After a galaxy stops forming new stars, it becomes a bit like a stellar graveyard. "Once star formation ends, existing stars die and are not replaced.

This happens in a hierarchical fashion, by order of stellar weight, because the most massive stars are the hottest and shine the brightest, and as a result have the shortest lives,"

As the hottest stars die, the galaxy colour changes from blue – the colour of hot stars – to yellow to red – the colour of the least massive stars," .

"Stars about the mass of the sun live about 10 billion years. If this galaxy stopped forming stars at the time we observed it, there would be no sun-like stars left in it today."

The researchers determined this galaxy experienced a burst of star formation spanning 30 to 90 million years, then it suddenly stopped.

Perang api

Perang api is one tradition few Balinese celebrate, and fewer outsiders knowabout. While the practices associated with the Hindu New Year's Eve are well documented – a day of enforced silence, fasting and meditation this little-known ritual takes place at 6pm in a handful of neighborhoods in central Bali on pengrupukan, the day preceding Nyepi.

Oscar awards 2024

Best picture

Oppenheimer

- **Best actor in a leading role Cillian Murphy, Oppenheimer Best actress in a leading roleEmma Stone, Poor Things**
- **Best director**
- **Christopher Nolan, Oppenheimer**
- **Best supporting actor Robert Downey Jr, Oppenheimer**
- **Best supporting actress Da'Vine Joy Randolph, The HoldoversBest adapted screenplay American Fiction**
- **Best original screenplay Anatomy of a Fall**
- **Best animated feature film The Boy and the Heron**

SIPRI REPORT

- **India was the top arms importer in the world in the period 2019-23, with imports having gone up by 4.7% compared with the period 2014-18, according to Swedish think tank Stockholm International Peace Research Institute (SIPRI).**

- **At the same time, arms imports by European countries increased by 94% between 2014-18 and 2019-23, the report said, which comes against the backdrop of the war in Ukraine. "Although Russia remained India's main arms supplier [accounting for 36% of its arms imports], this was the FIrst FIve-year period since 1960-64 when deliveries from Russia [or the Soviet Union prior to 1991] made up less than half of India's arms imports,"**

- **"Nine of the 10 biggest arms importers in 2019-23, including the top three of India, Saudi Arabia and Qatar, were in Asia and Oceania or the West Asia.**

- **Ukraine became the fourth biggest arms importer after it received transfers of major arms in 2022-23."**

- **India seems to have come back to the top slot in arms imports after briefly ceding space to Saudi Arabia in the past.**

- **Imports of Pakistan, the fifth largest arms importer in 2019-23, went up by 43%, with China supplying as much as 82% of all its arms imports.**
- **Arms exports by the world's largest supplier, the U.S., grew by 17% between 2014-18 and 2019-23, while those by Russia fell by more than half.**
- **France emerged as the world's second largest arms supplier as its exports grew by 47%**
- **Over half of arms imports by European countries, 55%, in 2019-23 were from the U.S.,up from 35% in 2014-18.**
- **"Europe is responsible for about a third of global arms exports, including large volumesgoing outside the region, reflecting Europe's strong military-industrial capacity,"**
- **aspect of its foreignpolicy exporting more arms to more countries than it**

The largest single recipient of French arms exports was India, which accounted for nearly 30%.

The increase in French arms exports was largely due to deliveries of combat aircraft toIndia, Qatar and Egypt

- With an 11% share of total global arms imports, India was the **world's biggest importer of major arms in 2018–22,** a position it has held for the period 1993–2022.
- India remained the top importer despite an 11% drop in its arms import between 2013-17 and 2018-22.

QUESTION CORNER

What makes the onion a tear-jerker?

Q: Why does cutting an onion produce tears?

A: Onions and garlic both contain derivatives of sulphur-containing amino acids.

When an onion is sliced, one of these compounds, S-1-propenyl-cysteine sulphoxide, is decomposed by an enzyme to form a volatile compound called propanethial-S-oxide. This is the irritant, or lacrimator (the name for any substance that causes tears to flow).

When the compound comes in contact with water – in this case in your eyes – it hydrolyses to propanal, sulphuric acid, and hydrogen sulphide. A hydrolysis is a chemical reaction in which a water molecule is used to break chemical bonds.

Tearfully, the eyes try to dilute the acid. However, it is these same sulphur compounds that produce the nice aroma when onions are being cooked.

Propanethial-S-oxide is the irritant that causes tears to flow. GETTY IMAGES

For feedback and suggestions for 'Science', please write to **science@thehindu.co.in** with the subject 'Daily page'

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URBANISATION

- The building of new towns met several needs from providing jobs and homes for refugees and absorbing excess population from the older urban areas, to generating economic development in the local region and serving as symbols of the new modern India that was emerging, though not completely ideal and commensurate to the needs, but quite inclusivein design and what was built.
- In the current phase, a the new conundrum in India is for a new form of urbanisation; a new revivalism of the faith where the cities and towns and where the system should be aligned to the religion of the majority, and not separate from it. new sense of urbanisation is dominating. And the old understanding that cities are considered to be centres of enlightenment, workplace, and habitatis being challenged Cities should not just be centres of workplaces but also centres of yatras, pilgrimage and so on.
- Thus, we FInd big corporates also landing in a small town such asAyodhya and investing heavily in its infrastructure . The post-colonial period saw the emergence of new towns, and some of them were industrial as well such as Bhilai, Rourkela, andChandigarh to name a few. Still, the metros attracted the largest numbers of people and investments

Urban settlements in India can be classified into several different types, which can provide insights into the country's urbanization patterns

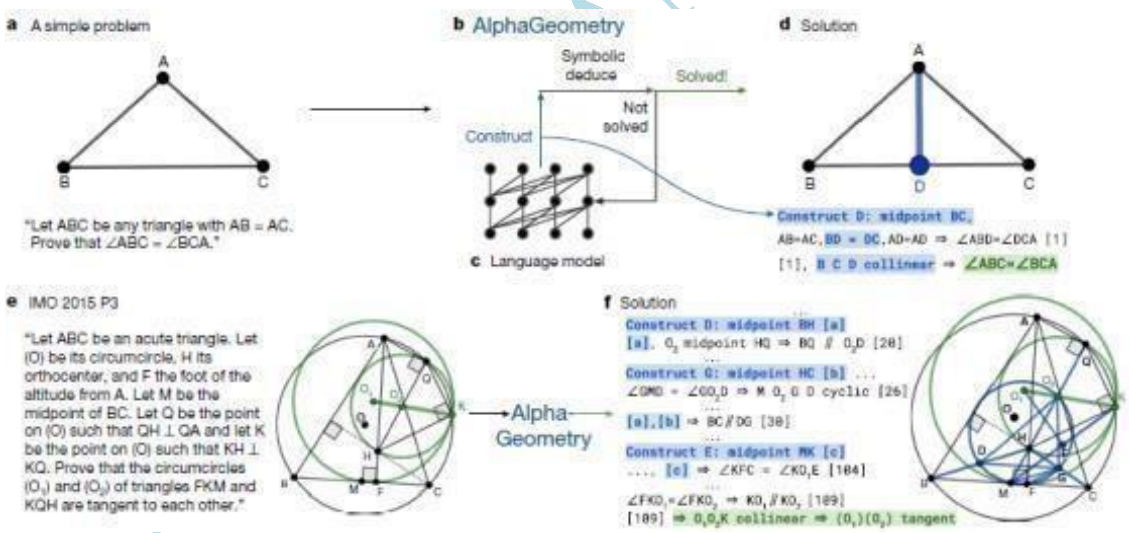
- **Census Town:** Population of at least 5,000, a population density of at least 400 per sq km, where at least 75% of the male working population is engaged in non-agricultural pursuits.
- **Statutory Town:** A town officially designated as such by the relevant state government. These towns typically have a corporation or municipality in charge of local government.
- **Satellite Town:** A town that is located in close proximity to a larger urban center and is dependent on it for economic and social activities.
- **Urban Agglomeration:** A continuous urban area of the city/town and also the suburban fringe/rural areas lying within the administrative boundaries of a nearby town/city.
- **Outgrowth:** A small settlement adjacent to a larger town or city that has grown out of it, but is still considered a separate entity by the government for administrative purposes.

Alpha Geometry

ALPHA GEOMETRY

This innovative neuro-symbolic system combines the strengths of a neural language model with thoseof a symbolic deduction engine, allowing it to mimic human-like reasoning capabilities.

By generating "fast, intuitive" ideas through the neural model and refining them with the
"deliberate, rational" decision-making process of the symbolic engine, AlphaGeometry demonstratesan uncanny ability to navigate thintricate landscape of geometric proofs. This unique approach not only allows for more efficient and accurate solutions but also sheds light on the potential of AI to
emulate human reasoning and problem-solving, bringing us one step closer to unlocking the full potential of artificial intelligence in various fields



In photovoltaics – i.e. the study of conversion of light energy intoelectrical energy — the Shockley Queisser limit is a theoretical concept that denes the maximum capacity of a solar cell to produce electricity. The Sun is the primary source of light and energy on the earth.

Photovoltaic devices like solar cells allow us to harness this energy.

- **Photovoltaic cells are made of semiconducting materials like (doped) silicon.**
- **When sunlight interacts with a semiconductor, it excites electrons from the lower-energy valence band to the higher-energy conduction band. .**
- **This transition leaves behind a vacancy in the valence band called a hole. (To be more precise, a holeis a vacant site where an electron is supposed to be. Since it denotes the absence of an electron, a holeis also a place with positive charge.)**
- **The process of an electron moving to the conduction band and leaving a hole behind in the valence band creates an electron-hole pair Semiconductors play a crucial role in the operation of electronic devices.**
- **In short, electron-hole pairs create the photocurrent, an electric current created as a result of radiation in the semiconductor. We know that the efficiency with which a solar cell can produce anelectric current when sunlight isincident on it can't be 100% because some light particles (photons)pass through the material without interacting with it(i.e. transparency loss, around 25%) and some energy simply heats up the material without exciting the electrons (thermalisation, around 30%).**
- **As a result, the maximum efficiency of a conventional solar cell is concerned, and this range is calledthe Shockley-Queisser limit.**
- **It is named after the physicists William Shockley (of the U.S.) and Hans- Joachim Queisser (Germany).**
- **Popocatépetl is an active stratovolcano located in the states of Puebla, Morelos, andMexico in centralMexico.**
- **It lies in the eastern half of the Trans Mexican volcanic belt.**
- **At 5,393 m it is the second highest peak in Mexico, after Citlaltépetl (Pico de Orizaba) at 5,636 m(18,491 ft).**

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RHODAMINE

- On February 17, Tamil Nadu banned the sale of cotton candy or candy oss after analysis confirmed the presence of Rhodamine-B, an industrial dye, in samples lifted from stalls in Chennai.
- Rhodamine-B is a textile dye, and its use in food has a huge impact on health.
- Rhodamine-B is a fluorescent dye used in cosmetics, textile and leather industries. It gives you brilliant pinks, greens and blues. Unfortunately, it is used as a food colouring agent not only in cotton candy but also in the preparation of sweets, various manchurian items and pakodas and in the preparation of sauces for Chinese food.
- FSSAI has approved certain food colours and avors as safe for consumption.
- These include: Caramel, Riboavin
- (Lactoavin), Saffron, Annatto, Curcumin (Turmeric), Carotene and carotenoids, including Beta- carotene, red colour from Ponceau 4R, Carmoisine, and Erythrosine, yellow colour (Tartrazine and Sunset Yellow FCF), blue colour (Indigo Carmine and Brilliant Blue FCF) and green colour (Fast Green FCF).

GELEPHU

Bhutan's plans for a regional economic hub atonly non-polluting industries (mainly IT, **Gelephu, a town bordering Assam in India, are**education, hotel and hospital sectors), and would **high on Bhutan Prime Minister Tshering**be promoted as an investment destination and

Todays agenda.

As a carbon-neutral city, Gelephu would include health and wellness hub in the middle of the region.The plan, launched by Bhutan's King Jigme Khesar Namgyel Wangchuck in December 2023,is to build a "Gelephu Mindfulness City"(GMC)

- **It would also lie at the crossroads of India'sthe new India-**
  Japan

  connectivity plans
- **"Act East" plans for connectivity to Myanmar,between India's north-eastern States through and on to Association of Southeast AsianBangladesh to the Bay of Bengal and Indian Nations and the Indo Pacific region as well as Ocean**
- **At the 7th Indian Ocean Conference 2024 in Perth in February, External Affairs Minister highlighted the "need for lateral land-based connectivity across the Indian Ocean region,... essential to**

and the northeastern States and just across the Indian.

GELEPHU - CHALLENGES

With warmer temperatures than in the infrastructure for trade and transport **mountains, Gelephugets high amounts of**out of the special administrative **rainfall during a monsoon season that**

- **The first part of the Gelephu project involves** border in Myanmar have been an area of great **scaling up the Gelephu airport .**

- The growing "outmigration" of Bhutanese youth in search of jobs abroad is another challenge, and the government hopes a mega project such as Gelephu will stem that. Finally, there is Bhutan's most pressinggeopolitical concern: pressure from its northern neighbours China to conclude a boundary resolution deal and to establish diplomatic ties.

GELEPHU - INDIA'S CONTEXT

India's Stake

- **Strong Ties:** India and Bhutan have thus far built an idyllic relationship, based on a strong understanding between every Bhutan's king and Indian Prime Minister over the past 75 years.
- **A Helping Hand:** Bhutan's requests have seldom ever been rejected, and India is the leading source of investments in Bhutan, comprising 50% of its total foreign directinvestment.
- **Security for Both:** India would also be wary of "missing an opportunity" of the kind seen in Sri Lanka's Hambantota a decade ago, which sent the close neighbour to China, caused unsustainable debt and is a project that risks becoming a "white elephant".
- **Connectivity and Investment:** Gelephu's infrastructure needs to dovetail with India's initiatives for regional connectivity and infrastructure.
- Collaboration with Bhutan in areas like renewable energy and cross- border trade **enhances India's strategic interests.**
- **Regional Development:** In addition to climate-friendly solar and wind power generation projects, India's plans for a South Asian power grid that would draw electricity from Nepal and Bhutan, with supply to Bangladesh and Sri Lanka would lend itself to more consistent power supplies needed for Gelephu..
- Violent clashes have escalated between Democratic Republic of Congo (DRC)'s army and Rwandan-backed M23Tutsi-led rebels in eastern Congo.

WHAT IS THE M23?

The M23, which refers to the March 23 date of a 2009 accord that ended a previous Tutsi-led revoltion eastern Congo, is the latest in a series of groups of ethnic Tutsi-led insurgents to rise up against Congolese force

- **The group has accused the government of Congo of not living up to the peace deal to fully integrate Congolese Tutsis into the army and administration.**
- **It also vows to defend Tutsi interests,**
- **particularly against ethnic Hutu militias like the Democratic Forces for the Liberation of Rwanda (FDLR), founded by Hutus who fled Rwanda after participating in the 1994 genocide of more than 800,000 Tutsis and moderate Hutus.**

WHAT SET OFF THE LATEST REVOLT? In 2012 and 2013, M23 seized large partsof eastern Congo and entered Goma, a strategic economic hub, before they were chased out by Congolese and U.N. forces into Uganda and Rwanda.

AND WHY IS RWANDA INVOLVED?

The government of Congo, U.N. officials and Western powers including the United States and Belgium have accused Rwanda of providing support for M23, including arms andsoldiers, despite Rwanda's repeated denials.

The U.S. has urged Rwanda to withdraw its military personnel from Congoremove surface-to-air missile systems.

Rwanda has blamed the escalation on Congo's decision to end the mandate of regionalpeacekeepers.

- **What does the proposed law provide?**

  The CEC and other ECs shall be appointed from persons who are holding or have held a post equivalent to the rank of Secretary to the Government of India.There shall be a search committee headed by the Minister of Law and Justice, who shall prepare a panel of five persons for consideration to the selection committee.

- **The CEC and EC shall be appointed by the President on the recommendation of this selection committee consisting of the Prime Minister, the Leader of Opposition in the Lok Sabha and a UnionCabinet Minister to benominated by the Prime Minister.**
- **On December 12, the Rajya Sabha passed The Chief Election Commissioner and other Election Commissioners (Appointment Conditions of Office and Terms of Office) Bill, 2023.**

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Dietary Breeding

- **Human gut bacteria that aid in the digestion of plant cellulose are scarce inurban societies abundant in ancient and hunter-gatherer microbiomes, a new study says.**

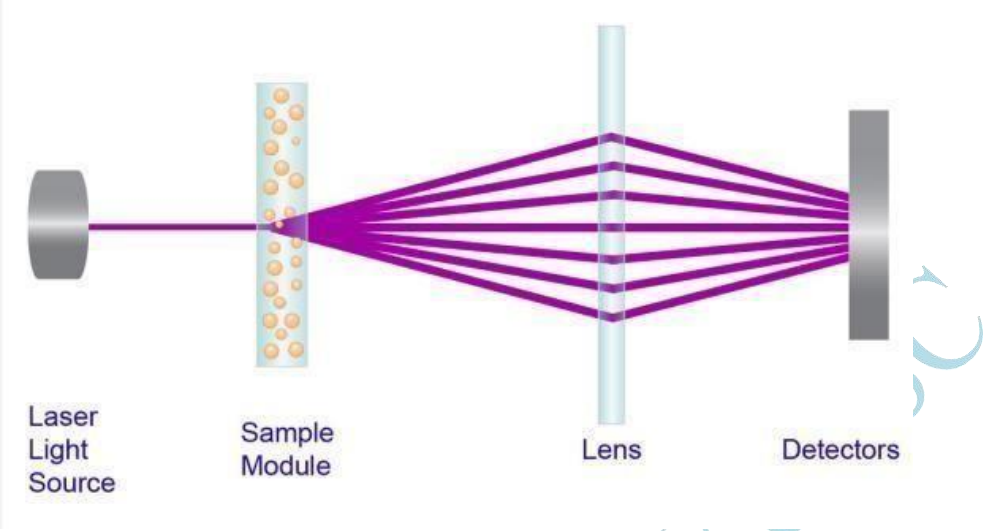
- **Humans rely on the gut microbiome to digest cellulose – the main component of plant breeding anda common element in diets that includes plant-based material. Dietary breeding is beneficial to gut microbiome stability.**

- **However, modern industrialized diets, which are dominated by processed foods, arelacking in plant breeding .**

- **In a new study, researchers propose a system to detect viruses in animals that could be less expensiveand time-consuming than current methods.**

- **The high throughput, lensless optical light diffraction technique can detect the 'fingerprint' of a viralinfection in Living cells without the need for expensive reagents or laboratory techniques.**

The approach could open newavenues to test for viruses in livestock and poultry and could inform ways to prevent viral growth and cross-species transmission.



Starlet sea anemone

Starlet sea anemone found along the east coast of North America secretes a specific neurotoxin in itsvenom that's vital to its defences against a main predator, the grass shrimp. Nv1 repels the shrimp and also attracts fish that prey on the crustaceans. While Nv1- possessing anemones secreted the neurotoxin into the surrounding water, which strongly.

DOYOU KNOW?

Starlet sea anemones

- The starlet sea anemone (Nematostella vectensis) is **a tiny sea anemone.**
- **It usually no more than 1.5 centimeters long**.
- It has a slender, **translucent body with white markings** that can resemble a star, hence itsname.
- Unlike most other **sea anemones, the starlet sea anemone doesn't attach itself** to rocks orcoral.
- Instead, it burrows itself in **the muddy or sandy bottoms of shallow coastal waters**, such assalt marshes, lagoons, and estuaries.
    - Starlet sea anemones are **carnivores and use their tentacles to capture small prey**,such as plankton and worms.
    - The tentacles have **stinging cells that paralyze the prey before it is brought to themouth**.

provides food and livelihoods for tens of millions of people, research from the country's Environment Ministry showed.
Saltwater levels are often higher in the dry season but they are intensifying due to rising sea levels, droughts, tidal fluctuations, and a lack of upstream freshwater.
The resulting crop losses could amount to 70 trillion dong ($2.94 billion)

Anthropocene Epoch

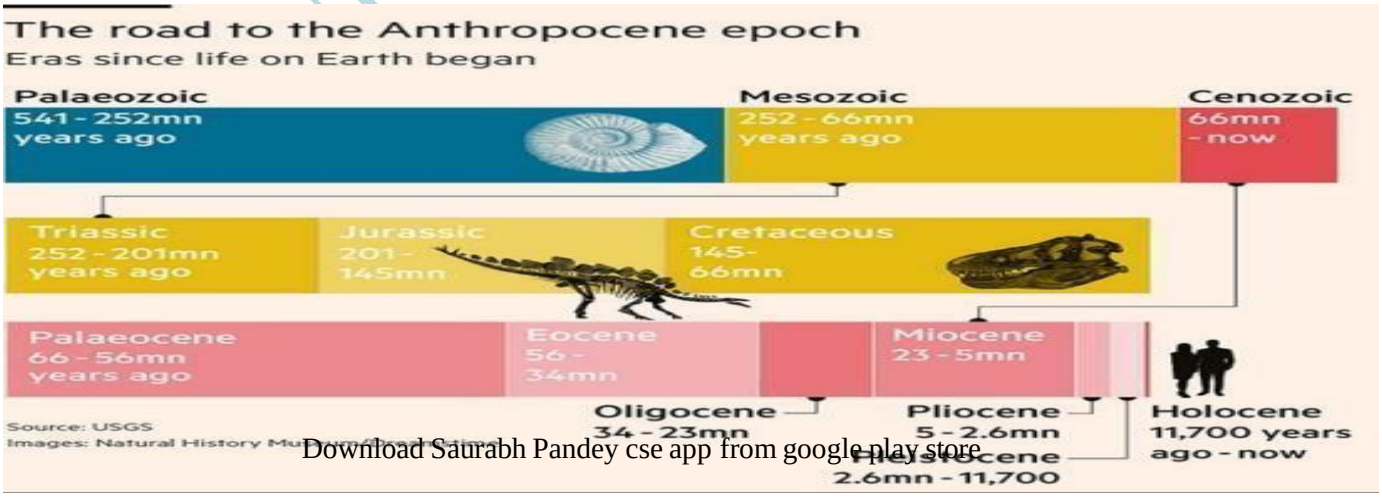
- **The proposal – to make the Anthropocene Epoch official – came from the Anthropocene Working Group of the Sub-commission of Quaternary Stratigraphy (SQS-AWG).**

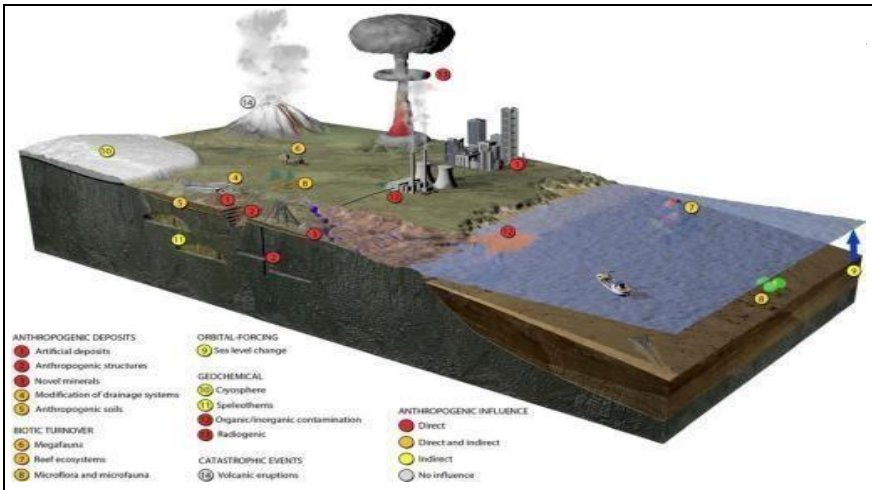
- **In the proposal, the group has said the start date of the Epoch can be linked to the formation of a particular layer of the ground. The SQS-AWG is a commission responsible for recognizing time units within our most recent period of geologic time have been looking into the question of formalizing the Anthropocene Epoch as youngest epoch, superposing the Holocene.**

- **The Anthropocene is a proposed geological epoch dating from the commencementof significant human impact on Earth until now.**

- **It affects Earth's geology, landscape, limnology, ecosystems and climate.**

- **The effects of human activities on Earth can be seen for example in biodiversity loss and climate change.**





store

Plastic Pollution

While the United Nations Environment Programme (UNEP) had previously identified around 13,000 plastic chemicals, the report by a team of European scientists found more than 16,000 chemicals in plastics

— a quarter of which are thought to be hazardous to human health and the environment. The report, funded by the Norwegian Research Council, comes as government negotiators grapple with devising the world's first treaty to tackle mounting plastic pollution, as some 400 million tonnes of plastic waste are produced every year.

India In Indian/ Dynamics in the Indian Ocean Region

India-China Relations:

- Despite New Delhi's diplomatic efforts, Male is increasingly aligning with China.
- Sri Lanka imposes a year-long moratorium on foreign research ships, including Chinese ones, in response to India's security concerns.

India-Mauritius Collaboration:

1. Last month, India's SAGAR policy yielded results.
2. The Prime Ministers of India and Mauritius inaugurated a new airstrip and jetty in the Agaléga Islands.
3. This enhances Mauritius's capability to combat illegal activities in its Exclusive Economic Zone.
4. Activity in the Indian Ocean:
5. Both the Western and Northern Indian Oceans are becoming active areas again.
6. The regionalization of the Israel-Hamas conflict results in attacks by Houthi rebels on international shipping.
7. Transits through the Suez Canal decrease significantly.
8. The diversion of ships to the longer route around the Cape of Good Hope affects all nations in the region.

Chinese Naval Presence:

1. Chinese Navy's presence in the Indian Ocean is set to expand.
2. Beijing's pursuit of naval bases in Djibouti, Kyaukphyu, Gwadar, and Hambantota is part of this expansion.

India-China Standoff:

1. The ongoing border standoff remains unresolved diplomatically for nearly four years.
2. India and China remain in adversarial positions.
3. **In contrast, Sri Lanka showed greater sensitivity to India's security concerns by imposing a year-long moratorium on foreign research ships, including Chinese ones, to its ports.**
4. **Last month, India's SAGAR policy produced a valuable dividend as the Prime Ministers of India and Mauritius inaugurated a new airstrip and a jetty in the Agaléga Islands, boosting Mauritius's capability to curb illegal activities in its vast Extended Economic Zone.**
5. **Both the Western Indian Ocean littered with island nations and the Northern Indian Ocean stretching from the Arabian Sea to the Suez have become active geographies again.**
6. **The gradual regionalization of the Israel Hamas confliict, as reflected in the attacks by Houthi rebels on international shipping, has now led to a massive drop in transits through the Suez Canal.**
7. **The diversion of ships to the longer route around the Cape of Good Hope adversely affects all nations in the region, big or small.**
8. **The new chain of developments is set to expand the Chinese Navy's footprint in the region**
9. **A clear pattern is emerging behind Beijing's quest for naval bases in Djibouti, Kyaukphyu, Gwadar, and Hambantota.**
10. **This, combined with the nearly four year-old border standoff, which has defied a diplomatic resolution, has meant the two nations continue to confront each other as adversaries**

SETBACK FOR INDIA-CHINA RELATIONS

The weeks-long stand-off snowballed into the deadliest clash between the two in 45 yrs

May 5-6: Scores of troopers injured after scuffle involving 250 soldiers of Indian and Chinese armies at Ladakh's Pangong Tso

May 9: Another skirmish in Sikkim's Naku La area leaves 4 Indian and 7 Chinese soldiers injured; tensions build up in Galwan Valley of Ladakh days later

May 21: India refutes Beijing's contention that it obstructed Chinese patrols

May 25: China marshals 5,000 soldiers on its side of disputed border in Ladakh; India too sends military reinforcements

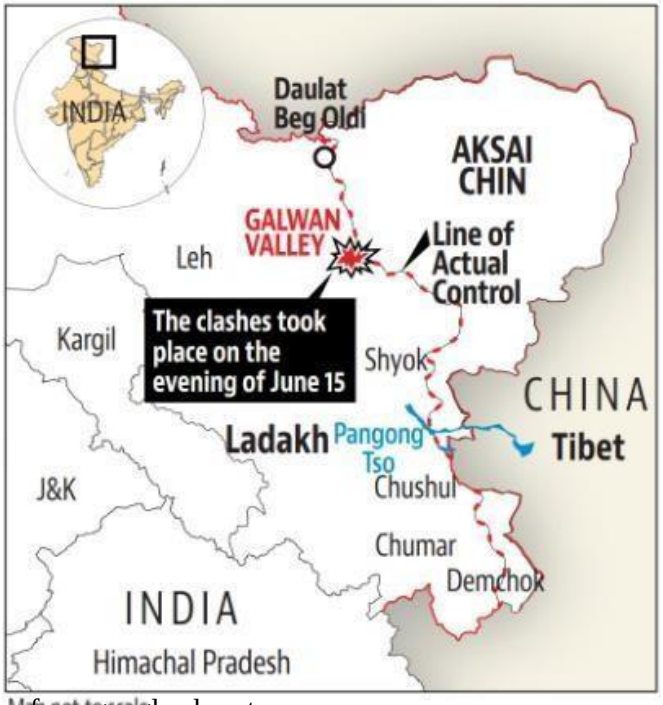
May 30: Defence minister says India and China have begun diplomatic and military-level talks

June 6: Top military officers of Indian and Chinese armies discuss de-escalation plan

June 9: Army officers say 'limited military disengagement' has begun at 3 hot spots along LAC including Galwan Valley

June 13: Army chief says situation is 'under control'

June 15: 20 Indian Army personnel killed in 'violent face-off' in Galwan Valley



Trade and Economic

Partnership Agreement (TEPA)

India-European Free Trade Association signeda Trade and Economic Partnership Agreement (TEPA) i.e. on 10th March 2024. India has been working on a Trade and Economic Partnership Agreement (TEPA) with EFTA countries comprising Switzerland, Iceland, Norway & Liechtenstein.

For the first time, India is signing an FTA with four developed nations - an important economic bloc in Europe. For the first time in history of FTAs, binding commitment of $100 bn investment and 1 million direct jobs in the next 15 years has been given. The agreementwill give a boost to Make in India and provide opportunities to the young & talented workforce.

Recently, the Narendra Modi Govt is on a spree to conclude comprehensive trade pacts with major nations and groups in line with **FTA 2.0 approach**. Under its new FTA 2.0 approach, India has recently signed three comprehensive trade pacts with Mauritius, UAE and Australia. Comprehensive Trade Talks are also on with the UK and the EU.

DO YOU KNOW?

The India-EFTA Trade and Economic Partnership Agreement (TEPA) is a **trade agreement between India and the EFTA countries**. It focuses on market access, investment promotion, Intellectual Property Rights (IPR), and other trade-related aspects to enhance economic cooperation between India and the EFTA states.

The agreement comprises of 14 chapters with main focus on market access related togoods, rules of origin, trade facilitation, trade remedies, sanitary and

phytosanitary measures, technical barriers to trade, investment promotion, market access on services, intellectual property rights, trade and sustainable development and other legal and horizontal provisions.

EFTA is an important regional group, with several growing opportunities for enhancing international trade in goods and services.
EFTA is one important economic block out of the three (other two - EU &UK) in Europe.Among EFTA countries, Switzerland is the largest trading partner of India followed by Norway.

The highlights of the agreement are:

- **EFTA has committed to promote investments with the aim to increase the stock of foreign direct investments by USD 100 billion in India in the next 15 years, and to facilitate the generation of 1 million direct employment in India, through such investments. The investments do not cover foreign portfolio investment.**

- **For the first ever time in the history of FTAs, a legal commitment is being made about promoting target-oriented investment and creation of jobs.**

- **EFTA is offering 92.2% of its tariff lines which covers 99.6% of India's exports. The EFTA's market access offer covers 100% of non-agri products and tariff concession on Processed Agricultural Products (PAP).**

- **Sectors such as dairy, soya, coal and sensitive agricultural products are kept in the exclusion list.**
- **Commitments related to Intellectual Property Rights in TEPA are at TRIPS level. The IPR chapter with Switzerland, which has high standards for IPR,shows our robust IPR regime.**
- **India's interests in generic medicines and concerns related to evergreening of patents have been fully addressed. India signals its commitment to Sustainable development, inclusive growth, social development and environmental protection Fosters transparency, efficiency, simplification, harmonisation and consistency of trade procedures.**

North Atlantic whale

- **Entanglement in fishing gear is a deadly threat to these critically endangered animals.**
- **Scientists estimate that before commercial whaling scaled up in the 18th and 19th centuries, there may have been as many as 10,000 North Atlantic right whales. Today, fewer than 360 individuals remain. Almost 90% of them have been entangled at least once.**
- **When whales become entangled in fishing gear, they use extra energy dragging it as they swim. If the rope is caught around their mouths, they may struggle to feed and slowly starve.**
- **North Atlantic right whales are legally protected, both internationally and in U.S. waters, including policies that seek to reduce deaths or serious injuries resulting from entanglements.**

About the Species

- **The North Atlantic right whale is one of the world's most endangered large whale species. Two other species of right whales exist: the North Pacific right whale, which is found in the North Pacific Ocean, and the Southern right whale, which is found in the southern hemisphere.**
- **Right whales are baleen whales, feeding on copepods (tiny crustaceans) by straining huge volumes of ocean water through their baleen plates, which act like a sieve.**
- **North Atlantic right whales have been listed as endangered under the Endangered Species Act since 1970.**
- **There are approximately 360 individuals remaining, including fewer than 70 reproductively active females.**
- **Human impacts continue to threaten the survival of this species.**

Colouring agent

- **Karnataka became the third State in South India to ban the use of certain colouring agents in cotton candy and gobi manchurian that are found to be harmful.**
- **While the Government plans to create awareness among manufacturers, it has also urged consumers to be aware of what they are consuming.**
- **The Food Safety and Standards Act stipulates a fine of not less than ₹10 lakh and a jail term of a minimum of seven years, extending to life imprisonment, against those using banned chemical substances in food products were the harmful chemicals? The unsafe samples with added colours showed traces of sunset yellow, tartrazine and rhodamine-b in cotton candy.**
- **Similarly, the unsafe samples of gobi manchurian had tartrazine, sunset yellow and carmoisine.**
- **A ban is already in place over the use of colouring agent rhodamine-b, a suspected carcinogenic substance.**

What are the penalties?

- **As per Rule 16 of the Food Safety and Standards Act, 2006 (Food Products Standards and Food Additives Regulation 2011), no artificial colours should be used in the preparation of gobi manchurian.**
- **The same rules allow certain food colours to be used within the approved limits, while non permitted colours, including rhodamine-b, should not be used in the preparation of cotton candy. The cancellation of licence for commercial activities, hefty fines and jail term have been threatened against the offenders.**
- **The Food Safety and Standards Act stipulate a fine of not less than ₹10 lakh and a jail term of a minimum of seven years, extending to life imprisonment, against those using banned chemical substances in food products.**

What is Mixed Reality??

- **Mixed reality is an immersive technology that combines physical and digital elements to enable them to interact with each other. This is typically done through 3D holograms.**
- **After mainframes, PCs, and cellphones, mixed reality is the next computing revolution.**

- **The term "mixed reality" was coined in a1994 study titled "A Taxonomy of MixedReality Visual Displays" by Paul Milgramand Fumio Kishino. Mixed reality combines the digital and physical worlds, enabling organic andintuitive 3D interactions between humans, computers, and the environment.**

- **The developments in computer vision, graphical implementations, audio and visual technologies, input methods, and cloud computing are responsible for this new reality.**

Mixed reality allows us to:

- **Speed up innovation: Using mixed reality, construction or design teams can simply generate digital twins of items and test innovative concepts with minimal waste and cost.**

- **Mixed reality, like VR and AR, enables the development of far more engaging shared and interactive experiences Mixed reality provides tremendous trainingand development possibilities.**

MR vs. VR vs. AR

- **Virtual reality, mixed reality, and augmented reality are altering our lifestyle and workplace environments.**

- **Virtual reality (VR) is a computer generated, interactive representation oa genuine or artificial place or activity.**

- **Mixed reality (MR) is an interactive representation or perspective of real world and computer-generated components.**
- **Augmented reality (AR) is a perspective of the actual world that incorporates computer-generated embellishments.**

What is CKDu??

Uncertain cause is a type of chronic kidney disease that mainly affects marginalised agricultural communities in specific areas of the world where a large number of people develop an unexplained, deadly form of kidney disease Because the populations affected are some of the world's poorest and are exposed to a high degree of occupational and environmental hazards, and because the disease is considered a 'medical mystery,' CKDu has received significant attention in scientific magazines and the media Most patients affected by CKDu are males between the ages of 20 and 60 who often live in rural or agricultural settings and may be and may be exposed to extreme working conditions. Many experience a rapid loss of kidney function.

Rheumatic disease

- **Rheumatic disease is an umbrella term that refers to arthritis and several other conditions that affect the joints, tendons, muscle, ligaments, bones, and muscles . It can cause inflammation, swelling, and pain in several joints at once. Other common rheumatic disease include-**
- **Fibromyalgia: a rheumatic disorder that affects 4 million people and causes pain all over the body (also referred to as widespread pain), sleep problems, fatigue, and often emotional and mental distress.**
- **Gout: a form of arthritis in which urate crystals build up in a joint, usually the large joint of the big toe.**
- **Childhood/juvenile arthritis: arthritis in children; the most common form is juvenile rheumatoid arthritis.**
- **Lupus: a chronic autoimmune disease that occurs when the body's immune**
- **system attacks the tissues and organs, causing damage to any part of the body**

Importance OF MIRV

Furthers India's nuclear weapons programme and strengthens second strike capability.
This is particularly important given India's nuclear doctrine based on a no-first-use policy, credible minimum deterrence and massive retaliation in case of a first strike, which was espoused in 2003, after the nuclear tests of 1998.

India completed the nuclear triad when Mr. Modi declared in November 2018 that the country's first nuclear powered ballistic missile submarine INS Arihant had finished its first deterrence patrol.

The MIRV is the next technological threshold in this direction and it is no only logical and a matter of time before the MIRV is deployed on submarine-launched ballistic missiles.

China, which is fast expanding its nuclear arsenal, has already deployed MIRV technology first deployed by the U.S. in 1970.

Pakistan claims to have tested it as well. In this regard, the other side of this development is the factor of escalation dynamics that is going to accelerate in the region with China and Pakistan.

This spiral race of one-upmanship is only going to deepen, get more technology intensive and turn out to be an expensive endeavour as well.

- **water crisis may be physical or economic based on multiple factors such as rapid urbanisation, industrialization, unsustainable agricultural practices, climate change, erratic rainfall patterns, water overuse and inefficient water management, pollution, inadequate infrastructure, a lack of 'belongingness' among stakeholders, runoff due to high rain along with soil erosion and sedimentation.**

i

- **Water scarcity leads to the poor functioning of ecosystems, threatens foodi and water security, and, ultimately, affects peace. According to the World Resources Institute, 17 countries face 'extremely high' levels of water stressa which is threatening to result in conflict, unrest and peace among people. India is not an exception to these problems.**

- **In India, water availability is already low enough to be categorised as water stressed, and is expected to reduce further to 1341m3 by 2025 and 1140m3 by**i

2050.

- **Also, 72% of all water withdrawals are for use in agriculture, 16% by municipalities for households and services, and 12% by industries. In almost every State and in the main cities of India, there is groundwater table**

In India's hilly regions, springs are nearly dry, while the country boasts 5,56,601 water bodies covering 62,71,180 hectares for irrigation. However, due to inadequate catchment treatment, poor design, and maintenance, many reservoirs, wetlands, and water bodies have silted up, reducing storage capacity and effectiveness. This has led to an imbalance between groundwater discharge and recharge, with excessive groundwater extraction.
Furthermore, contamination from sewage and other sources is deteriorating water quality. There's a critical need for effective surface and groundwater management, especially in rainfed regions, which contribute significantly to India's agricultural output.

To address these challenges, several steps have been proposed:

1. **Rainwater Harvesting (RWH)**:
    - RWH can augment recharge and support irrigation, fostering resilience against water scarcity and drought.
2. **Government Initiatives**:
    - Programs like Pradhan Mantri Krishi Sinchayee Yojana (PMKSY), watershed management, Mission Amrit Sarovar, and Jal Shakti Abhiyan emphasize water conservation, management, and rejuvenation of water bodies.
3. **Water Conservation Measures**:
    - Reviving ponds, wetlands, and tanks, alongside borewell recharge and watershed development, is crucial.
    - Afforestation and proper protocol for revival of ponds are essential.
4. **Additional Interventions**:
    - Monitoring groundwater levels, reclaiming circular water economy, and adopting efficient irrigation techniques (e.g., micro-irrigation, IoT automation) are necessary.
    - Integrated water resource management, water meter installation, and promotion of low-water crops are vital.
    - Integrated farming systems, resilience against climate change, and reducing water distribution losses are priorities.
    - Safe wastewater reuse, desalination, and appropriate water allocation strategies are essential.
    - Collaboration among research, industry, and academia is needed to implement new technologies.
5. **World Water Day 2024**:
    - The theme, "Leveraging water for peace," highlights the importance of global cooperation.
    - The United Nations' flagship report, "Water for Prosperity and Peace," underscores the significance of water management.
6. **Water Diplomacy**:
    - Improved cooperation and universal principles of International Water Law are crucial.
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    - Addressing climate change-related pressures is essential for sustainable water management.

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    - Addressing climate change-related pressures is essential for sustainable water management.
13. **Cross-Border Water Governance**:
    - Effective and equitable water allocation among nations sharing water resources is vital.
    - Sophisticated governance models are necessary for shared rivers and transboundary waters.
14. **Global Water Challenges**:
    - The worsening water pollution in major rivers like the Meghna, Brahmaputra, Ganga, and Indus necessitates international collaboration.

In conclusion, with these interventions, it's possible to tackle water scarcity, improve water quality, and promote cooperation, ensuring water becomes a force for peace and prosperity.

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Critical minirals in Africa

Platinum Group Metals (PGMs):

- PGMs are crucial for decarbonizing heavy transport and industry.
- Platinum, iridium, and palladium are key for green hydrogen adoption and decarbonization of difficult sectors like heavy transport and heating.
- Platinum and iridium are essential for catalysts in Proton Exchange Membrane (PEM) technology used in hydrogen fuel production.
- Africa holds over 90% of global PGM reserves, primarily in South Africa.
    - South Africa is a major producer, accounting for over 70% of global platinum production and over 80% of global iridium production between 2016 and 2020.
    - Zimbabwe was the world's third-largest producer of platinum and the second-largest producer of iridium during the same period.

These critical minerals are indispensable for achieving clean energy goals and economic development, emphasizing the importance of sustainable extraction and collaboration between nations to ensure access to these resources for a clean and prosperous future.

Manganese (Mn):

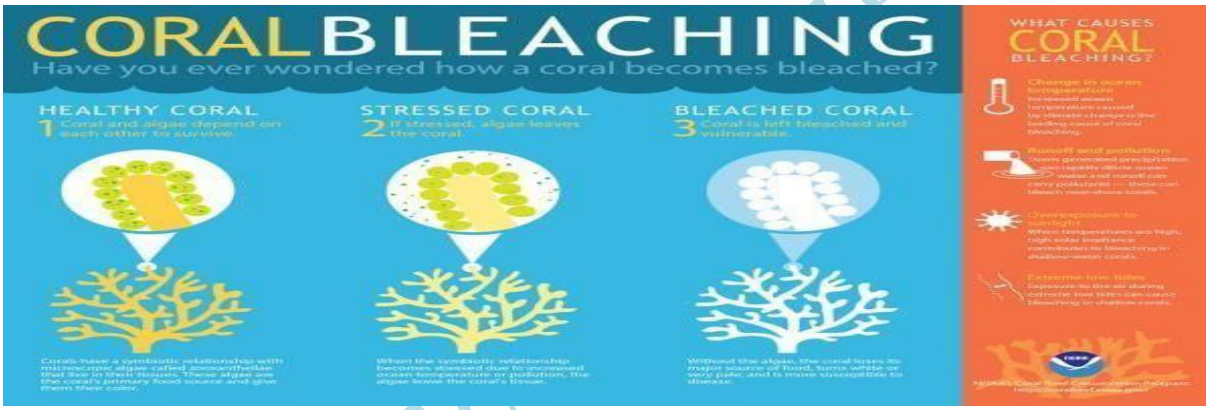
- African manganese is essential for concentrated solar power.
- Manganese production is prominent in African countries such as Côte d'Ivoire, Gabon, Ghana, and South Africa.
- South Africa and Gabon are major producers, with South Africa being the world's largest manganese producer.

The clean energy transition necessitates significant amounts of critical minerals essential for manufacturing clean energy technologies such as solar panels, wind turbines, electric vehicles, battery storage, hydrogen electrolyzers, and fuel cells. These minerals are also crucial for various applications in defense, ICT, pharmaceutical industries, and are key to achieving economy-wide decarbonization objectives, particularly in the transport and industrial sectors.

While the EU, the United States, and China have committed to reaching net-zero emissions by 2050 and 2060 respectively, Africa possesses substantial reserves of critical minerals including bauxite, chromium, cobalt, copper, gold, iron, lithium, manganese, platinum, and uranium.

Can 'good sounds' help coral islands recover from bleaching?

- **Corals have a symbiotic relationship with algae called zooxanthellae. When the temperature of water rises, corals expel zooxanthellae.**
- **An important visual symptom of these effects is that the colour of the coral reef changes, and they die off. This event is called bleaching**
- **Coral reefs are dying due to warming. The U.S. lost half its reefs in the Caribbean in one year in 2005 due to a large-scale bleaching event.**
- **When data of the region was collated, it confirmed that the 2005 event exerted more thermal stress than those in the previous 20 years combined**



What are Coral reefs?

- Corals **are marine invertebrates or animals not possessing a spine.**
- **Each coral is called a polyp** and thousands of such polyps live together to form a colony, which grows when polyps multiply to make copies of themselves.
- **Corals share a symbiotic relationship with single-celled algae called zooxanthellae.**
- The algae provides the coral with **food and nutrients,** which they make through photosynthesis, using the sun's light.
- In turn, the corals give the algae a home and key nutrients. The zooxanthellae also give corals their bright colour.
- **Australia's Great Barrier Reef** is the world's largest reef system stretching across 2,300 km.
    - It hosts 400 different types of coral, gives shelter to 1,500 species of fish and 4,000 types of mollusc.

DO YOU KNOW?

- Coral Bleaching happens when corals experience stress in their environment due to changes in temperature, pollution or high levels of ocean acidity.
- Under stressed conditions, the zooxanthellae or food-producing algae living inside coral polyps start producing reactive oxygen species, which are not beneficial to the corals.
- So, the corals expel the colour-giving zooxanthellae from their polyps, which exposes their pale white exoskeleton, giving the corals a bleached appearance.
- This also ends the symbiotic relationship that helps the corals to survive and grow.

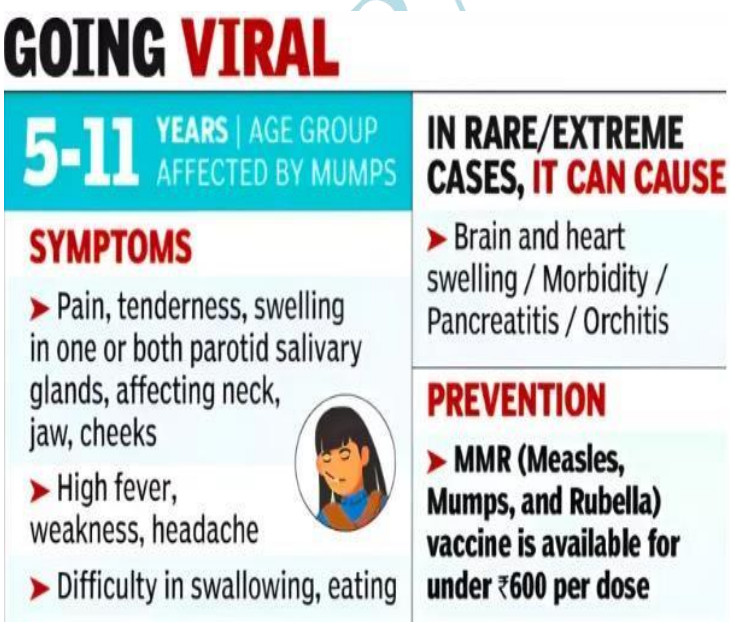
ABEL PRIZE

- **The Abel Prize for 2024 has been awarded to French mathematician Michael Talagrand for "contributions to probability theory and functional analysis, with outstanding applications in mathematical physics and statistics".**
- **Every year, the King of Norway awards the Abel Prize to at least one scholar who has made a significant contribution to mathematics.**
- **The Government of Norway has been presenting the prize since 2003, and has modelled it after the Nobel Prizes, awarded in neighbouring Sweden, including a cash prize of 9 million Norwegian kroner (approximately Rs 7 crore) for the laureates.**
- **.This said, the idea for the prize was first floated back in 1899, after the Norwegian mathematician Marius Sophus Lie found out that Alfred Nobel's will didn't include a prize for mathematics.**
- **The year 1899 was also the birth centenary of Niels Hendrik Abel, a famous Norwegian mathematician after whom the prize came to be named**
- **The Poza de la Becerra, a geological anomaly in the Cuatro Cienegas wetland in the Chihuahuan.**

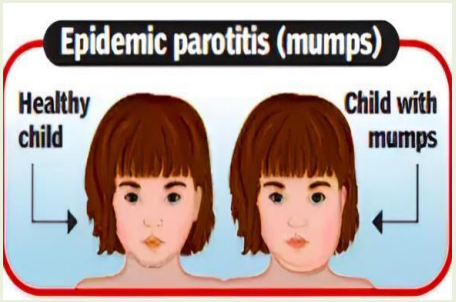
Mumps in Kerala

Mumps, an acute viral infection which historically affects children, has been spreading like wildfire in Kerala, for the past few months.

Despite being a vaccine-preventable disease, mumps has never been a part of the Universal Immunisation Programme



Mumps is caused by **the paramyxovirus.**
It transmits through close contact or airborne droplets from the respiratory system of an infected individual



(UIP) because of the disease's no-mortality profile and the perception that it has low public health significance. According to the World Health Organization (WHO), vaccination strategies targeting mumps control should be closely integrated with existing measlese limination and rubella control..

What are the new rules for elephant transfers?

- **The Centre has notified a set of rules called the Captive Elephant (Transfer orTransport) Rules, 2024 that liberalises the conditions under which elephants may be transferred within or between States that are the rules around the transfer and transport of elephants?**
- **Elephants are, according to the provisions of the Wildlife Protection Act, a Schedule 1 species and therefore, be it wild or captive,**
- **cannot be captured or traded under any circumstances.**
- **Section 12 of the Act allows Schedule I animals to be translocated for 'special purposes' such as education and scientific research.**
- **They can also be translocated for population management of wildlife without harming any wild animal and collection of specimens for recognised zoos/museums.]**
- **strict rules guide the transfer of such elephants. Section 40 (2) of the Wildlife Protection Act, 1972 prohibits the acquisition, possession and transfer of a captive elephant without the written permission of the Chief Wildlife Warden of the State.**
  - **Until 2021, however, these laws explicitly said that such transactions ought not to be of a 'commercial nature'.**
  - **The Environment Ministry in 2021 brought in an amendment that allowed the transfer of elephants for 'religious or any other purposes'.**
  - **Such a broad interpretation, activists and researchers said, could accelerate trafficking and illegal commercial transactions.**
  - **What do the updated rules say?**

    These rules provide new relaxations under which captive elephants can change owners or be transferred.

These include, for instance, situations when an owner is no longer in a position to maintain the elephant or when a state's Chief Wildlife Warden "deems it fit and proper"to transfer the elephant.

Vaccine and Immunity

- **Post-vaccination immunity develops in a complex process.**
- **In the fundamental immunological mechanism, our lymph nodes first produce the memory B cells that confer long-term protection against a disease. These cells 'memorise' the antigen the vaccine has delivered. In future, when a foreign object like a virus enters the body bearing the same antigen, the**
- **B cells will trigger the production of a large number of potent antibodies to destroy it, removing the infection.**
- **These memory B cells require T cell support, and only vaccines that stimulate T cells can also induce the body to produce them.**
- **Further, not all vaccines – including the polysaccharide typhoid and the pneumococcal vaccines – prompt the body to make B cells.**
- **In some cases, frequent boosters are required to enhance the duration of immunity the cells confer, ranging from six months to a few years.**
- **Also, vaccines trigger the production of memory B cells to different degrees, plus having memory B cells alone does not guarantee protection.**
- **Another essential immune cell, called long-lasting plasma cell (LLPC), migrates from the lymph node to the bone**
- **marrow and may endure for decades. LLPCs are the main immunological factor in vaccine-induced immunity.**
- **Every vaccine tries to create long lasting plasma cells for lifelong protection, a.k.a. the immunology 'holy grail'.**
- **The measles and rubella vaccines produce these cells in the bone marrow. However, some potent vaccines, such as the mRNA COVID- 19 shots, fail to activate these cells in the bone marrow. To provide long-term protection, then, vaccines must generate memory B cells and LLPCs in the bone marrow.**

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Explaining the disparity in durability

Recent Economic Growth Trajectory of India:

- **FY 2022/23:**

1. Real GDP expanded by an estimated 6.9%.
2. Driven by robust domestic demand, increased investment in infrastructure, and strong private consumption.

- **FY 2023/24:**

1. Real GDP growth estimated at 7.3%.
2. India ranked 5th in the world's GDP rankings in 2024.
3. Economy valued at $3.7 trillion, significant growth from a decade ago.

Future Prospects:

- Indian economy poised to hit $7.3 trillion by 2030 and $10 trillion by 2035.
- Ambitious target set by the Indian government to transform India into a 'developed country.

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- **Income Inequality:**

1. Top 10% holds 57% of total national income.
2. Top 1% holds 22% of total national income.
3. Share of the bottom 50% has decreased to 13%.

- **Tax Burden on Poor:**

1. Bottom 50% contributes 64% of GST revenue.
2. Top 10% contributes only 4%.

- **Healthcare Access:**

1. 63 million Indians are pushed into poverty annually due to healthcare costs.
2. 74% of the population cannot afford a healthy diet.
3. Child-wasting rate stands at 18.7, the highest in the report.

- **Food Security and Nutrition:**

1. 74% of the population cannot afford a healthy diet.
2. 39% fall short of a nutrient-adequate diet.

- **Gender Inequality:**

1. India ranked 127 out of 146 countries in the Global Gender Gap Report.
2. "Missing women" phenomenon in the workforce.

Addressing these inequality trends is crucial for ensuring that the benefits of economic growth are distributed more equitably across Indian society.

El Nino impact leaves Malawi and region on the edge of a hunger crisis

Context:

- **Malawi** has declared a **state of disaster** due to **severe drought conditions** affecting 23 of its 28 districts. The country's President has announced an **urgent need for over $200 million in humanitarian assistance** to address the crisis.

Regional Impact:

- This announcement follows a similar appeal from **Zambia**, and **Zimbabwe** is also considering **declaring a drought disaster**.

- These developments come amid warnings from the **U.N. World Food Programme (WFP)** about a **potential hunger crisis** in **southern Africa,** driven by the **El Niño weather phenomenon** and **one of the driest spells in decades**.

What are semiconductors?

- Any of a class of crystalline solids intermediate in electrical conductivity between a conductor and an insulator.
- Semiconductors are employed in the manufacture of various kinds of electronic devices, including diodes, transistors, and integrated circuits. Such devices have found wide application because of their compactness, reliability, power efficiency, and low cost.
- As discrete components, they have found use in power devices, optical sensors, and light emitters, including solid-state lasers.

Semiconductor industry in India

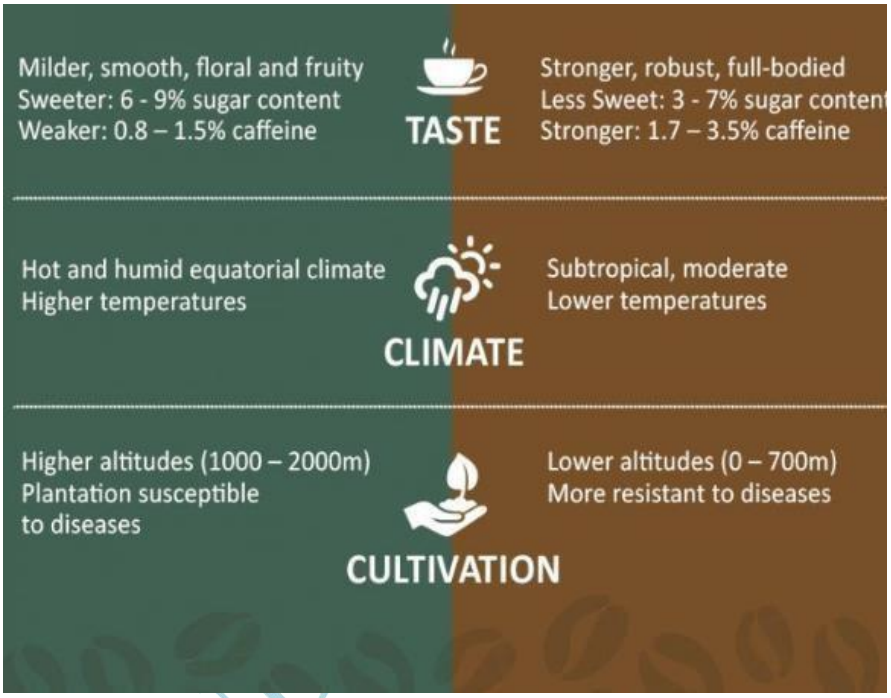
- The semiconductor industry is divided into fables, which deal with the designing and fabrication part, also called the semiconductor foundry, where the final microchip is manufactured.
- Within semiconductor design, there is very large-scale integration (VLSI) design, embedded software, and electronic design automation (EDA).
- According to the India Electronics and Semiconductor Association (IESA), semiconductor consumption in India was worth US$21 billion in 2019, growing at a rate of 15.1 percent.

India has seen growth in consumer electronics as a business and market, especially in the past 10 years.

- TVs and music systems, and a growing awareness/ need for white goods seeded the initial growth in the 1970s and phones in the 1980s and 1990s.
- The past decade has seen a growing demand and market for smartphones, intelligent vehicles, renewable energy (especially solar photo-voltaic), solid-state lighting (LEDs), electronics in the healthcare sector, tablets, increasingly sophisticated displays, etc.
- Local electronics consumption is expected to touch US$ 400 billion by 2020, which translates into a chip market of between US$ 50 billion and US$ 60 billion.
- Over the last two years, chip consumption has increased by 61.44 percent to US$ 8.25 billion.

Robusta Coffee

BBB Robusta Coffee farmers in South India are celebrating as their produce fetches an ***all-time high price***.
The farmgate price of raw Robusta coffee berries ***reached ₹172 per kilogram (kg)*** in the Wayanad market, a significant increase from ₹115 per kg last year.



Coffee Cultivation in India

- The coffee cultivation in India began with the planting of 7 seeds of coffee during 1600 AD by saint ***Baba Budan***, in the courtyard of his hermitage in Chikmagalur, Karnataka.
- Commercial plantations of coffee started in the 18th century under British entrepreneurship.
- Today, India is among the ***top 10 coffee-producing countries***, with about 3% of the global output.

Climatic conditions required for coffee production

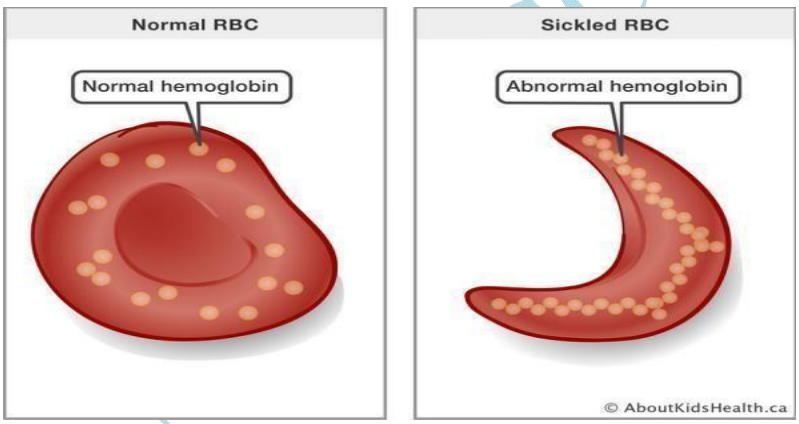
- It requires a hot and humid climate for its growth.
- Temperatures ranging between 15°C and 28 °C
- **Rainfall:** 150 to 250 cm.
- **Soil: Well-drained, loamy soil** containing a good deal of humus and minerals like iron and calcium are ideal for coffee cultivation.
- It is generally grown under shady trees.
- Dry weather is necessary at the time of ripening of the berries.
- It is grown on hill slopes at elevations from 600 to 1,600 metres above sea level.

Sickle cell Anaemia

An inherited haemoglobin disorder in which red blood cells (RBCs) become crescent or sickle-shaped due to a genetic mutation.

These RBCs are rigid and impair circulation, often leading to anaemia, organ damage, severe and episodic pain, and premature death.

India has the third highest number of SCD births, after Nigeria and the Democratic Republic of the Congo.



- **In 2023, the Government of India launched the National Sickle Cell Anaemia Elimination Mission, to eliminate SCD by 2047. At present, however, treatment and care for SCD remains grossly inadequate and inaccessible.**
- **States with a high prevalence of SCD, particularly among their most Marginalised populations are falling behind in their efforts to reach out and provide basic care to those affected. Blood transfusion is another important therapy for SCD, but its availability is limited to district-level facilities.**
- **Bone marrow transplantation (BMT), until recently the other cure for SCD, is out of reach for most SCD patients due to the difficulty in finding matched donors, the high cost of the treatment at private facilities, and long waiting times in public hospitals.**
- **Access to and equity of CRISPR In light of this, the application of the gene-editing technology called CRISPR (short for 'Clustered Regularly**
- **Interspaced Short Palindromic Repeats') to treat SCD is important for its novelty and promise but also for the health disparities it makes apparent.**
- **Lyfgenia, to treat SCD in people ages 12 and older. Casgevy, developed by Vertex**

Pharmaceuticals and CRISPR

- **Therapeutics and also approved in the U.K., is the first CRISPR-based therapy to have received regulatory approval in the U.S. Lyf Genia, manufactured by Bluebird Bio, doesn't use CRISPR but depends on a viral vector to change blood stem-cells**
- **Both treatments entail collecting a patient's blood stem-cells, modifying**
- **them, and administering high-dose jk, stem cell transplant.**
- **The treatments are expected to take up to a year and require several hospital visits**

Crispr and SCA in india

In India, CRISPR's possible medical applications also pose ethical and legal quandaries.

The National Guidelines for Stem Cell Research 2017 prohibit the

commercialisation of stem cell therapies and allow the use of stem cells only for clinical trials, except for BMT for SCD. Gene editing stem cells is allowed only for in-vitro studies.

The Guidelines also encourage (but don't mandate) the sharing of Financial benefits resulting from the commercialisation of stem cell products with the donor or communit

Further, the National Guidelines for Gene Therapy Product Development and Clinical Trials 2019 provide guidelines for the development and clinical trials of gene therapies for inherited genetic disorders. India has approved a five-year project to develop CRISPR for sickle cell anaemia. Under its Sickle Cell Anaemia Mission, the Council of Scientific and Industrial Research is developing gene- editing therapies for SCD.

Curb black carbon emissions

At the COP26 climate talks in Glasgow in November 2021, India pledged to achieve net-zero emissions by 2070, positioning itself as a frontrunner in the race to carbon neutrality.

AI FOR MENTAL HEALTH

- **We live in a world where therapy is a text away.**
- **Natural language processing (NLP), a branch of Artificial Intelligence (AI), enables computers to understand and interpret human language that mirrors human comprehension.**
- **In mental healthcare, we are already seeing a rapid evolution of use cases for AI with affordable access to therapy and better support for clinicians.**
- **Through text-based platforms and virtual mental health assistants, NLP programs provide privacy and anonymity that can improve help-seeking behaviour.**
- **For users, the chatbot can support them in reframing thoughts, validating**
- **emotions and providing personalised care, especially in the absence of human support.**
  - **Not only is this beneficial when a therapist is not accessible, but it also helps improve patient health outcomes just as well as in-person care.**
- **Mental health treatment requires continuity of care to take a more holistic approach and reduce instances of relapse Mental health illnesses have complex causes of origin, making it difficult to design a straightforward protocol or make a quick and accurate diagnosis. By using vast datasets, AI tools can help summarise information including clinical notes, patient conversations, neuroimages, and genetic information**

- Natural Language Processing (NLP) is a field of artificial intelligence (AI) and computational linguistics that focuses on the interaction between computers and humans through natural language.
- The goal of NLP is to enable computers to understand, interpret, and generate human language in a way that is both meaningful and useful.

Mojor cause of Migrant Death

- **Drowning had been the biggest cause of recorded migrant deaths over the past 10 years, the UN's migration agency said on Tuesday.**
- **Of the 64,000 migrant deaths recorded by thUN's International Organization for Migration(IOM) over the last decade, nearly 60% were linked to drowning.**
- **Of those deaths at sea, over 27,000 occurred in the Mediterranean, a route followed over the years by many migrants trying to reach southern Europe from northern Africa.**
- **The ninth meeting of the Intergovernmental Negotiating Body (INB), the final leg of negotiations for the 30-page World Health Organization (WHO) Pandemic Agreement, commenced last week (March 18).**
- **This is the most momentous time in global health since 1948. The key features**
- **The WHO Pandemic Agreement aims to address the systemic failures revealed by the COVID-19 crisis, with the goal of strengthening global defences and averting future pandemics from spiralling into catastrophic human crisis.**
- **The world's first pandemic treaty aims to "strengthen pandemic prevention, preparedness and response" with "equity as the goal and outcome".**
- **It addresses the searing inequity witnessed during the COVID-19 pandemic including a lack of preparedness in countries and the lack of coordination at international levels. The draft negotiating text covers several issues, that includes pathogen surveillance, health-care workforce capacity, supply chain and logistics, and tech transfer to support the production of vaccines, diagnostic tests and treatments, and the waivers of intellectual property (IP) rights. It seeks to strengthen surveillance for pathogens with "pandemic potential". The Agreement requires countries to also commit to better managing antimicrobial resistance, strengthening their health systems and sanitation, and making progress toward universal health coverage countries to report health emergencies within their borders.**
- **There is a significant emphasis throughout the text on equitable access to medical products.**
- **The current negotiating texts have also proposed an establishment of the Conference of Parties (COP) to oversee the implementation of the Pandemic Agreement. The proposed establishment of a COP suggests that the Agreement could be a classic international treaty adopted under Article 19 of the WHO Constitution as opposed to the alternative Article 21 opt-out regulation**
- **The most contentious aspect of the Agreement, essentially between developing countries, and others, mostly developed countries and some stakeholders, lies in the establishment of a global system for sharing pathogens and their genetic codes, while ensuring equitable access to the 'benefits' derived from research, including vaccines.**

- **Developing countries are hesitant to share information on pathogen spread and evolution if they perceive little in return, a situation exacerbated during the COVID 19 pandemic by "vaccine nationalism".**

- **To address this issue, the current draft of the Agreement proposes a quid pro quo mechanism, formally titled the WHO Pathogen Access and Benefit-Sharing (PABS) System that compels countries to share genome sequence information and samples with WHO-coordinated networks and databases.**

- **In return for access to these data, manufacturers of diagnostics, therapeutics, and vaccines will be required to provide 10% of their products free of charge and 10% at not-for-profit prices.**

- **The challenge of global governance, enforcement, and accountability is the second major sticking point of the Agreement negotiations. Without adequate accountability and enforcement mechanisms built into the Agreement, the whole endeavour is merely an exercise in symbolism**

Digital Markets Act (DMA).

- **The European Commission has launched non compliance investigations against tech giants such as Apple, Meta, Google's parent Alphabet, and Amazon to ensure fair and contestable markets in the digital sector, as per the**

- **provisions of the Digital Markets Act (DMA). The investigations focus on alleged violations related to steering customers to in-house services, ranking practices in marketplaces, and compliance with DMA obligations.**

- **The Commission assessed mandatory compliance reports and gathered stakeholder feedback before launching investigations, expressing concerns about compliance with DMA provisions by Alphabet, Apple, and Meta**

What is the DMA about?

- **The Digital Markets Act is the EU's law to make the markets in the digital sector fairer and more contestable.**

- **In order to do so, the Digital Markets Act ("DMA") establishes a set of clearly defined objective criteria to identify "gatekeepers". Gatekeepers are large digital platforms providing so called core platform services, such as online search engines, app stores, and**

messenger services. Gatekeepers will have to comply with the do's (i.e. obligations) and don'ts (i.e. prohibitions) listed in the DMA. The DMA is one of the first regulatory tools to comprehensively regulate the gatekeeper power of the largest digital companies. The DMA complements, but does not change EU competition rules, which continue to apply fully.

Measuring internet freedom in India

- **India has consistently topped the global list of countries imposing internet bans, with approximately 60% of all recorded blackouts worldwide.**
- **Shutdowns have been implemented citing reasons such as national security and threats to public order.**
- **Indian States and Union Territories can impose shutdowns only in cases of a 'public emergency' or in the interest of 'public safety,' as per the Indian Telegraph Act. .**
- **However, the law lacks clear definitions for what constitutes an emergency or safety issue.**
- **Global Internet freedom has declined for the 13th consecutive year, and the environment for human rights online has deteriorated in 29 countries, according to thelatest Freedom House report**
- **India's ranking has hovered around the same benchmark in the last three years. This is a dip from 2016 and 2017, when India scored 59 points, to 50 points in 2023**
- **China sends glacier water from Tibet to climate-hit Maldives- China has sent more than a million bottles of water from melting Tibetan glaciers to the Maldives, a gift from the world's highest mountains to a low-lying archipelago threatened by rising seas.**
- **The Indian Ocean nation of 1,192 tiny coral islands is on the frontlines of the climate crisis, with salt levels seeping into the land and corrupting potable water, leaving it dependent on desalination plants. Scientists say glaciers in the Himalayas are melting faster than ever due to climate change.**
- **The United Nations: The Intergovernmental Panel on Climate Change (IPCC) warned in 2007 that rises of 18 cm-59 cm would make the Maldives virtually uninhabitable by the end of the century.**
- **Maldives president promises his country — 80% of which is less than a metre (three feet) above sea level — will beat back the waves through ambitious land reclamation and building islands higher**

What is the Kunming Montreal GBF?

Framework was adopted during the 15th meeting of the Conference of the Parties to the UN Convention on Biological Diversity in December 2022 following a four-year consultation and negotiation process. It claims to support the achievement of sustainable development goals and build on previous strategic plans, paving "an

ambitious pathway to reach the global vision of a world living in harmony with nature by 2050."

Accordingly, four goals were set for 2050 and 23 targets for 2030 toward planning, monitoring, reporting and reviewing implementation, organising finance, and drawing up strategies for capacity development, technical and scientific cooperation, and an agreement on digital sequence information on genetic

resources.

In adopting the GBF, all parties have committees to set national targets to implement it.Target 3 of the Kunming-Montreal GBF, which aims to "increase terrestrial, inland water, and of coastal and marine areas, especially areas of particular importance for biodiversity and

ecosystem functions and services" to at least 30% of the world's terrestrial area. At present, protected areas (PAs) cover about 16%.

What are its implications?

goals of the GBF tilt the scale in favour of corporate houses eyeing forest resources at the expense of the

indigenous communities living with nature.

Indigenous peoples have been denied the right to housing, health, education, electricity, and security in Indonesia's Ujung Kulon National Park .

.What would GBF mean for India?

About 84% of India's national parks (89 out of a total of 106) were established in areas inhabited by the indigenous peoples and meeting the GBF targets will threaten their existence, the activists said.

For instance, the initiative to upgrade the Kumbhalgarh Wildlife Sanctuary in Rajasthan to a tiger reserve will affect 162 tribal villages located inside and outside the sanctuary while the expansion of the Nauradehi

Sanctuary in Madhya Pradesh is set to affect 62 villages of mostly tribal people.

In Assam, the June 19, 2022, notification for the Barak Bhuban Wildlife Sanctuary will affect the indigenous groups.

The gazette notification states that the sanctuary "is free from encroachment as per record, there are no rights and concessions of any person in the area" but the Khasis possess documents showing they have been living in the area since 1914

"hypoxic pockets"

Using a bioluminescent oxygen indicator, scientists discovered a spontaneous, spatially dened occurrence of "hypoxic pockets" in the mouse brain.

Their technique offers a way to learn more about brain oxygen tension (pO2), a measure of oxygen delivery and demand in brain tissue that changes dynamically but is not well understood.

m pox vaccine

Scientists have made new discoveries about the effectiveness of four vaccines for the mpox virus — and have uncovered potential signs of immune activity that correlate with protection.

Mpox (formerly known as monkeypox) is a viral disease caused by infection with the monkeypox virus.

Monkeypox virus is part of the same family of viruses as variola virus, the virus that causes smallpox.

Mpox is rarely fatal and its symptoms are similar to smallpox, but milder. Mpox is not

related to chickenpox.

Mpox is a zoonotic disease, meaning it can be spread between animals and people. It isendemic
(found naturally) in regions of central and west Africa. Monkeypox virus has been foundin small rodents, monkeys, and other mammals that live in these areas

Sandalwood.

- **Sandalwood roots form a haustorium that forms an octopus-like hold on the host tree's roots, from where water and nutrients are taken. one seed inside is a hard, dry kernel, notthe usual tough seed coat protecting a fleshy interior.**
- **This makes it difficult for the seed to survive beyond one season.**
- **Both the above properties - the need for other trees in the early growth phase, and the seeds, which are short-lived and cannot be stored, have added to the overexploited tree's difficulties.**
- **This has led to a drastic fall in the number of sandalwood trees in the forests of South India. The IUCN has classified sandalwood as a vulnerable species.**
- **It is not surprising that Australia is now the world's largest supplier of sandalwood and its oil..**
- **Asian Koel, and the Gray Hornbill swallow the fruit whole, and over time drop the seeds at great distances from the tree they feasted on. These birds are among India's larger frugivores, or eaters of fruit. The sandalwood tree's fruit is just right for the koels and hornbills.**

Osmopriming

- **Kerala Agricultural University in Thrissur, working with European colleagues have triedvarious ways of priming sandalwood seeds for germination (Forests, 14:1076, 2023).**
- **Best results were obtained when they soaked freshly collected sandalwood tree seeds in a 5% solution of polyethylene glycol-6000 for two days.**
- **This interesting synthetic substance induces osmotic pressure on the cells of the seed and pushes termination process forward. This is called osmopriming Statins , bad cholesteroland**

Cardiovascular disease. They work by blocking the activity of an enzymet involved in the metabolic pathway that produces LDL, or "bad", cholesterol. Statins are on the World Health Organization's list of essential medicines and among the most sold drugs worldwide. However, many studieshave found statins could increase the risk of developing diabetes. pre-diabetes (also known as frank diabetes): an impaired state (impaired fasting glucose - IFG - or impaired glucose tolerance - IGT) in which theser markers are altered toward the level of diabetes.

Black carbon

According to the Ministry of New and Renewable Energy, India had installed a renewable energy capacity of over 180 GW by 2023 and is expected to meet its target of 500 GW by 2030.

- **carbon is the dark, sooty material emitted alongside other pollutants when**
- **biomass and fossil fuels are not fully combusted.**
- **It contributes to global warming and poses severe risks.**
- **Studies have found a direct link between exposure to black carbon and a higher risk of heart disease, birth complications, and premature death.**
- **Most black carbon emissions in India arise from burning biomass, such as cow dung or straw, in traditional cookstoves.**
- **According to a 2016 study, the residential sector contributes 47% of India's total black carbon emissions. Industries contribute a further 22%, diesel vehicles h 17%, open burning 12%, and other sources 2%. Further, the National Guidelines for Gene Therapy Product Development and Clinical Trials 2019 provide guidelines for the development and clinical trials of gene therapies for inherited genetic disorders. India has approved a five-year project to develop CRISPR for sickle Cell anaemia. Under its SickleCell Anaemia Mission, the Council of Scientific and Industrial Research is developing gene- editing therapies for SC**